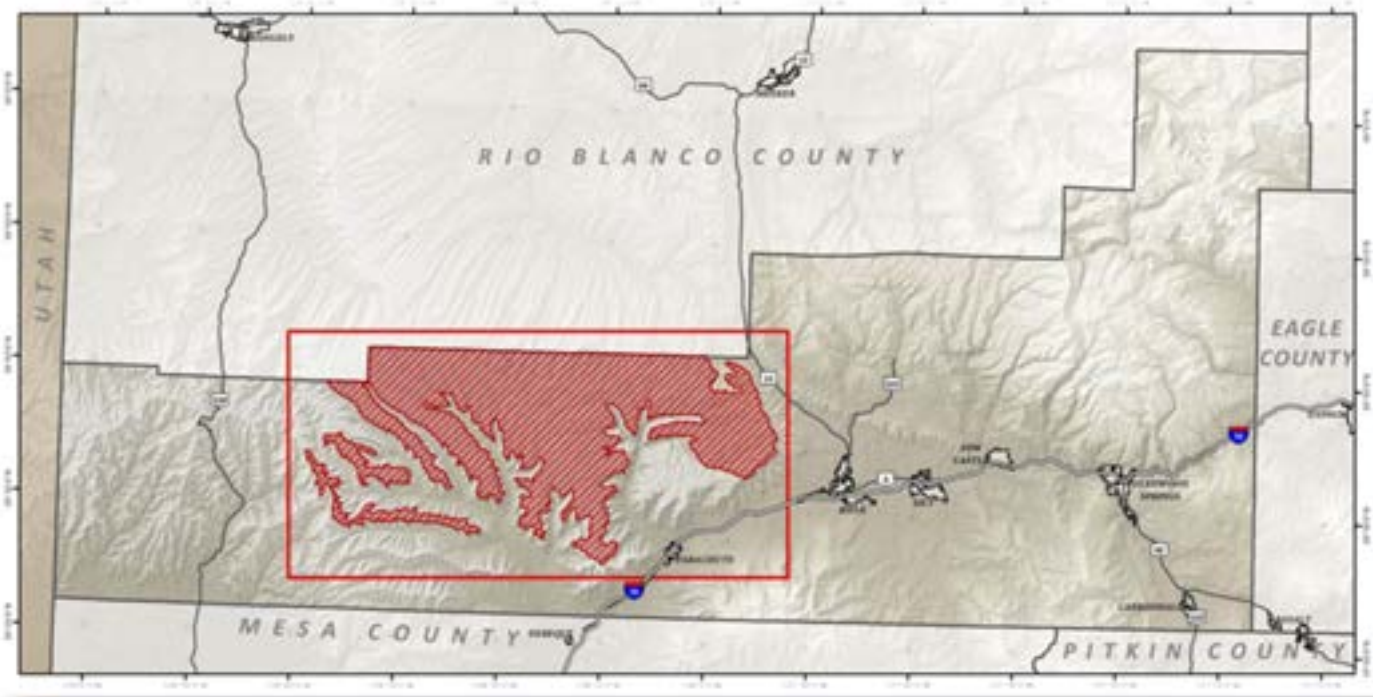
Comments on the BLM's NW Colorado Greater Sage Grouse Draft Resource Management Plan and Final Environmental Impact Statement

May 13, 2015



Prepared and Submitted by the Garfield County Board of County Commissioners

Commissioner John Martin, Chairman
Commissioner Tom Jankovsky
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Garfield County

May 13, 2015

Ruth Welch, State Director
Bureau of Land Management
Colorado State Office
2850 Youngfield Street
Lakewood, Colorado 80215-7210

[Hand Delivered]

Re: Garfield County Comments concerning the BLM's Northwest Colorado Greater Sage-Grouse Draft Resource Management Plan and Final Environmental Impact Statement (FEIS)

Dear Ms. Welch,

Thank you for the opportunity to comment on the Bureau of Land Management's ("BLM") and USDA Forest Service's ("USFS") Northwest Colorado Greater Sage-Grouse Land Use Plan Amendment and Final Environmental Impact Statement ("FEIS"). This letter and supporting documents attached are exhibits comprising Garfield County's (the County) formal comments.

While the County appreciates the ability to provide the BLM with formal comments on such an important issue, we are dismayed that the BLM only provided 10 working days for Cooperating Agencies to respond to such a large document that contains radically new and different information not previously disclosed during any of the Cooperating Agency meetings in the development of the alternatives in the Draft EIS. As a result, we believe the BLM presents us with an unrealistic and disingenuous review process having the effect of precluding meaningful Cooperating Agency comments. Nonetheless, we offer these comments and supporting documentation within the required timeframe. Since the direction provided by the BLM to review this FEIS states that the bulk of the DEIS remains unchanged with the exception of the new national language provided by BLM leadership in Washington DC, the County reiterates and resubmits our original comments[1] on the Draft Environmental Impact Statement (DEIS) herewith including a wide variety of additional comments and supporting documentation that reinforces points provided in this letter. Garfield County's overriding concern remains the fact, as these comments will demonstrate, that the BLM

[1] *See* Garfield County comments on the BLM's NW Colorado Greater Sage Grouse Draft Resource Management Plan and Draft EIS, December 2, 2013 and resubmitted with Data Quality Act Challenge, April 9, 2015 attached as Exhibits T, X, Z, AA, and BB.

did not coordinate their efforts and policies in the FEIS with local plans including the Garfield County Greater Sage Grouse Conservation Plan, as amended. As a result, there continue to be significant inconsistencies between provisions in the FEIS and Garfield County's Plan that remain unresolved despite the sincere efforts by Garfield County to seek resolution.

By way of background, the County participated as a Cooperating Agency via a Memorandum of Understanding as the BLM crafted the four alternatives in the DEIS prior to its public release. Additionally, the County asserted Coordination with state and federal agencies[2] and hosted four formal Coordination[3] meetings with a variety of state and federal agencies including the BLM. The purpose of these Coordination meetings was to provide a forum to attempt to point out and resolve inconsistencies between the BLM's planning efforts and local efforts by Garfield County, specifically including the ***Garfield County Greater Sage-Grouse Conservation Plan***[4] and the ***Greater Sage-Grouse Conservation Plan: Parachute – Piceance – Roan***.[5] Unfortunately, despite the County's sincere efforts to work closely with the BLM, these inconsistencies between the BLM's FEIS and the County's local and regional land use plans remain unresolved.

As you know, we continue to have serious concerns that BLM and the USFS have violated the National Environmental Policy Act ("NEPA").[6] Garfield County, Moffat County, Jackson County, Routt County and others have raised grave concerns about the integrity of this process from the very beginning.[7] Unfortunately, from our review of the FEIS, virtually nothing has been done to address these concerns. That the Cooperators have only days to review and comment on this FEIS of approximately 2,000 pages is unacceptable and indicative of the agencies' continued top-down approach. The management restrictions and closures in the FEIS will have a direct impact on the economy and the future viability of Garfield County and its citizens in the planning area and beyond.

At the release of the FEIS to Cooperating Agencies on April 29, 2015, the BLM provided direction to Cooperating Agencies to focus our comments on the new information that was provided in the form of "national language" from Washington DC. Again, while we do not have the time or resources to provide in-depth comments truly required, we do offer the following comments.

1. NSO in PHMA without waiver or modification for unleased fluid minerals: This illustrates the arbitrary one-size-fits-all concept at its best and does nothing to incorporate / understand local ecological site variability or addresses specific threats as required by the IM 2012-044.

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[2] *See* Resolution 2012-51 Asserting Coordination Regarding the Greater Sage Grouse with All Federal and State Agencies maintaining Jurisdiction Over Lands And/ Or Resources Located Within Garfield County attached as Exhibit E

[3] *See* Official Transcripts for Coordination meetings held by Garfield County attached as Exhibits G, I, J, and N.

[4] *See* Garfield County Greater Sage Grouse Conservation Plan, as amended, November 17, 2014 attached as Exhibit V.

[5] *See* Greater Sage Grouse Conservation Plan: Parachute – Piceance – Roan Working Group, April 29, 2008 attached as Exhibit A

[6] *See* 42 U.S.C. § 4321 et seq.

[7] *See* August 13, 2012 letter to BLM State Director Helen Hankins incorporated by reference herein as Exhibit H

2. We are deeply concerned over the new provision for unleased fluid minerals where exceptions to activity in NSO can only be granted by the unanimous approval of a three member panel consisting of the USFWS, BLM, and CPW. This effectively gives the USFWS veto power over a non-candidate species on BLM land and is unacceptable.

3. It appears that the new national language from Washington DC elevates the restrictions for GHMA the same as PHMAs without any scientific basis to do so. As a result, this is another primary example where the BLM has arbitrarily applied land use policy without the benefit or support of any scientific rationale for its basis.

4. Garfield County is very concerned by the exceptions granted by the BLM in this FEIS for two very large wind energy projects known as the TransWest and Energy Gateway South Transmission Line projects. The BLM admitted these projects were pet Presidential projects and therefore receive a "pass" from the provisions in the FEIS; however, their construction will result in immediately consuming all disturbance cap allowance space for Moffatt County without any due process and by executive fiat, that effectively eliminates any kind of alternative use including those which are less impactful and a less permanent resulting in long lasting socio-economic impacts to Moffatt County and Northwest Colorado.

   This policy exception in the FEIS indicates the BLM finds it acceptable to allow 1) the destruction of massive acres of sagebrush and 2) the installation of tall structures for transmission lines in Priority and General Habitat Management Areas for wind energy projects that the FEIS specifically prohibits. Oddly, natural gas exploration and development does not enjoy such as pass. Ironically, both of these actions are identified by the BLM and USFWS as primary threats to loss of habitat and species decline which supports the notion that there appears to be two separate standards for wildlife impacts driven by politics rather than science which have manifested in this FEIS. Garfield County believes this action by the federal government proves the very point that this FEIS process has been disingenuous from its inception with a forgone conclusion where national language from Washington DC presented at the eleventh hour would trump any local Cooperating Agency input across the west with no real focus on realistic conservation measures.

5. Garfield County is a Cooperating Agency in the Roan Plateau Resource Supplemental EIS (SEIS). We have been told by the BLM that the GRSG will not be analyzed in the Roan SEIS but the SEIS will be amended from the NW Colorado Sub-regional GRSG LUPA, and EIS, contrary to the statement on 1-4; line 26-31.

6. [Page 1-5, Line 6-11] Garfield County disagrees with the statement that the National Technical Team Report (NTT Report) provides the latest science and best biological judgement to assist in making management decisions relating to the GRSG. To the contrary, Garfield County supports the analysis in the NTT Data Quality Act Challenge[8] that raises serious questions about the scientific integrity of that Report such that it should not be used as the basis for Alternatives in the FEIS. Ultimately, the statement that the NTT 2011 report provides the latest science and best

[8] *See* BLM NTT Data Quality Act Challenge files with the BLM on March 18, 2015, attached as Exhibit Z.

biological judgment to assist in making management decisions relating to the GRSG is inconsistent with the findings of Garfield County and the policies in the Garfield County Sage Grouse Plan.

7. [Page 1-5, Line 12-14] Garfield County questions the accuracy of the habitat mapping for Garfield County as provided in the FEIS. As CPW and the BLM both explained to Garfield County[9], the mapping provided by CPW to the BLM is a Sensitive Wildlife Habitat map used for consultation purposes rather than a depiction of actual priority habitat. This Sensitive Wildlife Habitat map was generated from a 50,000 ft. viewpoint as testified by CPW in a Garfield County Coordination meeting on September 5, 2012.[10] Current mapping in the GRSG FEIS (notably all the mapping FEIS Figures that depict Priority and General Habitat as well as Linkage / Connectivity areas) is not the best available science and remains inconsistent with high-resolution and fully reproducible habitat mapping found in the Garfield County GRSG Conservation Plan[11] or in the peer reviewed manuscript used as the basis for habitat modeling in Garfield County.[12]

8. [Page 1-6, Line 24-33] The USGS "Conservation Buffer Distance Estimates for GRSG – A Review" as discussed in the Data Quality Act Challenge of the USGS Monograph Report[13] is inconsistent with Garfield County findings. Garfield County questions buffer distance estimates as they might apply to habitat in Garfield County which is naturally fragmented with wildly undulating and steep topography and vegetation type variability uncommon to the national (and typical) range. The BLM's science and application of buffers is inconsistent with findings in the Garfield County Plan.

9. [Page 1-8, Line 12-13] Garfield County is quite concerned about the Conservation Objectives Team Report (COT Report) and formally supported the Data Quality Challenge regarding the same.[14] Garfield County also questions the professional adequacy of the team members such that some are not GRSG biologists.

10. [Page 1-10, Line 17-18] Garfield County questions the Purpose and Need of the GRSG LUPA and the USFWS March, 2010 "warranted but precluded" ESA listing petition decision. Garfield County questions the non-transparent "sue and settlement agreement" with the plaintiffs and the USFWS. Garfield questions the USFWS population estimates and the model used regarding extinction prediction. The same points were raised in the Center for Environmental Science, Accuracy and Reliability report, "Science or Advocacy."[15]

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[9] *See* Letter to Mike King, Director, Colorado Department of Natural Resources, October 21, 2013 attached as Exhibit S.

[10] *See* Garfield County Coordination Meeting Official Transcript on September 5, 2013, lines 4-9, page 80, attached as Exhibit J.

[11] *See* Garfield County Greater Sage-Grouse Conservation Plan, as amended, November 17, 2015 attached as Exhibit V.

[12] *See* Use of Modeling in a Geographic Information System to Predict Greater Sage-Grouse Habitat, January 21, 2015, attached as Exhibit Y.

[13] *See* USGS Monograph Report Data Quality Act Challenge filed with the USGS on March 18, 2015, attached as Exhibit BB.

[14] *See* USFWS Conservation Objectives Team Report Data Quality Act Challenge filed with the USFWS on March 18, 2015, attached as Exhibit AA.

[15] *See* Center for Environmental Science, Accuracy & Reliability's Report entitled, "Science or Advocacy" as a part of the Data Quality Act Challenge of the USGS Monograph filed with the USGS on March 18, 2015,

11. [Page 110, Line 24-26] GRSG populations in Garfield County and NW Colorado are not in decline. In fact, the PPR population which includes Garfield County shows a 112 percent increase since 2010 (High Male Count) in data from Colorado Parks and Wildlife (CPW).[16]

12. The FEIS (Section 13.5) is inconsistent with the Garfield County Plan in that the FEIS only addresses predation on sage grouse indirectly, through habitat management, whereas the Garfield County Plan and amendments address predation through specific cause and effect mechanisms, uses an approach similar to Integrated Pest Management (IPM) to mitigate predation, and seeks USDA guidance if it is determined that predation has a deleterious population-level effect on the PPR population.

13. [Page 1-31, Line 34-39] Unlike the FEIS, the Garfield County GSG Conservation Plan points out predation as a significant threat to Greater Sage Grouse survival. The FEIS appears to barely identify it as a threat of any kind to the GSG and suggests mitigation by removing tall structures to reduce predator perches and maintaining residual herbaceous cover to reduce predation during GRSG nesting and early brood-rearing. This approach is inconsistent with the policies provided in the Garfield County Plan which include a scientific basis supporting the serious nature of predation as a threat as well as management policies that are not addressed or considered in the FEIS. Specifically, the County's Plan policies contains the following that is inconsistent with the FEIS:

> ***Predation of sage-grouse eggs, juveniles, and adults occurs naturally, but can increase in association with human development, unless precautions are undertaken. Scientific research has shown that the predators on sage grouse are generalists, meaning that they prey on other species as well, and in some cases their populations are subsidized by human sources of food. Sage-grouse eggs are preyed upon by red foxes, coyotes, badgers, ravens, and (sometimes) black-billed magpies. Common predators of juvenile and adult sage-grouse include golden eagles, prairie falcons (as well as other raptors), coyotes, badgers, red fox and bobcats. Younger birds (especially broods), may be preyed upon by raven, red fox, northern harrier, ground squirrel, snakes, and weasels. However, of these predators, research has shown that ravens are the most abundant and have the greatest impact on the populations studied.***
>
> ***While predation on sage grouse occurs at all stages of the life cycle, it is predation on nests and broods that is generally recognized as having the largest deleterious effect on annual survivorship and recruitment in populations. Adding to this***

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attached as Exhibit BB Sub-Exhibit A and the Data Quality Act Challenges on both the COT Report and the USGS Monograph attached as Exhibits AA and BB

[16] *See* Garfield County graph entitled "How are the Greater Sage Grouse doing in Colorado & PPR (Garfield & Rio Blanco Counties)?" attached as Exhibit CC.

problem is the fact that predators, such as ravens, are subsidized by humans to the point where they exceed historic levels in some areas by as much as 1,500%. In such cases, management actions, especially where predators like ravens are abundant and sage-grouse mortality is high (such as in the Plan Area), may be needed to ensure that sage-grouse populations are not depressed by a known and potentially mitigated source of mortality.

Ravens are clever and highly adaptable in their behavior. They use communication and group foraging which allows them to opportunistically exploit food resources associated with humans (e.g., landfills, trash, road kill, unattended food, and carrion from livestock operations). In contrast, sage-grouse are very stereotypic in their behavior and rely on cryptic coloration, which makes them vulnerable to predation by ravens. As a result of these and other unintended food subsidies, raven populations have greatly expanded in the West. This, in turn, has impacted many species, including desert tortoises, marbled murrelets, least terns, California condors, and sage-grouse.

While reducing human-supplied food subsidies to predators is an essential part of any management strategy, it may not be effective unless coupled with active deterrents or management actions to reduce raven density (i.e., Coates and Delehanty 2010; Dinkins 2013). The last reported research on nest and brood survival in the PPR population (Apa 2010), estimated annual nest success between zero and 40%, and substantially lower chick survival. By the end of that study, "Only 2 chicks remained radio-marked after 30 days of age. Apparent brood survival was 86% (n = 12/14) at 7 days, 62% (n = 9/14) at 14 days, and 14% (n = 2/14) at 30 days." Those data indicate predation could be holding back the PPR population.

<u>Policy</u>

A. ***Encourage and review applicant's use of anti-perch devices, burying of powerlines, closed rubbish bins, removal of road kill and dead livestock, and other methods to discourage predators on sage-grouse and limit excess predation. If predation on sage-grouse is documented to have a deleterious effect on the PPR Area sage-grouse population, then allow for appropriate mitigation of predation under USDA guidance.***

B. ***Encourage public agencies such as CPW, the BLM, and the USFWS to work with private land owners in areas of known Suitable Habitat to better understand the actual predation threat, then collaborate on the implementation of predator mitigation programs that discourage predators, reduce productivity and recruitment of predators, and reduce predator density.***

14. [Page 1-22, Lines 27 – 30]: The FEIS states the following: "The planning process is designed to help the BLM identify the uses of BLM-administered lands desired by the public and to consider these uses to the extent that they are consistent with the laws established by Congress and the policies of the executive branch of the federal government." Please note that the federal laws and policies also require the agency to reach consistency with local plans such as the Garfield County Sage Grouse Plan, but the BLM has failed to utilize this planning process to achieve the required consistency.

15. [Page 1-23, Lines 2-6]: The FEIS states: "The BLM utilizes the public scoping process to identify planning issues to direct (drive) a revision or amendment of an existing plan. The scoping process also is used to introduce the public to preliminary planning criteria, which set the parameters, or sideboards, for conducting the planning process (Step 2)." Please note that the BLM Planning rules at 43 CFR 1610.4-2 require the agency to coordinate with local governments when developing the planning criteria. "(b) Planning criteria will generally be based upon applicable law, Director and State Director guidance, the results of public participation, and **coordination with** any cooperating agencies and other Federal agencies, State and **local governments**, and federally recognized Indian tribes." The Planning criteria was not coordinated with Garfield County. The County was not given the opportunity to discuss with the BLM whether the proposed planning criteria conflicted with local plans and policies. This denied the County the opportunity to object to the use of the NTT report, among other issues, early in the process because such policies are not compatible with the unique local area. As a result, the "parameters, or sideboards" for the planning process were scientifically indefensible and inappropriate for the Garfield County unique area.

16. [Page 1-23, Line 7-9]: The FEIS states: "The BLM uses existing data from files and other sources and collects new data to address planning issues and to fill data gaps identified during public scoping (Step 3)." Although Garfield County provided credible science and analysis of the NTT report during the scoping process which demonstrated that the suggested policies of the NTT report in the Garfield County area were inappropriate, the County's position was ignored, plans brushed aside.

17. [Page 1-23, Line 12-16]: The FEIS states: "Typically, the Analysis of the Management Situation is conducted at the outset of planning for an entire RMP or RMP revision and is incorporated by reference into development of a single focused RMPA." (It should be noted that development of the AMS includes identifying any restrictions or constraints placed on the BLM in their planning process through local plans and policies). "In this case, direction for the RMPA is provided through new national policy (BLM Instruction Memorandum 2012-044: BLM 2012a)." Since the BLM relied on the national policy to guide the development of the plan amendment, the State Director had an additional duty to ensure the policy was consistent with local plans, but in this case failed to do so. The relevant portion of the planning rules requiring consistency with guidance policy are as follows: 43 CFR 1610.3-1 "(d) In developing guidance to Field Manager, in compliance with section 1611 of this title, the State Director shall: (1) Ensure that it is as consistent as possible with existing officially adopted and approved resource related plans, policies or programs of other Federal agencies, State agencies, Indian tribes and local governments that may be affected, as prescribed by § 1610.3-2 of this title;(2) Identify areas where the proposed guidance is inconsistent with such policies, plans or programs and provide reasons why the inconsistencies

exist and cannot be remedied; and(3) Notify the other Federal agencies, State agencies, Indian tribes or local governments with whom consistency is not achieved and indicate any appropriate methods, procedures, actions and/or programs which the State Director believes may lead to resolution of such inconsistencies." There was no discussion with the State Director and Garfield County as to whether or not IM 2012-044 was consistent with Garfield County plans. Additionally, the County was never provided a reason why inconsistencies with its plans could not be remedied. Further, the County has never been notified by BLM as to what methods, procedures or actions would lead to resolution. The BLM failed to coordinate and reach consistency with Garfield County and IM 2012-044.

18. [Page 1-24, Line 1-3]: The FEIS acknowledges that the purpose of the first four steps in the planning process is to help clarify the purpose and need for the EIS and to identify key planning issues to be addressed. The FEIS identifies the "purpose" to be, "to identify and incorporate **appropriate** Sage-grouse conservation measures into the plans. In compliance with IM 2012-044, the measures to be considered include **appropriate** conservation measures developed by the NTT." The IM cited also directs the BLM to consider and adjust the conservation measures to the unique local area. The BLM has failed to adequately consider the uniqueness of the Garfield County topography and habitat and has not prepared appropriate conservation measures for the area. They have compounded this failure by refusing to advance the Garfield County plan to be analyzed alongside the other alternatives.

19. [Page 1-24, Line 6-17]: The FEIS acknowledges that only those alternatives were advanced that comply with the purpose and need for the study. As explained above, the BLM failed to coordinate with Garfield County in the beginning planning stages as required by the BLM's planning rules, and failed to fulfill the purpose and needs statement by creating "appropriate" conservation measures for the area, and finally have failed to advance the only conservation plan developed from a scientific basis appropriate to the area with policies appropriate for the unique habitat and uses.

20. [Page 1-28, Line 29] BLM Instructional Memorandum 2012 – 044, BLM National GRSG Land Use Planning Strategy under policy and action states, "the conservation measures developed by NTT must be considered and analyzed, as appropriate, through land use planning process by all BLM State and Field Offices that contain occupied GRSG habitat. While these conservation measures are range wide in scale, it is expected that at the regional and sub-regional planning scales, there may be some adjustments of these conservation measures in order to address local ecological site variability." Garfield County specifically has local ecological site variability mentioned in IM 2012-44. The NW Colorado GRSG LUPA does not take into consideration the uniquely naturally fragmented habitat, dramatic changes in topography and vegetation in Garfield County. The LUPA is not consistent with Garfield County GRSG Conservation Plan (43 CFR; 1610. 3-2 Consistency requirements) nor has the BLM coordinated in the LUPA to address the inconsistencies with the Garfield County Plan. Although Garfield County attempted to Coordinate with the BLM[17], the BLM has not resolved the conflicts and inconsistencies between the two Plans.

[17] *See* Garfield County Coordination Meeting Official Transcripts attached as Exhibits G, I, J and N.

21. [Page 1-11, Line 22-24] Decisions in this LUPA are only applied to BLM-administered lands, National Forest Surface, and those lands that have a federal nexus due leased federal minerals. In our still valid comments regarding the DEIS[18], Garfield County thoroughly explained our concerns regarding the BLM's intent to use disturbance cap programs to penalize (reduce cap threshold availability) activity on public lands because of their inventory of disturbance on private lands without legal authority to do so.

22. [Page 1-28, Line 34-37] Memorandum 2012-44, BLM National GRSG Land Use Planning Strategy relies on the NTT 2011 report and directs all planning efforts associated with the national strategy to consider and analyze the conservation measures presented in the report. Garfield County questions and challenges that NTT 2011 report, provides the latest science and best biological judgment to assist the BLM GRSG planning strategy. Refer to the NTT Data Quality Challenge.[19] In addition, Garfield County finds the BLM relied almost exclusively on the NTT Report and ignored conservation measures submitted by various state and local governments, such as the Garfield County GRSG Conservation Plan.[20]

23. [Page 1-28, Line 29] The BLM Instructional Memorandum 2012-044 states "the PPH and PGH data and maps have been/are being developed by the BLM through a collaborative effort between the BLM and the respective state wildlife agency and these science based maps were developed using the best available data and may change as new information becomes available. Such changes would be science-based and coordinated with the state wildlife agencies so that the resulting delimitation of PPH and PGH provides for sustainable populations."

As testified by the BLM during the formal Garfield County Coordination meetings[21], there are no maps that have been developed by the BLM in the EIS. As stated in comments above, the Colorado Parks and Wildlife provided the habitat maps to the BLM which were designed as broad Sensitive Wildlife Maps used for consultation purposes and were not designed to identify specific GRSG priority habitat. In Garfield County, the best science-based habitat to date continue to be the objectively peer reviewed habitat maps contained in the Garfield County Greater Sage Grouse Conservation Plan and the maps are Garfield County GRSG peer reviewed maps. [22] The BLM has not reviewed nor resolved the inconsistencies between the Garfield County Conservation Plan Map and the BLM LUPA/DEIS map for Garfield County.

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[18] *See* Garfield County comments to the BLM on the Draft Resource Management Plan Amendment and Draft Environmental Impact Statement filed with the BLM on December 2, 2013 attached as Exhibit T.
[19] *See* BLM NTT Report Data Quality Act Challenge filed with the BLM on March 18, 2015, attached as Exhibit Z.
[20] See Garfield County Greater Sage Grouse Conservation Plan, as amended, November 17, 2014 attached as Exhibit V.
[21] *See* Garfield County Coordination Meeting Official Transcripts attached as Exhibits G, I, J and N.

[22] *See* the Manuscript: Use of Modelling in a Geographic Information System to Predict Greater Sage-Grouse Habitat, January 21, 2015, attached as Exhibit Y.

24. [Page 1-30, Line 17-22] Section 1.5.1: The Scoping Process: Garfield County questions the BLM's procedures and commitment to the scoping process. Under FLPMA regulations, "43 CFR 1610.3-1/3-2, Coordination of Planning Efforts, the BLM is to assist in resolving inconsistencies between federal and non-federal government plans, and develop resource management plans collaboratively with cooperating agencies. The BLM LUPA and FEIS is inconsistent with the Garfield County GRSG Conservation Plan pertaining to GRSG maps, buffers, disturbance caps, habitat management in GRSG general habitat and regulatory assurance. These inconsistencies have not been resolved nor has there been collaboration between the BLM and Garfield County.

25. [Page 1-31, Line 34-39] Issues identified for consideration in the NW Colorado LUPA are not consistent with the Garfield County GRSG Conservation Plan and Garfield County comments on the BLM RMPA and DEIS comments concerning predation and hunting as an issue and threat to the GRSG. Also refer to the COT Data Quality Challenge. Concerning Fluid Minerals, the largest LEK in the PPR is on a reclaimed well pad, 31 strutting males, CPW Nov 2014 PPR GRSG work group report.

26. [Page 1-32, Line 1-5] Planning Criteria - "Planning criteria are based on appropriate laws, regulations, BLM and Forest Service, service manual and Handbook sections, policy directives, as well as on public participation and coordination with cooperating agencies". Garfield County questions the planning criteria follow appropriate laws and regulations. Refer to comments above illustrating Garfield County's concerns over the BLM ignoring their own policy directives in IM 2012-44. Refer to the BLM desk guide to Cooperating Agency Relationships and Coordination with Intergovernmental Partners #2012.

27. Garfield County continues to question the apparent complete dismissal of hunting as a significant threat to the persistence of the species across the range. The Data Quality Act Challenge of the BLM's NTT Report[23] states the following:

> *The NTT Report virtually ignores hunting as a threat to GRSG. FWS has estimated the GRSG population to be 535, 542.179 Some 207,430 GRSG were harvested during hunting seasons between 2001 and 2007.180 New data and research published by Gibson et al. 2011 have refuted the frequently repeated belief that there is a no additive demographic effect of hunting on GRSG populations. Thus, the hunting of some populations can have an effect not only on those populations but also on nearby populations that are not hunted (but are linked by dispersal).181 The BLM must address and incorporate up-to-date information on threats to GRSG from hunting in the NTT Report to comply with the DQA and the Guidelines.*

[23] *See* the BLM NTT Report Data Quality Act Challenge, filed with the BLM on March 18, 2015, attached as Exhibit Z.

Equally as concerning, 9 of the 11 states in the national range will continue to allow a hunting season managed by their respective state Fish and Game Departments in 2015 with the exclusion of North and South Dakota and Washington.

28. [Chapter and Page: 1-32, Row # or Line #: 6-10] 1.8 Relationship to other Policies, Plans and Programs. "While the BLM and Forest Service are not obligated to seek consistency, the agencies are required to describe the inconsistencies between the proposed action and other plan, policies and controls within the EIS." Garfield County alternative #2.11.2 BLM response to the inconsistencies with Garfield County GRSG conservation plan are inadequate in that it states "the Garfield County Plan is contained within the existing range of alternatives and is not significantly distinguishable from those alternatives." This statement is patently false. The Alternatives do not address / include specific components of the Garfield County Plan. The NW Colorado GRSG LUPA and FEIS does not address inconsistencies with the Garfield GRSG conservation plan in habitat maps, buffers disturbance caps, threats, regulatory assurance or implementation of policies. Additionally, as has been noted above, the BLM's statement that it is not obligated to reach consistency with Garfield County's plans is incorrect. While NEPA requires the identification of, analysis of and effort to resolve those conflicts, the BLM's planning rules require that consistency be met.

29. The BLM and FWS have taken a default position that the studies relied upon for the DEIS, COT Report, and NTT, including the Sage Grouse Monograph, have been peer reviewed and therefore meet an acceptable standard of data quality to be used in agency decision making. However, the record provided from Garfield County's Coordination meetings with the BLM, comments on the DEIS, and Data Quality Act challenges to the USFWS, BLM, and USGS, clearly show otherwise.

30. Most fundamentally, Garton et al. (2011), which is the central study in the USFWS 2010 warranted by precluded decision on the greater sage grouse and the COT Team Report, which the Northwest Colorado RMP is based upon, contains known mathematical errors, built in methodological bias, and data that has never been made available for scrutiny. Had the peer review of Garton et al. (2011) been adequate, those errors, bias, and use of secret data would have been identified and the paper would not have been published, or its use by the BLM and FWS for decision making.

31. Garfield County has exercised due diligence and demonstrated consistency with the Data Quality Act in uncovering and reporting the errors, biases, and lack of reproducibility in Garton et al. (2011), as well as other studies, to the BLM and FWS. This reporting has taken place during coordination meetings, in correspondence and comments on the DEIS, through a recent Data

Quality Act Challenge, and in testimony and responses questions before Congress.[24 and 25] However, the BLM and FWS have consistently failed to act upon this information provided by the County and independent scientists, thus failing its responsibilities required by the Data Quality Act and the NEPA Coordination process.

32. We note the example above as the most egregious example of a fundamental inconsistency between the Garfield County Plan and the FEIS: whereas the Garfield County Plan adheres to the provisions of the Data Quality Act, the FEIS does not. The FEIS critically relies upon a selective presentation of studies, analyses that Garfield County has pointed out as being inaccurate, in error, and data that are not public. And finally, because the BLM and FWS have consistently ignored these Data Quality Act failures raised by Garfield County, the process by which the FEIS was developed also failed the basic requirements of the Data Quality Act and NEPA.

33. [Page 1-42, Line 11-45] Buffers: The FEIS is inconsistent with the Garfield County Plan in that it relies on one-size-fits-all NSO buffers around leks that do not address specific threats and are wholly inappropriate to Garfield County's unique circumstances. This appears to be driven primarily through the incorporation of national guidance language. In contrast, the Garfield County Plan uses an approach that is suited to its unique topography and sage grouse habitat, because it protects high quality habitat and leks through NSOs but recognizes that an activity or surface disturbance may still be allowed to occur within these areas if it produces no functional (behavioral) disturbance, results in no net loss to sage grouse habitat, or has no deleterious demographic effect on the population. Proposed LUPA management action concerning buffer from LEKS in PHMA and ADH. Due to naturally fragmented habitat, drastic changes in topography and vegetation in Garfield County and the PPR, there is no scientific evidence that buffers work in this terrain. With topography change within .6 mile could be 2000' below a lek and completely

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[24] *See* Committee on Natural Resources. 2013a. Oversight Hearing On: "Defining Species Conservation Success: Tribal, State, and Local Stewardship vs. Federal Courtroom Battles and Sue-and-Settle Practices." Tuesday, June 4, 2013. U.S. House of Representatives, Committee on Natural Resources, Washington, D.C., U.S. Government Printing Office Serial No. 113–22. Available at: http://www.gpo.gov/fdsys/pkg/CHRG-113hhrg81318/pdf/CHRG-113hhrg81318.pdf Accessed 12 May 2014.

[25] See Committee on Natural Resources. 2013b. Oversight Hearing on: *"Transparency and Sound Science Gone Extinct?: The Impacts of the Obama Administration's Closed-Door Settlements on Endangered Species and People."* U.S. House of Representatives, Committee on Natural Resources, Washington, D.C., August 1, 2013. U.S. Government Printing Office Serial No. 113–37. Available at: http://www.gpo.gov/fdsys/pkg/CHRG-113hhrg82446/pdf/CHRG-113hhrg82446.pdf Accessed 12 May 2014.

out of GRSG habitat. These buffers consistency have not been resolved between the Garfield County Greater Sage Grouse Conservation Plan and the NW Colorado BLM LUPA and FEIS. (Chapter and Page: 1-35, Row # or Line #: 31-35.)

Inconsistent with the Garfield County Plan is the fact that the FEIS bases its buffers, NSOs, and no new leasing requirements on erroneous assumption perpetuated in the review by Manier et al. (2014), in Harju et al. 2012, and response of birds at a single lek exposed to loud, distorted noise (Blickley et al. 2012). That assumption is that if a human activity results in a local, temporary displacement of birds at one or more leks, this somehow equates to a population level decline and must be avoided. The Garfield County Plan, in contrast, does not confound these local and demographic effects that the FEIS does. Manier et al. 2014 rely on surmise and speculation for buffer distances, including "interpreted values", "a distance range for possible conservation buffers based on interpretation of multiple sources" and "expert knowledge of the authors." That approach is inconsistent with the Data Quality Act, and therefore, the Garfield County Plan.

The FEIS is inconsistent with the Garfield County Plan in that the FEIS uses an inflexible approach to imposing buffers and fails recognize that both technology and mitigation evolve over time in ways that reduce impacts to sage grouse and other species. Therefore, a more flexible approach is required rather than the FEIS's which base buffer and NSO requirements on studies cited in, and unsubstantiated opinion of authors of, Mainer et al. (2014) that are outdated because they are based on yesterday's technology, BMPs, and mitigation. The Data Quality Act Challenge details the numerous failings of that outdated and opinion-based literature cited in the FEIS, Mainer et al. (2014) and NTT Report. In contrast, the Data Quality Act challenge and most recent scientific literature are not inconsistent the Garfield County Plan's approach to mitigation.

Inconsistent with the Garfield County Plan, which requires data transparency that is consistent with the Data Quality Act, the FEIS will rely on lek location and status data from the state wildlife agency to establish lek buffers. However, it has been the direct experience of Garfield County that Colorado Parks and Wildlife does not make these data public, or share these data with local governments, or the BLM. [26], [27] Specifically, CPW responded:

"In regard to the request for "precise data on radio-collared sage grouse locations", we are denying additional access to those records in accordance with the provisions of the Colorado Open Records Act, specifically, 24-72-204 (2)(a)(III), which excludes specific details of bona fide research projects from release. Radio-collared sage-grouse data is currently being gathered and analyzed as part of an ongoing research study conducted by Colorado Parks and Wildlife. When the study is completed and the results are published, we will be able to provide the requested data."

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[26] *See* Letter from Colorado Parks & Wildlife responding to Garfield County's Colorado Open Records Act (CORA) request denying the County's request for data, March 9, 2013, attached as Exhibit EE.
[27] *See* Garfield County's Colorado Open Records Act (CORA) request to Colorado Parks and Wildlife, March 5, 2013, attached as Exhibit DD.

34. [Page 1-41 – 43] Stipulations Applicable to Fluid Mineral Leasing and Land Use Authorizations: The FEIS's stipulations that "surface occupancy or use will be restricted to no more than 1 disruptive facility per 640 acres, and the cumulative value of all applicable surface disturbances, existing or future, must not result in greater than 3 percent loss of the sagebrush habitat within PHMA (as measured by Colorado Management Zone)." As discussed in formal Coordination meetings, in the Garfield County Plan, and before Congressional committee (Committee on Natural Resources 2013a), this one-size-fits-all-approach is entirely inconsistent with the topography and naturally fragmented habitat in Garfield County, and therefore, the Garfield County Plan. And as detailed in the Data Quality Act Challenge on the NTT report, these stipulations are based upon erroneous opinions of a handful of authors that fail the litmus test of science required by the Act.

35. [Page 1-42, Line 44-45] The FEIS stipulation to, "Apply Timing Limitation (GRSG TL-46e) within 4 miles of active leks during lekking, nesting, and early brood-rearing (March 1 to July15)" is inconsistent with the Garfield County Plan for the same obvious reasons as above. And as detailed in the Data Quality Act Challenge, such 4 mile buffers inevitably contain large areas of non-habitat and marginal habitat with a near zero probability of sage grouse use, and lack a defensible scientific basis.

36. [Page 1-43, Line 7-17] "The disturbance cap in Proposed LUPA/FEIS, was changed from 5 percent in lands that support sagebrush to 3 percent in PHMA." The disturbance cap has no scientific basis and is arbitrary.[28] The problem issue with the disturbance cap in Garfield County and the PPR is difference and inconsistency in the habitat mapping comments #3 and comments #9. The difference in PHMA between the two maps is significant and reflects to the disturbance cap.

I. Comments on FEIS Chapter 2. Proposed Action and Alternatives

On December 2, 2013, Garfield County provided testimony in our comments on the BLM's NW Colorado Greater Sage-Grouse Draft Resource Management Plan and Draft Environmental Impact Statement (DEIS) that:

> *"The BLM and USFS should make it clear to the DEIS readers including USFWS, that the existing RMP and LUP provide a plethora of regulatory mechanisms to manage and protect GRSG habitat as well as other multiple use objectives. This remains a fundamental failure of the DEIS by refusing to disclose this in the No Action Alternative."*

Despite our urging, the BLM's FEIS continues to ignore the value of existing regulations highlighted by their inadequate analysis of the No Action alternative known as Alternative A. To be clear, Alternative A

[28] *See* Data Quality Act Challenges for the NTT Report, filed with the BLM on March 18, 2015 and attached as Exhibit Z.

did not consider other County, State and Federal requirements in permitting of activities on BLM lands, especially with regards to fluid minerals or other land use activities on public, private, or for activities with a Federal nexus. There are numerous statements in the FEIS regarding Alternative A that state there are no specific protection measures in place to protect GrSG or its habitats. Garfield County finds these statements to be not only completely false but also biased and pre-decisional.

In the No Action alternative, there is no mention of the following local, state and federal requirements:

A. Garfield County, and other NW Colorado counties' requirements for permitting of activities within sage-grouse habitats specifically including the Garfield County Greater Sage-Grouse Conservation Plan[29]. Garfield County requires an assessment of sage-grouse habitats and potential impacts of any land-use activity on both public and private lands; the No Action alternative makes no mention of this county plan and thus has failed to incorporate this local requirement.

B. Colorado Oil & Gas Conservation Commission (COGCC) permitting: Through the COGCC permitting process for oil & gas development activities, consultation with Colorado Parks and Wildlife (CPW) is a requirement[30, 31] regardless if the lands are publicly or privately owned or managed. CPW often provides GrSG protection measures or requires Wildlife Mitigation Plans, which the FEIS fails to consider. The No Action alternative makes no mention of this State requirement or how CPW is involved in protecting, mitigating, or enhancing GrSG habitats.

C. Colorado Oil & Gas Conservation Commission (COGCC) permitting: Through the COGCC permitting process for oil & gas development activities, consultation with the Colorado Parks and Wildlife (CPW) is a requirement[32, 33] regardless if the lands are publicly or privately owned or managed. CPW often provides GrSG protection measures or Wildlife Mitigation Plans, which the FEIS fails to consider. To underscore this oversight by the FEIS, the State of Colorado demonstrated the effectiveness of existing regulations and Conditions of Approval (COA) required through Permits to Drill in the "Synthesis Report" [34] that ultimately stated the following: *The State of Colorado audited COAs recommended by Colorado Parks and Wildlife through Colorado Oil and Gas Conservation Commission rules and found a 97% adoption and implementation rate:*

"Results show very high correlation between Best Management Practices (BMPs) recommended by SPW for protection of GrSG habitat and voluntary adoption. In other words, CPW met with operators every time a permit for drilling in GrSG habitat was sought. During

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[29] *See* the Garfield County Greater Sage Grouse Conservation Plan, as amended, November 17, 2014 attached as Exhibit V.

[30] https://www.colorado.gov/pacific/sites/default/files/AP_PO_CDPHE-Oil-and-Gas-Consultation-Program-Fact-Sheet%20(2).pdf

[31] https://cogcc.state.co.us/RR_Docs_new/Rules_new2.html

[32] https://www.colorado.gov/pacific/sites/default/files/AP_PO_CDPHE-Oil-and-Gas-Consultation-Program-Fact-Sheet%20(2).pdf

[33] https://cogcc.state.co.us/RR_Docs_new/Rules_new2.html

[34] *See* http://dnr.state.co.us/SiteCollectionDocuments/News/ColoradoSynthesisReport.pdf

those consultations, CPW recommended a series of actions designed to minimize or eliminate impacts on habitat. Adoption of those recommendations by an operator is entirely voluntary under the 1200-series regulations, but our analysis suggests that they are adopted 97% of the time."

The BLM has ignored these, and other, extensive existing regulatory mechanisms in the NTT Report in violation of the DQA and the Guidelines which are being used in the FEIS. This regulatory certainty should be acknowledged by BLM in all the alternatives analyses. The No Action alternative makes no mention of this State requirement or how CPW is involved in protecting, mitigating, or enhancing GrSG habitats.

D. USFWS Section 7 or Section 10 Consultation: Given the No Action alternative fails to consider the local, state or federal permitting requirements for any activity, there is no consideration that USFWS has the ability, through the Section 7 or Section 10 consultation process, to review projects that may impact GrSG. The No Action alternative fails to consider the fact that GrSG is indeed a Candidate Species, and is therefore under the regulatory authority of both the BLM and USFWS. Chapter 4 fails to consider USFWS has the ability to comment on, and also ensure that reasonable and prudent measures are employed to protect GrSG and its habitats.

In summary, the No Action alternative only regurgitates current RMP management, and fails to adequately consider, incorporate, reference or acknowledge other federal, state and local planning and permitting requirements or processes. The current FEIS has thus failed to meet the requirements of NEPA and CEQ[35] regulations.

As is pointed out here and throughout these comments, the BLM has repeatedly refused to provide a hard look of the Garfield County Greater Sage Grouse Plan or incorporate it into any of the proposed alternatives in the FEIS. Recall, despite Garfield County's repeated requests though formal comments and in Coordination meetings, the Plan was only included in the Appendix of the DEIS; it was never included in any of the alternatives, and seems to have been forgotten in Alternative A and in the effects analysis.

It is profoundly unfortunate that the BLM has assigned the Garfield County Sage-Grouse Conservation Plan as an "Alternative Eliminated from Detailed Analysis". To be clear, the BLM has never analyzed the County's Plan as an alternative in any of its EIS documents. The Greater Sage-Grouse Conservation Plan has been adopted by Garfield County Commissioners as a companion land use plan to their Land Use & Development Code; adherence to the Greater Sage-Grouse Conservation Plan is not just a recommended alternative for the BLM to consider in the FEIS, but it is also a Garfield County planning requirement for any surface use in GrSG habitats in the County. The BLM has failed to consider this and other local plans or processes in *Chapter 3. Affected Environment* and *Chapter 4. Environmental Consequences*, and the FEIS thus fails the NEPA and CEQ regulations to consider this as an existing condition.

[35] https://ceq.doe.gov/

II. Comments on Chapter 3. Affected Environment

Chapter 3 fails to consider other state, federal and local permitting, NEPA and USFWS/CPW consultation requirements, and thus fails to meet CEQ and NEPA requirements. Chapter 3 does not consider or reference sage-grouse habitat mapping in Garfield County. Garfield County has gone to great lengths to produce a peer reviewed, scientifically developed map of sage-grouse habitat in Garfield County. The BLM and FEIS simply discounted these efforts as an "Alternative Eliminated from Detailed Analysis", and failed to consider the best, scientifically available information, and thus fails to meet NEPA and CEQ requirements. Further, it appears the BLM didn't read the Garfield County Plan, as they state the mapping didn't consider mixed mountain shrublands, and only considered sagebrush habitats; it appears the BLM did not read the County's Conservation Plan, the County actually expanded habitat to include large areas of mixed mountain shrublands after extensive consultation with CPW biologists, despite the fact that there was no peer reviewed literature supporting the notion that sage-grouse use mixed mountain shrubland habitats. Because the BLM failed to use the best scientifically available information, the FEIS again fails to meet CEQ and NEPA requirements. This is one of many specific examples of how the FEIS is inconsistent with Garfield County's local Greater Sage-Grouse Conservation Plan.

Instead, the BLM and FEIS uses poor surrogates or is wrong in their effects analysis. In one part, the FEIS actually used mule deer habitat mapping as a surrogate for sage-grouse habitat in its effects analysis (see Chapter 4, Table 4.1, page 4-26)

> *"Table 4.1, Acres of Federal Mineral Estate in Mule Deer Habitat, shows the aces of leased and unleased mule deer habitat where it overlaps GRSG habitat. <u>Although multiple big game species occupy sagebrush habitats, mule deer range most closely approximates GRSG habitat</u>."*
> [Underline emphasis added, misspelled words are left as-is].

The Authorized Officer for the BLM, when required to administer these provisions, will be challenged when mule deer habitat is used as a surrogate for sage-grouse habitat, when multiple Counties in Colorado have gone to great lengths in developing accurate maps, coordinating with CPW, and have spent years and millions of dollars in on-the-ground efforts to protect and enhance sage-grouse and their habitats.

III. Comments on Chapter 4. Environmental Consequences

The No Action alternative did not consider other state, federal or local plans, and basic NEPA and CEQ requirements, and only considered current RMP guidance. In the Chapter 2 No Action alternative tables, the conclusions in Chapter 4 are flawed. There is no meaningful or measureable differentiation in the analysis process, and no quantification of how one Alternative would benefit sage-grouse over another, and no meaningful assessment of how the implementation of any Alternative would affect sage-grouse.

The following are examples of this point:

> <u>Impacts from Range Management of Terrestrial Wildlife</u> [see Page 4-23]:
>
> *"Alternative A would allow livestock grazing, with no restrictions in place to protect GRSG habitat specifically and therefore would have the greatest impact on terrestrial wildlife."*

Garfield County believes this statement is not only false, but it is equally misleading. To remind the BLM of what they actually said in the No Action Alternative, please look at what was actually said in the No Action alternative. Consider the following quotes from the FEIS (starting at page 2-82):

> ***"Little Snake RMP**: Identify and initiate restoration and rehabilitation of sagebrush habitat while maintaining a mosaic of canopy cover and seral stages.*
>
> *Special status, threatened and endangered species, and other plants and animals officially designated by the BLM and its habitats are maintained and enhanced by sustaining healthy, native plant and animal communities*
>
> *Guidelines for Livestock Grazing Management A-3, #7, "Natural occurrences...should be combined with livestock management practices to move toward the sustainability of biological diversity across the landscape, including the maintenance, restoration, or enhancement of habitat to promote and assist recovery and conservation of threatened, endangered, or other special status species by helping provide natural vegetation patterns, a mosaic of successional stages, and vegetation corridors thus minimizing habitat fragmentation."*
>
> ***Roan Plateau RMP**: Ensure that Land Health Standards are being met through Land Health assessments, and application of the GSFO (CRVFO) Monitoring Plan. Use a combination of administrative solutions (season of use revisions, livestock exclusion, and stocking level adjustments) and rangeland projects (e.g., fences and ponds) to direct livestock use to meet resource objectives and Land Health Standards.*
>
> ***Routt National Forest**: Manage forage for livestock and wildlife based on specific habitat area objectives identified during allotment management plan revision (Management Area Prescription for 5.11, 5.12, 5.13, p. 2-40, p. 2-43, 2-45). Design livestock grazing prescriptions to include achievement of wildlife goals for deer and elk winter range (Management Area Prescription 5.41, p. 2-48).*
>
> ***Grand Junction RMP**: Manage vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado while taking in to account site potential as determined by ecological site inventories, Range/Ecological Site Descriptions, Soils, completed Land Health Assessments, and site-specific management objectives.*
>
> *Implement changes in livestock use through allotment management plans, grazing use agreements, and terms and conditions on grazing permits for priority allotments based on the current prioritization process and/or land health issues*
>
> *Revise or implement allotment management plans/grazing use agreements to resolve conflicts between grazing and management of soils, riparian, and water resources.*
>
> ***Little Snake RMP**: Sustain the integrity of the sagebrush biome to maintain viable populations of **GRSG**...consistent with local conservation plans.*
>
> *Identify and initiate restoration and rehabilitation of sagebrush habitat while maintaining a mosaic of canopy cover and seral stages.*
>
> ***Roan Plateau RMP**: Ensure that Land Health Standards are being met through Land Health surveys, and application of the GSFO Monitoring Plan. Use a combination of administrative*

solutions (season of use revisions, livestock exclusion, and stocking level adjustments) and rangeland projects (e.g., fences and ponds) to direct livestock use to meet resource objectives and Land Health Standards.

***Little Snake RMP**: Overall habitat goals for the sagebrush biome and **GRSG** established*

***White River RMP**: **Livestock and big game management techniques will be used to retain ~50 percent herbaceous growth by weight through September 15, on GRSG brood and nest habitats**.*

***Little Snake RMP**:*

- *Manage for a diversity of seral stages within plant communities.*
- *Restore natural disturbance regimes, such as fire, and vegetation treatments to accomplish biodiversity objectives.*
- *Establish desired plant communities in coordination with stakeholders across the LSFO.*
- *Restore a diversity of seral stages within sagebrush communities.*
- *Maintain large patches of high-quality sagebrush habitats, consistent with the natural range of variability for sagebrush communities in northwest Colorado.*

***White River RMP**: Acceptable desired plant communities will be managed in an ecological status of high-seral or healthy mid-seral for all rangeland plant communities. An exception may be provided for wildlife habitat -areas where specific cover types are needed. The required cover type in those wildlife habitat areas will be the desired plant communities. The ecological status of a desired plant community in specified wildlife habitat areas could be lower than high seral. In which case, the desired plant communities will be managed, at a minimum, to maintain an at-risk rating (Table 2.6 of Appendix D [of the White River RMP]) and have a stable to improving trend in ecological status.*

***Grand Junction RMP**: Manage vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado while taking in to account site potential as determined by ecological site inventories, Range/Ecological Site Descriptions, Soils, completed Land Health Assessments, and site-specific management objectives.*

Implement changes in livestock use through allotment management plans, grazing use agreements, and terms and conditions on grazing permits for priority allotments based on the current prioritization process and/or land health issues."

This type of approach is reiterated throughout the No Action alternative. Again, the FEIS effects analysis states that:

> *"Alternative A would allow livestock grazing, with no restrictions in place to protect GRSG habitat specifically and therefore would have the greatest impact on terrestrial wildlife."* [underline emphasis added]

Clearly, the highlighted text above (which is not all-inclusive of resource protection measures that would benefit and protect GrSG and their habitats from the No Action section, but is just a sample of what was in Chapter 2) does not align whatsoever with the BLM's statement in the FEIS that there are…"*no restrictions in place to protect GRSG habitat…*" and is a prime example where the BLM has ignored its duty

to properly analyze the No Action alternative. To this end, Garfield County finds that the one sentence "effects analysis" for impacts from Range Management on GrSG from implementation of the No Action alternative does not reflect the actual guidance which the BLM has in place to protect habitats, and that the effects analysis is biased, methodologically flawed, and pre-decisional, and the FEIS needs to be redone while actually considering the actual information presented in Chapter 2 as well as other forgotten existing federal, state and local protection measures such as the Garfield County Greater Sage Grouse Conservation Plan.

Another example of how the Effects Analysis is broken is from **Fluid Minerals**. While the FEIS presents many pages of summarized (albeit dated) literature on how oil & gas has detrimental impacts on Greater Sage-Grouse, the actual effects analysis of implementation of any Alternative is extremely brief and does not reflect existing federal, state and local planning as mentioned above, and fails to incorporate the existing NEPA process and reviews, and fails to utilize the best available science- and especially any conflicting viewpoints. The extremely brief effects analysis for Alternative A on Greater Sage-Grouse from oil and gas activities is limited to the following four sentences (see page 4-91):

> *Alternative A—In general, Alternative A would have the least protective measures for GRSG and sagebrush habitat, but this would vary depending on MZ (existing LUPs). Protective measures would generally include seasonal restrictions during the breeding, brood-rearing, and winter periods, NSO stipulations of 0.25 or 0.60 mile from a lek, and 1 and 5 percent voluntary disturbance caps on existing leases (see **Chapter 2** for specifics). Certain lands (such as WSAs) would be closed to fluid minerals leasing, but this would benefit GRSG and sagebrush habitats only where they are coincident. Overall, Alternative A would have the greatest impacts on GRSG and sagebrush habitat."*

Recall, that one of the primary reasons for the FEIS and RMPA is the purported threat of oil and natural gas development in GrSG habitats; however, despite the importance of this topic, the actual effects analysis of continuing with existing management (which has led to the actual *increase* in lek attendance and *increased* sage-grouse populations in the past 3 years) is limited to 4 sentences. Again, the FEIS failed to consider the other NEPA and Section 7 requirements, COGCC & CPW review processes, ongoing habitat management, GrSG research and mitigation measures of CPW and other entities, and other County permitting requirements in this Alternative A analysis. It would appear from the Alternative A effects analysis that the BLM has no NEPA review process and does nothing to protect GrSG at this time, and that the CPW and USFWS has no involvement either. In contrast the LUPA effects analysis includes the following, apparently more robust effects analysis (starting on page 4-95):

> *"Under the Proposed LUPA, no new leasing would be permitted within 1 mile of active leks and no new surface occupancy would be allowed in PHMA. No modifications or waivers would be permitted. The Authorized Officer may grant an exception to this NSO stipulation only where the proposed action: 18*
>
> *(i) Would not have direct, indirect, or cumulative effects on GRSG or its habitat; or,*

(ii) Is proposed to be undertaken as an alternative to a similar action occurring on a nearby parcel, and would provide a clear conservation gain to GRSG.

Exceptions based on conservation gain (ii) may only be considered in (a) PHMA of mixed ownership where federal minerals underlie less than fifty percent of the total surface, or (b) areas of the public lands where the proposed exception is an alternative to an action occurring on a nearby parcel subject to a valid Federal fluid mineral lease existing as of the date of this RMP [revision or amendment]. Exceptions based on conservation gain must also include measures, such as enforceable institutional controls and buffers, sufficient to allow the BLM to conclude that such benefits will endure for the duration of the proposed action's impacts.

> *"Any exceptions to this lease stipulation may be approved by the Authorized Officer only with the concurrence of the State Director. The Authorized Officer may not grant an exception unless the applicable state wildlife agency, the USFWS, and the BLM unanimously find that the proposed action satisfies (i) or (ii). Such finding shall initially be made by a team of one field biologist or other GRSG expert from each respective agency. In the event the initial finding is not unanimous, the finding may be elevated to the appropriate BLM State Director, USFWS State Ecological Services Director, and state wildlife agency head for final resolution. In the event their finding is not unanimous, the exception will not be granted. Approved exceptions will be made publically available at least quarterly."*

Additionally, an NSO stipulation would be applied to within 2 miles of active leks in GHMA. Disturbances would be limited to 3 percent and 1 disturbance per 640 acres density of PHMA in each Colorado Management Zone, with no new leasing allowed if the disturbance cap exceeds this amount. Seasonal restrictions would apply to construction, drilling and completion activities within 5 4 miles of active leks during the sage-grouse reproduction period of March 1 to July15.

Under the Proposed LUPA, no new leasing would be permitted within 1 mile of active leks, and no new surface occupancy would be allowed in PHMA (see exception criteria below) and within 2 miles of active leks in GHMA (see Appendix D).

The Proposed LUPA would provide more protections to GRSG and GRSG habitat than Alternatives A and D. Because all of PHMA would be managed as No Surface Occupancy with very rare potential for exceptions, impacts would be similar to those described for Alternative B. The potential for direct habitat loss and indirect impacts would be similar to those described under Alternative B. Although 1 mile around active leks would be managed as closed to leasing (224,200 acres) under the Proposed LUPA compared with all PHMA (1,315,500 acres), all of PHMA would be managed as NSO with very rare exceptions, making the impacts on GRSG or GRSG habitat similar. Additionally, under the Proposed LUPA, disturbance would be limited to 3 percent in PHMA and density would be limited to 1 energy facility per 640 acres, providing greater protections for GRSG and GRSG habitat than Alternatives A and D and similar to those described for Alternative B."

Garfield County finds the disparity in effects analysis, from just this one section an example that the FEIS is pre-decisional and that the level of detail and care in considering existing conservation measures of Alternative A vs. the BLM-preferred LUPA indicative of a pre-decisional effort to bias the reader and public that selecting the LUPA as the only viable option to protect Greater Sage-Grouse.

Additional evidence of the biased and pre-decisional nature of the FEIS includes statements such as the following, found on page 4-88:

> *"Direct Habitat Loss/Fragmentation/Indirect Habitat Loss or Avoidance*
>
> *Direct Habitat Loss—Direct habitat loss from fluid minerals development would be attributed to vegetation clearing (from well pad, access road, and ancillary facilities construction) and longer-term facility occupation. Loss or modification of big sagebrush communities would not regain any shrubland character for GRSG for 20 to 30 years, following interim or final reclamation, or longer depending on length of occupation. In some cases, shrubland may not regain functional utility (e.g., roads and permanent facilities) to support GRSG over the life of the plan amendment. Small herbaceous inclusions in sagebrush-dominated landscapes can serve as important sources of herbaceous and invertebrate forage for brooding GRSG. Because of population size and habitat configuration (natural geographic patterns), these impacts may be more pronounced in certain zones (e.g., Colorado MZ 17). Conservation measures outlined in each alternative would reduce the potential for direct habitat loss across sagebrush landscapes within each MZ."*

Statements like this are found throughout the FEIS; where the scientific literature and our professional opinion is in disagreement that *"Loss or modification of big sagebrush communities would not regain <u>any</u> shrubland character for GRSG for 20 to 30 years"* [underline emphasis added] is intentionally biasing the public reader and Authorized Officer that only the LUPA can be selected. We disagree with the science and contest that the authors are not qualified to make such statements without scientific evidence consistent with the Data Quality Act.

The FEIS is fraught with an oversimplification of existing protection measures for Greater Sage-Grouse, a bias against any land use aside from measures to protect sage-grouse through the adoption of the LUPA. We consistently find statements that any impacts to lands would "render the habitat unsuitable" (page 4-79 as an example), and that the FEIS did not utilize existing science or provide substantive proof that Greater Sage-Grouse do not find any utility of habitats that have been temporarily disturbed, aside from some supposed returned utility after 20-30 years post-disturbance.

The FEIS does not consider existing timing stipulations, avoidance of habitat, impact minimization measures, existing NEPA procedures, current USFWS review, existing habitat and impact minimization and mitigation, and simply asserts that there are woefully inadequate protection measures in place, or as stated there are "<u>no</u> restrictions in place to protect GrSG habitat...", which is false, misleading, biased and pre-decisional, and is not based on facts.

Considering that implementing the LUPA would have far-reaching socioeconomic impacts to northwest Colorado, we would have hoped that the BLM would have taken a hard look at the effects analysis, and

not just cut-n-paste random information and used pre-decisional language. We found many instances of repetitive statements of:

> *"The Proposed LUPA would provide more protections to GRSG and GRSG habitat than Alternatives A and D. Because all of PHMA would be managed as No Surface Occupancy with very rare potential for exceptions..."*

Simply repeating this information and statistics from the LUPA while ignoring the No Action alternative is not a comparative effects analysis and does nothing to actually inform the reader of how sage-grouse would be affected if Alternative A, B, C, D or the LUPA is implemented. Statements biased against Alternative A such as: *"Various stipulations apply, but most are not specific to GRSG or GRSG habitat."*(Page 4-109) are not supported by the language in Alternative A, or in the existing federal, state and local review processes. We find that the FEIS presents worst cases for anything but the LUPA, emphasizes the "bad" in Alternative A, and ignores existing review, avoidance, impact minimization or mitigation of potential impacts to sage-grouse on public lands or lands with a federal nexus. Ultimately, we find the FEIS is biased, pre-decisional, and inaccurate in its depiction of existing Greater Sage-Grouse protection measures and processes.

Additionally, NEPA requires that included in the "Environmental consequences" section is a discussion of the "Possible conflicts between the proposed action and the objectives of Federal, regional, State and local ... land use plans, policies and controls for the area concerned." (40 C.F.R 1502.16 (c)) By failing to advance the Garfield County plan to be analyzed alongside the other alternatives, the BLM was able to again avoid informing the public and decision makers of the inconsistencies between local needs and the federal mandate, therefore denying the opportunity to fully consider whether the preferred alternative is the proper course

IV. Coordination

The Federal Land Policy and Management Act[36], the National Forest Management Act[37] and their corresponding rules, require both the BLM and USFS to coordinate their land use planning efforts with local governments. Congress recognized the importance of agencies working closely with local governments early in their planning to resolve conflicts with the purpose of reaching consistency. FLPMA specifically requires the BLM to be apprised of local plans, give consideration to local plans, meaningfully involve local governments in the planning process, and work to resolve inconsistencies between the two planning efforts. It is expected that these early efforts will give both government entities the opportunity to harmoniously work out any potential conflicts. However, if there are still conflicts at the end of the process, FLPMA places the burden of achieving consistency on the BLM.

> *"Land use plans of the Secretary under this section shall be consistent with State and local plans to the maximum extent he finds consistent with Federal law and the purposes of this Act."*

The State Director in her April 29, 2015 letter, acknowledges her duty to achieve consistency with the Garfield County plans under FLPMA. While the statutory language clearly states that local plans must comply with federal laws and regulations, the letter misstates the specific language of the Act and finds that local plans must also comply with agency policies as well[38].

This is troubling since agency policies are internally prepared without public or Congressional input. They can and often do change when political shifts in the Executive Branch take place. Congress restricted the coordination consistency requirement to the federal laws and regulations and the purposes of the laws,

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[36] 43 U.S.C.A. 1712(c) In the development and revision of land use plans, the Secretary shall—(9) to the extent consistent with the laws governing the administration of the public lands, coordinate the land use inventory, planning, and management activities of or for such lands with the land use planning and management programs of other Federal departments and agencies and of the States and local governments within which the lands are located,... In implementing this directive, the Secretary shall, to the extent he finds practical, keep apprised of State, local, and tribal land use plans; assure that consideration is given to those State, local, and tribal plans that are germane in the development of land use plans for public lands; assist in resolving, to the extent practical, inconsistencies between Federal and non-Federal Government plans, and shall provide for meaningful public involvement of State and local government officials, both elected and appointed, in the development of land use programs, land use regulations, and land use decisions for public lands, including early public notice of proposed decisions which may have a significant impact on non-Federal lands. Such officials in each State are authorized to furnish advice to the Secretary with respect to the development and revision of land use plans, land use guidelines, land use rules, and land use regulations for the public lands within such State and with respect to such other land use matters as may be referred to them by him. Land use plans of the Secretary under this section shall be consistent with State and local plans to the maximum extent he finds consistent with Federal law and the purposes of this Act.

[37] 16 U.S.C.A. § 1604 ("(a) Development, maintenance, and revision by Secretary of Agriculture as part of program; coordination: As a part of the Program provided for by section 1602 of this title, the Secretary of Agriculture shall develop, maintain, and, as appropriate, revise land and resource management plans for units of the National Forest System, coordinated with the land and resource management planning processes of State and local governments and other Federal agencies.").

[38] State Director April 29, 2015 - "As you are aware, under the Federal Land Policy and Management Act (FLPMA), land use plans of the Secretary of Interior shall be consistent with state and local plans to the maximum extent consistent with the purposes, policies and programs of Federal laws and regulations applicable to the federal lands."

but did not expand this to include agency policy. Importantly, courts have ruled that agency policy cannot be held to the same standard as statutes and regulations.

As has been communicated throughout this planning process, Garfield County's plans fully comply with federal laws and regulations. Additionally, the plans incorporate, where appropriate, similar programs and policies as the agencies for the purpose of narrowing the issues upon which consistency should be met. However, there are some policies that have been deliberately rejected by the County, such as the NTT Report (reasons discussed throughout this review). As a result, the Greater Sage-Grouse Conservation Plan contains specific policies that directly conflict with the BLM's preferred alternative.

Additionally, the Garfield County Plan and the NTT Report are based upon notably different scientific premises and facts. The habitat mapping model used in Garfield County's plan is significantly more refined, accurate and sophisticated than the BLM's habitat calculations. As a result, the Garfield County policies are more refined, accurate and appropriate for the unique area. Although the FEIS claims that an alternative was included that had similar policies as Garfield County, this is blatantly false. It would be impossible to equate the policies and studies with those of Garfield County's plan because none of the alternatives were based on the advanced science and refined mapping used by Garfield County.

The National Environmental Policy Act[39] also requires coordination with local governments. The Act's purpose is to ensure the action proposed by the agency is properly analyzed so that the best decision can be made. It is for this purpose that where a conflict of the use of resources exists, the agencies are required to include an alternative that can be analyzed with equal scrutiny as other alternatives including the preferred. Conflicting perspectives were not intended to be brushed away, as the Garfield County Plan has been, but rather analyzed side by side. If the agencies preferred action is the best course then why would an agency fear it being compared to that put forward by the local government with the responsibility to protect the health, safety and welfare of the people?

By failing to bring forward the Garfield County Plan for rigorous analysis, even in the No Action alternative, the agencies have also failed to identify conflicts as required in Chapter 4 on Environmental Consequences. By not identifying any conflicts, the agencies then also avoid their responsibility to resolve those conflicts or mitigate those that cannot be resolved. Ultimately, because the agencies refused to fully coordinate they missed the many opportunities to resolve conflicts between the two planning process and failed to reach consistency under FLPMA. Additionally they failed to fully inform the public and decision makers of the conflicts between the proposed uses of the resources therefore denying them the opportunity to be fully informed of the environmental consequences as required under NEPA.

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[39] 43 U.S.C. 4331(a) "it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans. (b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may —"

In interpreting and applying the concept of coordination, the courts have held that "coordination means more than *trying* to work together with someone else."[40] Instead, coordination, by definition, means trying to work together with someone else by means of negotiating to harmoniously bring a common action, movement, or condition[41] [emphasis added]. Coordination exceeds the definitions of cooperation, and consultation. Above all else, coordination is a process for reconciliation of conflicts between federal and local policies. Coordination provides local governments with the ability to present local customs, culture, and landscape variance and other considerations to federal agencies. Federal agencies, meanwhile, are required to consider such evidence from local governments and negotiate in good faith to resolve conflicts.

An agency's EIS cannot "virtually ignore" the powers of state and local governments.[42] The procedure followed and steps taken by the federal agency in a given matter should be "clearly indicative of good faith."[43] In good faith, the federal agency should initiate coordination with state and local agencies regarding prospective action "as soon as possible" and continue coordination throughout the entire process.[44] Coordination, if conducted correctly, results in a reliable identification of the extent of the impacts, and a sound planning process.[45] Ultimately, an EIS should be "the product of comprehensive coordination between federal, state, and local agencies" after "numerous public hearings and meetings were held before th[e] statement [i]s filed, at which the environmental effects ... [are] discussed."[46]

"NEPA requires agencies to take into account the comments and views of local governments that are authorized to develop environmental standards."[47] Like NEPA, "the procedural requirements of the FLPMA are designed to protect the interests of local governments whenever federal agencies develop or implement federal land-use plans."[48] Since "the FLPMA includes environmental objectives similar to those of NEPA (*see id.* § 1701(8)), the concrete interests asserted by [a] County that merit procedural protection under NEPA also merit protection under the FLPMA."[49]

In light of Garfield County's wealth of geographic-specific data, knowledge of its unique landscape and understanding of local culture, involvement in sage-grouse issues for over 10 years (as a participant in the PPR Plan), the BLM stood to benefit immensely from coordinating with Garfield County. In addition to coordination, the County also participated in the NEPA cooperating agency process. Since the

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[40] *California Native Plant Soc. v. City of Rancho Cordova*, 172 Cal. App. 4th 603, 641, 91 Cal. Rptr. 3d 571, 602 (2009).
[41] *Id.*
[42] *Suffolk Cnty. v. Sec'y of Interior*, 562 F.2d 1368, 1375 (2d Cir. 1977).

[43] *Sierra Club v. Froehlke*, 534 F.2d 1289, 1300 (8th Cir. 1976).

[44] *Id.*
[45] *Concerned About Trident v. Schlesinger*, 400 F. Supp. 454, 475 (D.D.C. 1975).

[46] *Sierra Club v. Froehlke*, 534 F.2d 1289, 1300 (8th Cir. 1976).
[47] *Yount v. Salazar*, No. CV11-8171-PCT DGC, 2013 WL 93372, at *13 (D. Ariz. Jan. 8, 2013) (*citing* 42 U.S.C. § 4332(2)(C)).
[48] *Id.* (*citing* 43 U.S.C. § 1712(a), (c)(9)).
[49] *Id.* at *14.

beginning of the Cooperating Agency meetings, Garfield County reiterated on multiple occasions that the BLM did not acknowledge that the habitat in Garfield County was vastly different than that of the national range. As such, it required a more refined habitat and policy analysis tailored to our County. So much so, Garfield County went to great lengths to adopt its Greater Sage-Grouse Conservation Plan[50] which states:

> ***The purpose of the Garfield County Greater Sage-Grouse Conservation Plan (the Plan) is to provide private and public land owners with land management principles, policies, incentives, and best management practices based on the best available science that are tailored to fit Garfield County's unique landscape and habitat characteristics for the betterment of the species.***
>
> ***Because of the County's unique landform, elevation, topography and vegetative cover that differ drastically from the rest of the national range, the Board of County Commissioners (the Board) commissioned an in-depth analysis, based on best available science, to determine what suitable habitat exists in the County at a refined level never before completed to obtain a very realistic and accurate picture of suitable habitat.***

The habitat mapping[51] contained in the Greater Sage Grouse Conservation Plan is the most refined and peer reviewed habitat mapping to date in Garfield County and represents best available science that has neither been read, evaluated or included in the FEIS by the BLM, but was also summarily ignored during the Cooperating Agency meetings as admitted to by BLM NW Colorado District Manager Jim Cagney and in a Coordination meeting on April 4, 2013.[52] The habitat modeled by the County results in approximately 73,000 acres of suitable habitat which is a 68% decrease in the habitat mapping contained in the FEIS. This conflict remains unresolved despite significant attempts during Coordination meetings as well as meetings with the Director of the Colorado Department of Natural Resources.[53] Unfortunately, the BLM has, thus far, failed to comply with the aforesaid statutes and regulations to resolve conflicts between local and federal policies and plans.

II. The EIS Violates NEPA

NEPA[54] requires informed decisions – not environmentally "ideal" decisions.[55] The proper standard under NEPA is to analyze how action affects the human environment.[56] While NEPA requires federal agencies to consider the environmental consequences of federal actions, it does not mandate particular results.

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[50] *See* Garfield County Greater Sage Grouse Conservation Plan, as amended, November 17, 2014 and attached as Exhibit V.
[51] *See* Manuscript: "Use of Modeling in a Geographic Information System to Predict Greater Sage Grouse Habitat" attached as Exhibit Y.
[52] *See* Official Transcript of Coordination meeting on April 4, 2013 and attached as Exhibit N.
[53] *See* Letter to Mike King, Director of the Colorado Department of Natural Resources, October 21, 2013 and attached as Exhibit S.
[54] 42 U.S.C. §4331 *et seq.*

[55] *See* Nicholas C. Yost, *NEPA Deskbook, 3rd Ed.*, at 6, Environmental Law Institute (2003).
[56] 42 U.S.C. § 4332(2)(C); *see also San Luis & Delta-Mendota Water Auth. v. Jewell*, 747 F.3d 581 (9th Cir. Cal. 2014).

Agencies are not constrained by NEPA from deciding that other values outweigh environmental costs.[57] The purpose of NEPA "is not to create paperwork—even excellent paperwork—but to foster excellent action."[58] NEPA must "achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities."[59] The BLM has failed in this regard and the FEIS currently cannot be accepted by Garfield County.

NEPA is a procedural statute. It does not mandate any particular outcome or require an agency to select an alternative that has the fewest environmental consequences. NEPA simply requires that an agency give a "hard look" to the environmental consequences of any major federal action it is undertaking.[60] Once the procedural elements of NEPA have been satisfied and the environmental consequences given the required hard look, an agency may issue its decision relying on the factors and considerations specified in the statute under which it is acting—in this case, FLPMA among others.

A. Purpose and Need

Council on Environmental Quality ("CEQ") regulations require a purpose and need statement to describe the proposed action, the purpose of the proposed action, and the underlying need to which the agency is responding.[61] In this case, the purpose and need is, "to inform USFWS's March 2010 'warranted, but precluded' ESA listing petition decision" and ensure BLM and the USFS have adequate regulatory mechanisms in place.[62]

The agencies assert that restrictions on land uses and programs must be implemented "to avoid the continued decline" of GRSG through conservation measures specified in the National Technical Team's *A Report on National Greater Sage-Grouse Conservation Measures* (the "NTT Report").[63] First, there is no "continued decline" relevant to greater sage-grouse populations in Colorado. Rather, populations are largely stable and increasing. Second, there are significant and fundamental flaws with the NTT Report that should preclude its wholesale use and definitive role in driving this EIS. The NTT Report was cited or mentioned at least 19 times in the FEIS. Measures incorporated into action alternatives in the EIS were largely derived from the NTT Report, and Alternative C is essentially the recommendations from the NTT report.[64]

Garfield County has supplemented its comments on the FEIS with the Data Quality Act ("DQA")[65] Challenges it filed against BLM on the NTT Report, USGS on the Sage-Grouse Monograph and the U.S. Fish and Wildlife Service on the Conservation Objectives Team ("COT") Report. These DQA Challenges are also

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[57] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989).
[58] 40 C.F.R. § 1500.1(c) (2005).
[59] 42 U.S.C. §4331(b)(5).
[60] *See Methow Valley*, 490 U.S. at 350-51; *Kleppe*, 427 U.S. at 410, n.21 (Agency is to take a "hard look" at the environmental consequences).
[61] 40 CFR § 1502.13.
[62] DEIS at 6.
[63] *Id.*
[64] *Id.* at xxxii.
[65] 44 U.S.C. § 3516.

incorporated herein by reference.[66] Significant flaws with the NTT Report have also been incorporated into comments on this FEIS, as submitted in December of 2013 by American Petroleum Institute, Western Energy Alliance, IPAA and COGA. Garfield County incorporates those comments herein by reference.

The BLM wholly fail to mention compliance with authorizing statutes in the purpose and need. Rather, they aver that they will consider these measures "in the context of their multiple-use missions."[67] The BLM and the USFS have no discretion to avoid their statutory missions nor to impact valid existing rights as discussed below.

B. Cooperating Agencies

Federal, state or local agencies may act as joint lead agencies in the preparation of an EIS.[68] Jurisdiction by law and special expertise also grant state, Tribal and local governmental entities the opportunity to participate as cooperating agencies.[69] The benefits of cooperating agency status include "fostering intergovernmental trust (e.g., partnerships at the community level) and a common understanding and appreciation for various governmental roles in the NEPA process."[70]

NEPA requires the various agencies involved to address their differing missions, laws and policies early in the process. The process should not move forward until differences are addressed in an agreed upon methodology.[71] The lead agency must use, to the maximum extent practicable, the environmental analysis and recommendations of cooperating agencies consistent with its own responsibilities as lead agency.[72] Otherwise, the EIS can be found to be inadequate.[73] CEQ FAQ 14(b)(A). Such is the case here. The BLM has wholly failed to recognize and incorporate the best scientific and commercial data available as provided by Garfield County—a cooperating agency in this process.

Federal agencies can rely upon state, regional and local plans in their consideration of environmental impacts under NEPA.[74] In this case, BLM and the USFS should have considered Garfield County's Plan as its preferred alternative relative to applicable lands in the NEPA process. Instead, it has been relegated to merely a reference, and even forgotten from the No Action alternative. Reference to the efforts alone

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[66] See Data Quality Act Challenges at Exhibits Z, AA, and BB also available at: http://www.westernenergyalliance.org/knowledge-center/wildlife/greater-sage-grouse/DQA-Challenge

[67] DEIS at 6.
[68] 40 C.F.R. §1501.5(b).
[69] James Connaugton, CEQ Chair, Memorandum for State and Local Governmental Entities, February 4, 2002.
[70] Id.; See also: 516 Department Manual 2.5, and discussion therein, 69 Fed.Reg. 10869, 10877 (March 8, 2004).
[71] THE NEPA TASK FORCE: Report to the Council on Environmental Quality. Modernizing NEPA Implementation. September, 2003.
[72] Section 1501.6(a)(2) (emphasis added); see also CEQ FAQ 14(b)(A).
[73] CEQ FAQ 14(b)(A).
[74] *See, e.g.* 40 CFR § 1502.21; *Georgia River Network v. U.S. Army Corps of Engineers*, 334 F. Supp. 2d 1329 (N.D. Ga. 2003) (agency properly relied upon federal, state and local regulations, including local land use plan); *Sierra Club North Star Chapter v. La Hood*, 693 F. Supp. 2d 958 (D. Minn. 2010) (accepting reliance on local plans in indirect effects analysis).

is insufficient.[75] Federal agencies must consider and rely upon state, regional, and local plans in their consideration of environmental impacts under NEPA.[76] Here, the EIS did not adequately consider Colorado Oil and Gas Conservation Commission ("COGCC") rules regarding wildlife and surface water, the Colorado Greater Sage-grouse Conservation Plan, Garfield County's Plan, and the BLM's own NEPA process for authorizing land use activities in the development of the FEIS.

Colorado's Department of Natural Resources is also a cooperating agency. In October of 2013, Governor Hickenlooper called upon the BLM to recognize and rely upon the meaningful local and state conservation measures already in place.[77] Later, in a letter from the Governor to NW Colorado BLM District Manager, Jim Cagney dated January 14, 2014, he reiterated significant concerns over provisions being proposed in the EIS including a lack of sound science to support some of the BLM conclusions. From our review of the FEIS, the Governor's request fell on deaf ears.[78]

C. Proposed Alternatives Are Inconsistent with Authorizing Statutes

Under NEPA, the agency's "environmental impact statement must study reasonable alternatives in detail."[79] The discussion of alternatives required by NEPA is limited by an agency's statutory objectives and the "underlying purpose and need" to which the agency is responding in proposing alternatives.[80] The courts have excused federal agencies from considering alternatives that required legislative or administrative changes.[81] As the Second Circuit Court of Appeals stated, "[S]tatutory objectives provide a sensible compromise between unduly narrow objectives an agency might choose to identify to limit consideration of alternatives and hopelessly broad societal objectives that would unduly expand the range of relevant alternatives."[82]

Neither NEPA nor the endangered Species Act ("ESA") amends or alters the agencies' statutory missions. This process must not conflict with BLM's duties and authorities under FLPMA, the Mineral Leasing Act of 1920 (30 U.S.C. § 181 et seq.) or USFS duties and responsibilities under the National Forest Management

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[75] *See* 43 CFR § 1610.

[76] *See, e.g.* 40 CFR § 1502.21; *Georgia River Network v. U.S. Army Corps of Engineers*, 334 F. Supp. 2d 1329, 1345 (N.D. Ga. 2003) (agency properly relied upon federal, state and local regulations, including local land use plan); *Sierra Club North Star Chapter v. La Hood*, 693 F. Supp. 2d 958, 990 (D. Minn. 2010) (accepting reliance on local plans in indirect effects analysis).

[77] Available at: http://www.colorado.gov/cs/Satellite?c=Page&childpagename=GovHickenlooper%2FCBONLayout&cid=1251647577416&pagename=CBONWrapper.

[78] *See* letter from Governor Hickenlooper to NW Colorado BLM District Manager, Jim Cagney dated January 14, 2014 attached as Exhibit K.

[79] *Biodiversity Conservation Alliance v. Bureau of Land Mgmt.*, 608 F.3d 709, 714 (10th Cir. 2010).

[80] *See Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, 435 U.S. 519 (1978) (Where the Court rejected a claim that the Nuclear Regulatory Commission should have reviewed energy conservation as an alternative to the licensing of a nuclear power plant); *see also* 40 CFR § 1502.13; 40 CFR § 1508(9)(b).

[81] *See Roosevelt Campobello International Park Commission v. EPA*, 684 F. 2d 1041 (1st. Cir. 1982) (Where the court held federal agencies need only consider alternatives which are consistent with the purposes of a proposed project.).

[82] *City of New York v. United States Dep't of Transp.*, 715 F.2d 732, 743 (2d. Cir. 1983), appeal dismissed, 465 U.S. 1055 (1984).

Act ("NFMA") (16 U.S.C. § 1600 et seq.) and the Multiple-Use Sustained-Yield Act of 1960 (16 U.S.C. §§ 528-531). Nor can the EIS impact valid existing rights. Relevant statutes include the following:

1. FLPMA

Under FLPMA, the BLM is required to manage the public lands on the basis of multiple use and sustained yield.83 "'Multiple use management' is a concept that describes the task of achieving a balance among the many competing uses on public lands, 'including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and [uses serving] natural scenic, scientific and historical values.'"84 FLPMA also mandates protection of valid existing rights.

2. Energy Policy Act of 2005

The Energy Policy Act of 2005 (EPCA) requires federal land management agencies to ensure that the least restrictive stipulations are utilized to protect many of the resource values to be addressed. Such is not the case in this FEIS. Here, the agencies failed to demonstrate that less restrictive measures were considered but found insufficient, and the FEIS purports that the LUPA is the only viable Alternative; insofar as the BLM also dismissed its own NEPA requirements, as well as other state and local statutes from Alternative A or Chapter 4.

3. Energy Policy and Conservation Act of 2000 (EPCA)

BLM Field Offices must review all current oil and gas lease stipulations to make sure their intent is clearly stated and that measures are the <u>least restrictive necessary</u> to accomplish the desired protection. Consideration of less restrictive measures must be included in the EIS. In April 2003, field offices were directed to comply with four EPCA planning integration principles:

1) Environmental protection and energy production are both desirable and necessary objectives of sound land management and are not to be considered mutually exclusive priorities.
2) The BLM must ensure appropriate accessibility to energy resources necessary for the nation's security while recognizing that special and unique non-energy resources can be preserved.
3) Sound planning will weigh relative resource values, consistent with the FLPMA.
4) All resource impacts, including those associated with energy development and transmission will be mitigated to prevent unnecessary or undue degradation (BLM 2003a)."

The alternatives considered in this FEIS are inconsistent with statutory authorities and unduly narrow and biased against multiple uses of public lands. For all of the above reasons, the FEIS analysis process is arbitrary, capricious and an abuse of discretion.[85]

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[83] 43 USC § 1701(a)(7) (2006).
[84] *Norton v. Southern Utah Wilderness Alliance*, 542 U.S. at 58 (quoting 43 U.S.C. § 1702(c)).
[85] 5 U.S.C. § 706.

D. Climate Change

Garfield County takes issue with characterization of climate change as a "profound" threat. Analysis of climate change should be outside the scope of this EIS. First, its effects are not within the reasonably foreseeable future. Second, regional climate models are problematic because they compound the inherent problems in the global models and lack verifiability due to insufficient "calibration" data necessary to perform proper statistical analysis.[86] Localized climate projects are problematic for mountainous areas because current global climate models are unable to capture the variability of climate phenomena in mountainous regions at a local or regional scale.[87] Despite these gross limitations, BLM leaps to the conclusion that climate change is a threat in the planning area. This type of predetermined analysis is clearly inconsistent with the best available science standard under the ESA and the standards of quality and objectivity required by the DQA, and the question of climate change as it relates to changes in RMPA guidance with managing sage-grouse habitats is well outside the scope of the purpose and need of this FEIS. This NEPA process is not a proper tool to attempt to regulate climate change.

E. Insufficient Economic Analysis

[Chapter 3, Page: 252-282] The FEIS Social and Economic Conditions is a superficial discussion of potential impacts, it fails to give a concrete economic analysis of the proposed action. It greatly discounts the adverse effects of the proposed action. There is no analysis of loss of jobs in Garfield County, State and Federal revenues and property tax. Table 3.95, page 3-281 refers to tax revenues by County. There is no further analysis to show Garfield County property tax revenues are 70.2 percent attributable to oil and gas property tax. Nor do the Social/Economic conditions reflect the importance of oil and gas property taxes to the special districts in Garfield County. Three fire districts, two school districts, a hospital district and park district receive 70-95 percent of their property tax revenues from oil and gas property taxes.[88]

The FEIS contains only a very brief discussion of the potential economic impacts. It fails to give a concrete economic impact analysis between the Alternatives. This cursory review is insufficient. Moreover, the BLM greatly discounts the adverse effects of implementation of the action alternatives. Regulatory

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[86] The global model commonly relied upon is the 2007 Intergovernmental Panel on Climate Change (IPCC), which recognizes its fundamental uncertainties stating, "uncertainty in climate change projections has always been a subject of previous IPCC assessments Uncertainty arises in various steps towards a climate projection (figure reference omitted). For a given emissions scenario, various biogeochemical models are used to calculate concentrations of constituents in the atmosphere. Various radiation schemes and parameterizations are required to convert these concentrations to radiative forcing. Finally, the response of the different climate system components (atmosphere, ocean, sea ice, land surface, chemical status of atmosphere and ocean, *etc.*) is calculated in a comprehensive climate model. In addition, the formulation of, and interaction with, the carbon cycle in climate models introduces important feedbacks which produce additional uncertainties." Available at: http://www.ipcc.ch/publications and data/ar4/wg1/en/ch10s10-1.html; Foley, A.M., Uncertainty in Regional Climate Modeling: A Review, Progress in Physical Geography, 34(5) 647–670, 2010.

[87] *See, e.g.* 78 Fed. Reg. 2509.

[88] *See* Economic Impacts of Sage-Grouse Management Supplement Report, Piceance Basin Development Analysis prepared by BBC Research and Consulting for Garfield County Community Development Department, attached as Exhibit FF.

hurdles and red tape are amongst the most formidable threats to the viability of multiple uses of public lands.

For example, the BLM insufficiently considered the economic impacts of oil and gas. The University of Colorado's Leeds School of Business reports that Colorado's oil and gas industry recorded $9.3 billion in production value in 2012.[89] With direct employment of more than 51,200 jobs and average wages over $74,800; oil and gas is crucial to a strong and growing economy in Colorado.[90] Domestic oil and gas production from northwestern Colorado will help reduce dependence on foreign oil and provide much-needed jobs and revenues. BLM has failed to adequately consider these issues in its NEPA analysis.

The BLM must also comply with Executive Order No. 13211.[91] That order directs any agency that takes an action with a "significant adverse effect" on the supply of domestic energy resources to "appropriately weigh and consider the effects of the Federal Government's regulations on the supply, distribution, and use of energy," and to prepare and submit to OMB's Office of Information and Regulatory Affairs a "Statement of Energy Effects" for their "significant energy actions."[92]

III. Best Available Science and Data Quality

The BLM should rely upon data of the highest integrity and accuracy in the FEIS. Throughout the FEIS, frequently cited sources fail to meet: (1) the best available science standard under the ESA;[93] and (2) standards of integrity, objectivity, and transparency under the DQA.

Moreover, BLM's Instruction Memorandum No. 2012-044 specifies, "[W]hile these conservation measures are range-wide in scale, it is expected that at the regional and sub-regional planning scales there may be some adjustments of these conservation measures in order to address local ecological site variability" and that "...it is anticipated that individual plans may develop goals and objectives that differ and are specific to individual planning areas." [emphasis added].

As you know, Garfield County has provided maps to a level of detail that far surpasses current BLM and state maps. Notwithstanding the direction in IM 2012-044[94] that maps, "...may change as new information becomes available," the BLM has failed to incorporate the best available science as provided by the County.

The FEIS also runs afoul of the Data Quality Act ("DQA").[95] Both the DQA and the Office of Management and Budget Guidelines ("OMB Guidelines") implementing it require agencies to "ensure and maximize"

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[89] Brian Lewandowksi and Richard Wobbekind, *Assessment of Oil and Gas Industry: 2012 Industry Economic and Fiscal Contributions in Colorado* (July 2013), http://www.coga.org/pdf_studies/UniversityofColorado_LeedsSchoolofBusiness_Oil&NaturalGasIndustry_EconomicStudy2012.pdf.
[90] *Id.*
[91] *Available at:* http://www.gpo.gov/fdsys/pkg/FR-2001-05-22/pdf/01-13116.pdf.
[92] Exec. Order No. 13211, 66 Fed. Reg. 28355 (May 18, 2001).
[93] 16 U.S.C. §1533(b)(1)(A).
[94] *See* BLM Instructional Memorandum dated December 27, 2011
[95] 44 U.S.C. §§3504(d)(1), 3516.

the quality, objectivity, utility, and integrity of information disseminated by federal agencies.[96] Here, BLM has failed to meet the requirements of the DQA and applicable Guidelines in the sufficiency of disclosure of data sources and methodology used in the information disseminated, and has dismissed other competing habitat mapping and management efforts. Moreover, the FEIS and documents relied upon therein, do not rise to the standards of objectivity, utility and integrity required under the DQA.

Existing conservation measures are among the important issues the FEIS failed to properly consider. For example, a study prepared by SWCA Environmental Consultants found that most major oil and natural gas companies have more stringent standards in place than federal agencies acknowledge.[97] From just a sample of 103 NEPA documents for oil and natural gas projects, the study found that companies have implemented 773 conservation measures for GRSG.[98] These measures include monitoring existing populations; restricting human activities to protect leks; interim and final reclamation; noxious weed control; dust suppression through application of water or chemical suppressant to roadways; seeding of all disturbed areas that are not used during the well production phase; NSO buffers to protect wetlands; general noise abatement; and habitat improvement and mitigation projects.[99]

In addition, the Western Governors Association on released its 2014 Sage-Grouse Inventory on April 2, 2015. This highlights the effective conservation work undertaken by public, private and non-governmental groups during the past year across the 11-state range of the greater sage-grouse.[100] In addition to recording state and local government conservation initiatives, it also includes reports from federal agencies, conservation districts, tribes, industry and nonprofits.[101]

The BLM has impermissibly disregarded such efforts, and failed to incorporate these facts in Chapter 3. In addition, there has been no "full and fair discussion" as to sage-grouse status as a sensitive species[102] or on the adverse impacts that the onerous proposed restrictions will have in the planning area. Finally, the agencies have clearly failed to recognize the states' primary authority over wildlife management and the County's vital role in land use planning and conservation.

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[96] DQA §515(a), OMB Guidelines, § 11(2), 67 Fed. Reg. at 8458.

[97] SWCA Environmental Consultants, *Evaluation of the NEPA Process as an Adequate Regulatory Mechanism to Eliminate or Minimize Threats to Greater Sage-Grouse Associated with Oil and Gas Development Activities*, http://www.westernenergyalliance.org/sites/default/files/images/WesternEnergyAlliance_GRSG_NEPA_Final_071414.pdf (July 2014).

[98] *Id.* at pages 1, 6, and 8.

[99] *Id.* at page 7-8.

[100] Western Governors Association, *Sage-Grouse Inventory*, http://westgov.org/images/dmdocuments/2014_WGA_Sage_Grouse_Inventory_Final_lo_res.pdf (Released April 2, 2015).

[101] *Id.* at page 4.

[102] *See* 40 CFR § 1502.1.

IV. Conclusion

As stated at the outset of these comments, despite our sincere efforts to coordinate with the BLM and participate as a Cooperating Agency in this process, it is evident our comments, local plans, and peer reviewed best available science provided to the BLM over the last three years have been summarily dismissed. Nonetheless, we offer this body of comments in our continued effort to participate in good faith in hopes that the BLM will consider and properly evaluate our comments as originally required by the BLM's own Instructional Memorandum 2012-044, NEPA, FLPMA, etc. As evident throughout these comments, it is unfortunate the BLM has failed to properly evaluate the No Action Alternative because existing rules, regulations, policies and local plans are more than adequate for the conservation of habitat and preservation of the species. We strongly urge BLM to re-visit its mandate to manage for multiple-uses and to adopt and incorporate Garfield County's Greater Sage-Grouse Conservation Plan and mapping as the best available science into the preferred alternative for lands contained within Garfield County managed by the Bureau of Land Management.

Very truly yours,

Tom Jankovsky, Commissioner
(On behalf of the Garfield County Board of County Commissioners)

cc: The Honorable John Hickenlooper, Governor, State of Colorado
The Honorable Cory Gardner, U.S. Senate
The Honorable Michael Bennet, U.S. Senate
The Honorable Scott Tipton, U.S. House of Representatives
The Honorable Bob Rankin, State House of Representatives
Neil Kornze, Director, Bureau of Land Management
Tom Tidwell, Chief, U.S. Forest Service
Erin Jones, NEPA Coordinator, BLM, Grand Junction
Mike King, Executive Director, Colorado Department of Natural Resources
Robert Broscheid, Director, Colorado Parks & Wildlife

Exhibits Contained in three Ringed Binders

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B. BLM Instructional Memorandum 2012-044, December 27, 2011
C. Letter to BLM requesting Cooperating Agency Status & Coordination, February 14, 2012
D. Letter to BLM regarding Garfield County Scoping Comments, March 20, 2012

E. Resolution 2012-51: Garfield County Asserting Coordination, June 18, 2012
F. Letter to BLM Director Helen Hankins requesting Coordination, June 18, 2012
G. Garfield County Coordination Meeting Transcript, July 17, 2012
H. Letter to BLM Director, Helen Hankins, August 13, 2012
I. Garfield County Coordination Meeting Transcript, August 27, 2012
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K. Letter to Jim Cagney from Governor Hickenlooper, January 14, 2014
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S. Letter to Mike King, Colorado Department of Natural Resources, October 21, 2013
T. Garfield County comments on the BLM DEIS, December 2, 2013
U. Garfield County Commissioner Tom Jankovsky Congressional Testimony, April 8, 2014
V. Garfield County Greater Sage Grouse Conservation Plan, as amended, November 17, 2014
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X. Letter to BLM Director attaching DQA Challenge to County DEIS Comments, April 9, 2015
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   Exhibit A- *The NTT Report Fails to Meet DQA Standards*
   Exhibit B- *Studies Cited in the NTT and COT Reports Fail DQA Standards*
   Exhibit C- *Studies that Were Not Included in the NTT and COT Reports*
   Exhibit D- *Peer Review and Information Quality Breakdown in an Endangered Species Act Decision: The Case of the Greater Sage-Grouse*
AA. Data Quality Act Challenge to USFWS on COT Report, March 18, 2015
   Exhibit A- *The COT Report Fails to Meet DQA Standards*
   Exhibit B- *Studies Cited in the NTT and COT Reports Fail DQA Standards*
   Exhibit C- *Studies that Were Not Included in the NTT and COT Reports*
   Exhibit D- *Peer Review and Information Quality Breakdown in an Endangered Species Act Decision: The Case of the Greater Sage-Grouse*
BB. Data Quality Act Challenge to USGS on the Monograph, March 18, 2015
   Exhibit A- *Ecology and Conservation of Greater Sage-Grouse: Landscape Species and Its Habitats, An Analysis of the four most influential chapters of the monograph*

Exhibit B- *A Comprehensive Review of Greater Sage-Grouse: Ecology and Conservation of a Landscape Species and Its Habitats*
Exhibit C- *Peer Review and Information Quality Breakdown in an Endangered Species Act Decision: The Case of the Greater Sage-Grouse*

CC. Garfield County Greater Sage-Grouse Populations in the PPR/ State of Colorado
DD. Garfield County CORA Request to CPW, March 5, 2013
EE. CPW Response to Garfield County CORA Request, March 8, 2013
FF. BBC Research Report Regarding the Economic Impact of Sage-Grouse Management
GG. Comments on FEIS on BLM Comment Matrix

Greater Sage-Grouse

Conservation Plan

Colorado Division of Wildlife, Kathleen Tadvick, April 2007

Parachute-Piceance-Roan (PPR)

Final – April 29, 2008

Prepared by Parachute-Piceance-Roan (PPR) Work Group

Parachute-Piceance-Roan (PPR) Greater Sage-Grouse Conservation Plan

April 29, 2008

Prepared by

Parachute-Piceance-Roan (PPR) Greater Sage-Grouse Work Group

Copies of the Plan may be obtained from:

Colorado Division of Wildlife

Northwest Region Office
Wildlife Conservation Manager
711 Independent Ave.
Grand Junction, CO 81505

Meeker Service Center/Area 6 Office
PO Box 1181
Meeker, CO 81641

The Work Group may be contacted via the Colorado Division of Wildlife at:

Colorado Division of Wildlife, Wildlife Conservation Section, Northwest Region Office, 711 Independent Ave., Grand Junction, CO 81505

Literature citation should read as follows:

Parachute-Piceance-Roan (PPR) Greater Sage-Grouse Work Group. 2008. Parachute-Piceance-Roan (PPR) Greater Sage-Grouse Conservation Plan. Colorado Division of Wildlife, Denver, Colorado.

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ACKNOWLEDGEMENTS

The PPR Work Group would like to acknowledge the following people and organizations for their help and assistance in the effort that went into this plan: The Rifle Fire Protection District and Garfield County for allowing us to use their meeting spaces; Mancinelli's Pizza and Subs in Rifle for getting the food to the meetings on time; Garfield County for providing the services of Indra Briedis to record the proceedings of our meetings; Indra for her patience and attention to detail; Cathy Neelan for her facilitation services and keeping us focused on the task at hand; Dave Moreno of APHIS for his presentation informing on predator management; Tony Apa and Jeff Beck, CDOW grouse researchers, for sharing their knowledge and information on sage grouse; Mike Lopez for going above and beyond the call by representing the PPR Work Group on the State Steering Committee that developed the Colorado Conservation Plan; Angie Varela of CDOW for videotaping and editing the interviews with Max Altenbern, Bill Brennan and Pat Johnson; Max, Bill and Pat for doing the interviews and sharing their recollections; Tim and Chris Uphoff for hosting the interviews at their residence; Karin Eichoff of the CDOW GIS group for producing the maps and invaluable help in formatting them for the document; and last but far from least John Toolen, Wildlife Conservation Biologist CDOW for his knowledge and devotion to the completion of this plan.

EXECUTIVE SUMMARY

The Parachute-Piceance-Roan (PPR) Greater Sage-Grouse Conservation Plan informs and guides the activities of participants of the local PPR Greater Sage-Grouse Work Group and others who care to use the Plan. The Work Group came together in response to perceived needs: 1) to learn more about this sage-grouse population for the purpose of maintaining and improving their habitat in the face of potential listing of the bird as a threatened or endangered species, and 2) to develop a framework to guide management efforts and maintain the sage-grouse population while integrating existing and potential land use activities on public and private lands in the area. The Plan was cooperatively developed over a period of nearly 3 years by the Work Group on the basis of listening to each other's interests and concerns and striving to achieve a balance of interests that will allow various activities to continue while being aware of potential effects on the grouse and "working around" the grouse where possible. The Plan and participation in its implementation is strictly voluntary on the part of any persons, agencies, or companies, though any are free to include portions of it within their internal policies or mandates as appropriate.

The Parachute-Piceance-Roan population of Greater Sage-Grouse occupies the mid-to high elevation (7000 to 9000 feet) areas of the three drainages in the descriptive name. The area occupied by the birds currently is smaller than 50 years ago, when adjacent lower elevation country in the Rifle, Silt, DeBeque and Plateau Creek areas had resident birds. The current three year running average for high male counts is 195, which is larger than some remaining populations in Colorado, but relatively small compared to the Northwest Colorado or North Park populations. Over the years, it appears that the PPR birds are increasingly isolated by distance from the nearest populations of birds north of the White River and in the Meeker and Rangely areas. Many factors are thought to be contributing to the decline of sage-grouse populations. Several factors (primarily human activities) are identified as contributing to impacts on sage-grouse populations and their habitat. A number of human factors and natural processes play a role in influencing grouse habitat from year to year and decade to decade. Compared to other areas in Colorado, the PPR area is beginning to experience unprecedented levels and intensity of natural gas well development within the range of a sage-grouse population. Addressing impacts from this activity on sage-grouse populations is one of the major focal points of this Plan, and Was perhaps the most time-consuming and heavily analyzed part of the Plan.

The Plan's Introduction contains the purpose and guiding principles and describes the process used to bring the Work Group together to develop the Plan. A Conservation Assessment describes the biology and life history, distribution, abundance, and genetics of the Greater Sage-Grouse with the best available information known from across its range, and also brings together information that is known about the local population. The Conservation Assessment is intended to be the "building block" providing the best available science for informing development of conservation strategies.

The section "Conservation Strategies" address the primary topics of interest and concern in the PPR area and outline specific conservation actions for each strategy. The strategies specify who is to perform them and establishes a timeline for doing so. Over one-hundred specific actions are identified in the Conservation Strategies. Ensuring the continuing existence of the PPR Greater Sage-Grouse population will be a challenge. The efforts of the Work Group participants to work

together for the grouse are encouraging. This Plan is intended to provide a basis for the group to go forward to manage and conserve grouse in the area while also continuing or expanding other activities that are the particular mission or livelihood of the landowners involved, be they public or private.

I. INTRODUCTION

A. Purpose

This document (the Plan) establishes a process and a framework that will guide management efforts directed at improving sage-grouse habitat and increasing numbers of Greater Sage-Grouse (sage-grouse) in the Parachute Creek/Piceance Creek/Roan Creek area. The Plan's components include the Work Group's guiding principles, descriptions of the environment in western Garfield and Rio Blanco counties, a section on the biology of Greater Sage-Grouse and their habitat requirements, the conservation strategies developed by the Work Group, an outline of conservation actions and an implementation schedule.

The purpose of the Plan is to provide for coordinated management across jurisdictional/ownership boundaries and to develop the wide community support that is necessary to assure survival and improve the sustainability/longevity/vigor of Greater Sage-Grouse in the Parachute-Piceance-Roan area. Designed to be dynamic, the Plan will be flexible enough to include new information and issues, as well as results from previous conservation efforts. It is also designed to answer questions and improve data collection necessary for future resource management decisions.

The possibility for listing of the Greater Sage-Grouse under the Endangered provided some of the PPR Work Group's impetus to develop this Plan. Four petitions that would have affected GrSG in Colorado were submitted to the U.S. Fish and Wildlife Service (USFWS) to list the species (or a subspecies) as threatened or endangered under the Endangered Species Act (ESA). Three of these petitions were to list all GrSG as either endangered or threatened, and for all, listing the species was found "unwarranted" (U.S. Fish and Wildlife Service 2005). A court complaint was filed on July 14, 2006, from Western Watersheds Project, alleging that the USFWS 12-month finding is incorrect, arbitrary, and unwarranted by the facts. In December, 2007, the court granted the motion by the plaintiff and the USFWS will be required to review its earlier decision to not list the species. The fourth petition requested to list the eastern subspecies (*Centrocercus urophasianus urophasianus*) as endangered. The U.S. Fish and Wildlife Service found there was not substantial information that listing the subspecies was warranted, and specifically that there was insufficient evidence that the eastern sage-grouse is a valid subspecies or a "Distinct Population Segment" (U.S. Fish and Wildlife Service 2004). Regardless of the current status of GrSG petitions under the ESA, or of debate about the details of the species' status, sage-grouse conservation clearly deserves immediate attention by responsible conservation agencies.

B. Guiding Principles

- Involve the public in the planning and decision process.
- Maintain an atmosphere of cooperation and participation among public land and wildlife managers, private landowners, and other participants while respecting individual views and values.

- Implement conservation actions in a way that meets the needs of Greater Sage-Grouse while also considering and encouraging the maintenance of a stable, productive, and profitable agricultural economic base in Garfield and Rio Blanco counties.
- Make every effort to seek efficiency and integration of efforts, especially between agencies, in the implementation of conservation actions.
- Encourage voluntary participation in Plan implementation and Work Group activities; participation by anyone is strictly voluntary.
- Review, revise and update the Plan as necessary through the Work Group process.

C. Process

Agency and industry concern about the status of the GRSG in the PPR area was fueled by a pending ruling by the USFWS to list the GRSG as threatened or endangered. In November 2004, biologists from the Colorado Division of Wildlife (CDOW), the Bureau of Land Management (BLM) and consultants representing the natural gas energy companies met in Meeker, Colorado, to discuss data needs and issues affecting wildlife with the rapidly expanding energy industry in the Piceance Basin. It was agreed that there was a severe shortage of data for the Greater Sage-Grouse population. From December 2004 through March 2005, four additional meetings were held in Rifle to plan and schedule spring lek counts and other data collection projects. By March 2005 the group agreed that a working group should be formed by the CDOW to begin a conservation planning effort patterned after the successful work of completing the Northern Eagle/Southern Routt Greater Sage-Grouse Conservation Plan. Conservation Plans have also been prepared for GrSG populations in Middle Park, North Park and Northwest Colorado (Moffat, western Routt and part of northwest Rio Blanco counties).

The CDOW took the lead, provided briefings in April 2005 on the process to county commissioners in Mesa, Garfield and Rio Blanco counties and held public information meetings in June, 2005 at the Rock School on Piceance Creek, the Cowboy Chapel on Roan Creek and in Rifle. The public meetings provided information about the need for a conservation plan and to recruit participants for the planning process. Special effort was made to invite landowners, county representatives and energy-related industry officials to participate in the process. Every effort was made to identify and invite all potential stakeholders to participate in the process. A mailing list was developed and meeting announcements distributed to inform interested parties of Work Group meetings.

Monthly Work Group meetings were held from July, 2005 through July, 2007. The Work Group established a list of issues affecting sage-grouse in the area and worked through consensus to develop a Conservation Strategy (a “map” to guide management of sage-grouse and to provide guidance for on-the ground activities that may affect sage-grouse). A facilitator was hired to conduct the meetings and to help build consensus. This person had no vested interest in the outcome of the Plan and was there to build trust among the stakeholders and insure that all stakeholders had equal input into the Plan. The process was based on the recognition of mutual benefits, which were expressed in the goals, objectives, and actions. The Work Group agreed to use a four step process in designing the Conservation Strategy: (1) Issues were discussed and Conservation Actions proposed at a monthly meeting of the Work Group. (2) At each meeting, the Work Group reviewed and modified draft Conservation Actions. (3) The modifications were

mailed out (in most cases, e-mail was used) with meeting notes to everyone on the mailing list for review. (4) At subsequent meetings the Conservation Actions were discussed, sometimes further modified, and adopted. A tentative schedule was developed to discuss the different issues and the Work Group made every effort to invite key stakeholders for specific issues of interest. For example, recreation groups were contacted prior to the meeting in which conservation actions relating to recreation were developed. The same was done for issues including data availability, habitat quality, grazing, predation, industrial development and water projects. Meeting notices and summaries were mailed to all interested parties throughout the process. Although every stakeholder who expressed an interest was included in the mailing list, many of the interested parties did not attend the meetings for a variety of reasons. However, many stakeholders consistently participated throughout the duration of the Plan's development.

The initial idea was to call this group of GrSG the "Roan Plateau population". This name was not used to avoid confusion with the area described in the BLM's Roan Plateau EIS for development of the natural gas resource on the east end of the plateau, which is currently under public scrutiny and the source of much controversy. The term PPR (short for Parachute, Piceance, and Roan Creeks) is more cumbersome, but adequately describes the area (drainages) in which the birds reside. Another source of confusion is the term "Piceance Basin". Geologists use the term to describe the 6000 square mile subsurface gas field that is found under portions of Moffat, Rio Blanco, Garfield Mesa, Delta, Gunnison and Pitkin counties (Toal 2005). Biologists use the same label for the smaller hydrologic unit, i.e. all the terrain that drains into Piceance Creek and Yellow Creek in Garfield and Rio Blanco counties. In this report, we will attempt to clarify which term, biological or geological, applies to the point under discussion.

The draft Plan was issued in February, 2008 for public review and comment. Seventy-four comments were received, summarized by the DOW and all realistic and appropriate comments were incorporated into the Plan by agreement of the Work Group. A follow up draft was issued in March, 2008. Ten comments were received, reviewed by a "Comment Review Committee" and appropriate comments were again incorporated into the Plan. The final Plan was signed and became official April 29, 2008.

The Plan outlines future monitoring and evaluation efforts. Monitoring and evaluation are necessary to assess sage-grouse population and habitat trends in the area, assist in planning cooperative efforts to improve sage-grouse habitats, continually inform affected parties and USFWS and review additional issues as the landscape context changes. As such, this Plan should be viewed as flexible and dynamic, subject to review and revision by the Work Group as situations change and new information becomes available. As this is written, an "Annual Work Group Meeting" is anticipated for June each year, coinciding with the availability of the latest lek count data from April and May.

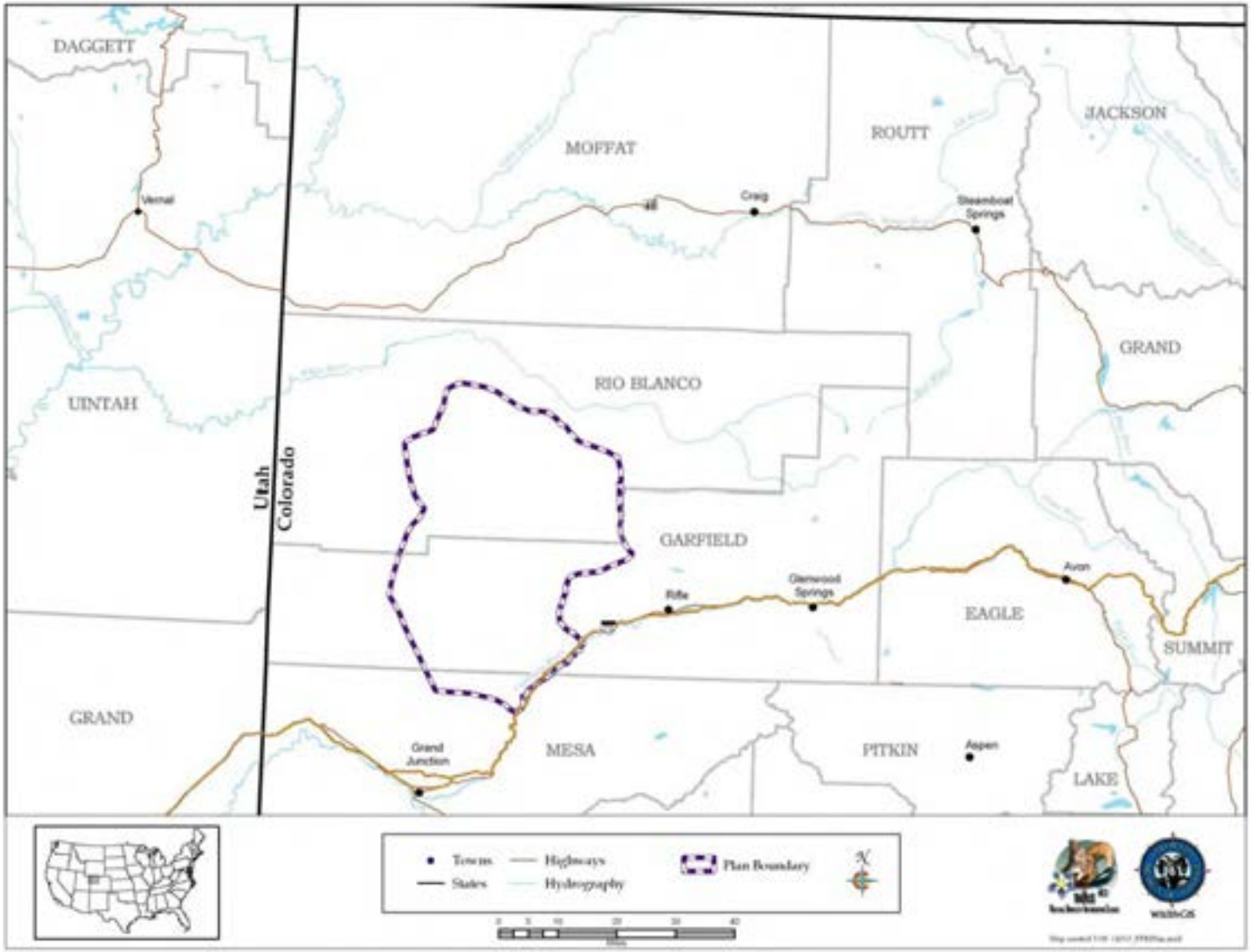

Figure 1. Location Map, Parachute-Piceance-Roan Area

II. CONSERVATION ASSESSMENT

Colorado Division of Wildlife, Kathleen Tadvick, April 2007

Male Greater Sage-Grouse inflating his air sacs.

In this section we provide the most current background information on Colorado GrSG biology, distribution, abundance, and genetics. We identify and describe pertinent mapping efforts, and we estimate current population size, degree of genetic isolation, and amount and status of habitat. We also catalogue recent conservation efforts for GrSG and their habitats.

A. Biology and Life History

1) Species Description

Sage-grouse, the largest grouse species in North America, were first described by Lewis and Clark in 1805 (Schroeder et al. 1999). They are known for their strong association with sagebrush habitat, using sagebrush for both food and cover at all times of year. The species was originally given the scientific name *Tetrao urophasianus* (Bonaparte 1827), but was later renamed *Centrocercus urophasianus* (Swainson and Richardson 1831). Aldrich (1946) described eastern (*C. u.urophasianus*) and western (*C. u. phaios*) subspecies, but Benedict et al. (2003) found no genetic support for this distinction. All sage-grouse were considered a single species until Gunnison sage-grouse (*C. minimus*) were recognized as a separate species (Young et al. 2000), with all other sage-grouse now termed “greater sage-grouse”. The 2 species are

differentiated morphologically, by size (Hupp and Braun 1991, Young et al. 2000) and plumage (Young et al. 2000), genetically (Kahn et al. 1999, Oyler-McCance et al. 1999), and behaviorally by differences in strutting behavior (Barber 1991, Young 1994, Young et al. 2000). The current ranges of the 2 species are not overlapping or adjacent (Schroeder et al. 2004).

Greater sage-grouse are sexually dimorphic in size and plumage. Adult males weigh 5.5 – 7.0 pounds, adult females are 2.9 – 3.8 pounds, yearling males range from 4.9 – 6.2 pounds, and yearling females weigh 2.6 – 3.5 pounds (Schroeder et al. 1999). All GrSG are brownish-grey, and have black bellies, dark brown primary feathers, long tails, and yellow-green eye combs, but other features vary. Males sport a contrasting white upper breast and black bib at the throat, long black filoplumes at the base of the neck, and 2 yellowish air sacs on the chest, which are most conspicuous when inflated during courtship displays.

The life history characteristics of GrSG and Gunnison's sage-grouse (GuSG) are very similar. In this section, if data are specific to GuSG, it is so noted. Otherwise, all references are for GrSG.

2) Food Habits

Unlike many other game birds, sage-grouse do not possess a muscular gizzard (Patterson 1952) and therefore lack the ability to grind and digest seeds. They only occasionally, by accident, consume grit (Rasmussen and Griner 1938, Leach and Hensley 1954). With the exception of some insects in the summer, the year-round diet of adult sage-grouse consists of leafy vegetation.

Sagebrush leaves are the primary food source during the early spring (Patterson 1952, Rogers 1964, Wallestad et al. 1975). In the pre-egg-laying period, females may select forbs that are generally higher in calcium and crude protein than sagebrush (Barnett and Crawford 1994). During the first 3 weeks after hatching, GrSG chicks focus on insects (beetles, ants, grasshoppers) as their primary food (Patterson 1952, Trueblood 1954, Klebenow and Gray 1968, Savage 1968, Peterson 1970, Johnson and Boyce 1990, Johnson and Boyce 1991, Drut et al. 1994*b*, Pyle and Crawford 1996, Fischer et al. 1996*b*). Johnson and Boyce (1990) demonstrated in laboratory studies in Wyoming that GrSG chick growth and survival rates increase with the quantity of invertebrates in the diet. They also found that invertebrate forage is required to sustain GrSG chicks until they are at least 21 days old.

Diets of 4 to 8-week-old chicks were found to have more plant material (approximately 70% of the diet) than those of younger chicks, of which 15% was sagebrush (Peterson 1970). Succulent forbs are predominant in the diet until chicks exceed 3 months of age, at which time sagebrush becomes a major dietary component (Gill 1965, Klebenow 1969, Savage 1969, Connelly and Markham 1983, Gates 1983, Connelly et al. 1988, Fischer et al. 1996*b*, Huwer 2004). In Moffat and Grand Counties in Colorado, Huwer (2004) used human-imprinted GrSG chicks to experimentally test the hypothesis that chick growth rates increase with forb abundance. She found that in known brood-rearing areas with <10% to >20% forb composition, chick growth rates increased with forb abundance.

Although insects are consumed by adult grouse (Patterson 1952, Rogers 1964, Wallestad et al. 1975), forbs and sagebrush leaves comprise a majority of the summer diet (Rasmussen and

Griner 1938, Moos 1941, Knowlton and Thornely 1942, Patterson 1952, Leach and Hensley 1954). Highly used forbs include common dandelion, prickly lettuce, hawksbeard, salsify, milkvetch, sweet clover, balsamroot, lupine, Rocky Mountain bee plant, alfalfa, and globemallow (Girard 1937, Knowlton and Thornley 1942, Batterson and Morse 1948, Patterson 1952, Trueblood 1954, Leach and Browning 1958, Wallestad et al. 1975, Barnett and Crawford 1994). The quantity and make-up of forbs in adult GrSG summer diets varies with location.

From late-autumn through early spring the diet of GrSG is almost exclusively sagebrush (Girard 1937, Rasmussen and Griner 1938, Bean 1941, Batterson and Morse 1948, Patterson 1952, Leach and Hensley 1954, Barber 1968, Wallestad et al. 1975). Many species of sagebrush may be consumed, including big, low, silver, and fringed sagebrush (Remington and Braun 1985, Welch et al. 1988, 1991, Myers 1992, Connelly et al. 2000*c*). GrSG have been shown to select differing subspecies of sagebrush for their higher protein levels and lower concentrations of monoterpenes (Remington and Braun 1985, Myers 1992). Sage-grouse can gain weight over the winter (Beck and Braun 1978, Hupp 1987, Remington and Braun 1988, Hupp and Braun 1989a), but in exceptionally harsh winters, fat reserves can decrease (Hupp and Braun 1989a). During particularly severe winters sage-grouse are dependent on tall sagebrush that remains exposed above the snow.

3) Life History and Movements

a) Breeding

Sage-grouse are charismatic birds known for their elaborate spring mating ritual, where males congregate and “dance” to attract mates on traditional “strutting grounds”, more generally referred to as "leks" (Patterson 1952, Gill 1965). During the display, males step forward with their tail feathers and filoplumes held upright, inflate their air sacs, and produce distinctive “plop” sounds (Schroeder et al. 1999). Lek sites are open areas that have good visibility (allowing sage-grouse a greater opportunity to avoid predation) and acoustical qualities so the sounds of display activity can be heard by other sage-grouse.

The sage-grouse mating system is polygamous (i.e., a male mates with several females). Adult males defend territories within the lek arena, sometimes exclusively (Dalke et al. 1963, Wiley 1973*a*, Gibson and Bradbury 1987, Hartzler and Jenni 1988), and sometimes with overlap among territories (Simon 1940, Scott 1942, Patterson 1952, Wiley 1973*a*, Gibson and Bradbury 1986, Gibson and Bradbury 1987). Males may maintain the same territory in successive years (Dalke et al. 1963, Hartzler and Jenni 1988, Gibson 1992). Defense of a territory may include chases and wing fights with other males (Simon 1940, Scott 1942, Wiley 1973*a*), and can result in injury (Patterson 1952). Subadult males do not establish territories or mate, though they may attend the lek (Patterson 1952, Eng 1963, Wiley 1973*a*).

In Colorado, strutting occurs from mid-March through late May, depending on elevation (Rogers 1964). Males establish territories on leks in early March, but the timing varies annually by 1-2 weeks, depending on weather condition, snow melt, and day-length. Males assemble on the leks approximately 1 hour before dawn, and display until approximately 1 hour after sunrise each day

for about 6 weeks (Scott 1942, Eng 1963, Lumsden 1968, Wiley 1970, Hartzler 1972, Gibson and Bradbury 1985, Gibson et al. 1991).

In Jackson County, Colorado, a seasonal peak of male attendance at leks occurred approximately 30 days following the peak of female attendance (Emmons 1980, Emmons and Braun 1984). Adult male sage-grouse seemed to show more fidelity to lek sites within a season than did yearling males. Emmons (1980) reported that yearling males visited 2-4 leks within a breeding season, while a majority of adult males visited only 1 lek. Emmons and Braun (1984) reported that inter-lek movements were more common than previously reported (Dalke et al. 1960, Wallestad and Schladweiler 1974). Emmons and Braun (1984) further reported that the adult and yearling seasonal lek attendance rates increased to 95-100% and then decreased later in the season.

Walsh (2002) reported much lower lek attendance rates in Grand County, Colorado, although he reported daily attendance rates rather than seasonal rates, and the research was conducted in only 1 breeding season. Lek attendance rate for adult males was 42.0% and ranged from 7.1 – 85.7%. Yearling male attendance rates were even lower at 19.3%, ranging from 0 - 38.5%. Yearling male attendance steadily increased through the season and there was a peak of male and female attendance in mid-April. Walsh (2002) also did not observe any inter-lek movements.

Females generally arrive on leks each morning after the males do, and depart while the males are still displaying. Both males and female juvenile GrSG in Colorado show some degree of natal lek site fidelity (Dunn and Braun 1985). Most females visiting the lek are bred by a few males occupying the most advantageous sites near the center of the lek (Scott 1942, Lumsden 1968, Wiley 1973*a*, Hartzler and Jenni 1988). When a female is ready to mate she invites copulation by spreading her wings and crouching (Scott 1942, Hartzler 1972, Wiley 1978, Boyce 1990). Males provide no parental care or resources and females generally leave the lek and begin their nesting effort immediately after mating.

b) Nesting

GrSG nests are not uniformly distributed within nesting habitat (Bradbury et al. 1989, Wakkinen et al. 1992), although some research indicates that 70-80% of all nests often occur within 2 miles of an active lek (Bradbury et al. 1989, Wakkinen et al. 1992). Research in Idaho has shown movements that range from 2.1-3.0 miles (Wakkinen 1990, Fischer 1994, Apa 1998). Radio telemetry research on GrSG in Colorado from 1978-2005 has illustrated that female movements are extensive, with 52% (n = 271/518) of the radio-marked females nesting within 2 miles of the lek of capture, and 80% (n = 417/518) within 4 miles of the lek of capture (Peterson 1980, Hausleitner 2003, A. D. Apa, CDOW, unpublished data, K. Giesen, retired CDOW unpublished data). In addition, female grouse have been documented moving as far as 15-20 miles from the lek where they were captured (assumed to be the lek upon which they bred; Connelly et al. 2000*c*). More specifically, movements of females from the lek of capture to nest were a little less extensive in some populations within Colorado. Sixty-five percent (n = 64/99) nested within 2 miles and 89% (n = 88/99) nested with 4 miles from the lek of capture (Peterson 1980, K. Giesen, retired CDOW, unpublished data) in North Park. In southern Routt/Northern Eagle 48% (n = 15/31) and 97% (n = 30/31) moved 2 and 4 miles from the lek of capture, respectively (L.

Rossi, CDOW, unpublished data). In northwest Colorado, 49% (n = 192/388) and 77% (n = 299/388) of females moved 2 and 4 miles from the lek of capture, respectively (Hausleitner 2003, A.D. Apa, CDOW, unpublished data).

Nests are typically shallow bowls lined with leaves, feathers and small twigs placed on the ground at the base of a live sagebrush bush (Schroeder et al. 1999). GrSG clutch size ranges from 6-10 eggs, with 7-9 being the most common (Griner 1939, Wallestad and Pyrah 1974, Connelly et al. 1993, Gregg et al. 1994, Schroeder 1997). In Moffat County, Colorado, GrSG clutch size averaged 5.7 eggs for yearling females and 7.0 eggs for adult females (overall average was 6.7 eggs; Hausleitner 2003). In addition, Peterson (1980) reported that the clutch of adult females was 7.0 eggs (range 6-9) and yearling clutches averaged 6.7 eggs (range 5-9). Incubation does not start until the last egg is laid and eggs are incubated 27 to 28 days (Patterson 1952, Peterson 1980).

GrSG have one of the lowest nest success rates of all the upland game bird species (Schroeder 1997), ranging from 63% in Montana to 10% in Oregon (Drut 1994, Connelly et al. 2000*c*). In Moffat County, nest success in 2001-02 ranged from 45-60% (Hausleitner 2003). GrSG nest abandonment is not uncommon if the hen is disturbed. While re-nesting is infrequent, it does occur (Patterson 1952, Eng 1963, Hulet 1983, Connelly et al. 1991). Peterson (1980) reported a 33.3% re-nesting rate (females that lost their first nest and attempted to re-nest), while Hausleitner (2003) reported lower re-nesting rates of 8 and 15% in 2001 and 2002, respectively. Clutch size of re-nesting attempts varies from 4-7 eggs (Schroeder 1997).

Although clutch initiation dates (date of first egg laid) can vary among years and locations, Hausleitner (2003) reported the mean clutch initiation date in Moffat County, Colorado as 26 April in 2001, and 21 April for 2002. Hatching begins around mid-May and usually ends by July. Most eggs hatch in June, with a peak between June 10 and June 20.

c) Survival

The survival rate of GrSG varies by year, sex, and age (Zablan 1993). Adult GrSG survival rates have been estimated from banding or radio telemetry studies (Table 1). There is evidence to suggest that adult female sage-grouse have higher survival rates than do adult males (Swenson 1986). This higher survival rate may be due to sexual dimorphism. Females have cryptic plumage and a more secretive nature, versus the more elaborate plumage and display activities of males (Schroeder et al. 1999). Seasonal female survival in Colorado was highest in winter (Hausleitner 2003). Predation, both on eggs and birds, appears to be a primary cause of mortality (Schroeder et al. 1999); human predation through sport harvest is also a cause of mortality. The availability of food and cover are key factors related to chick and juvenile survival. In Wyoming, survival of juveniles from hatch to fall was estimated to be 38% (June 1963).

Table 1. Annual Survival Rates of GrSG.

GrSG Sample	Survival Rate	Location	Study
Adult females	55%	Colorado	Zablan 1993
Females	75%	Idaho	Connelly et al. 1994
Males	60%	Idaho	Connelly et al. 1994
Females	67%	Wyoming	June 1963
Males	59%	Wyoming	June 1963
Adult Females (2001-2002)	65%	Colorado	Hausleitner 2003
Yearling Females (2001-2002)	71%	Colorado	Hausleitner 2003
Adult females (2002-2003)	48%	Colorado	Hausleitner 2003
Yearling Females (2002-2003)	78%	Colorado	Hausleitner 2003

d) Movements

Sage-grouse move seasonally among habitat types (Connelly et al. 2000*c*; see "Habitat Requirements" in this section). Depending on the dispersion of habitat across the landscape, this may result in the birds using broad landscapes throughout the year, moving great distances in some seasons, and exhibiting annual migratory patterns (Beck 1975, Wallestad 1975, Schoenberg 1982, Hulet 1983, Berry and Eng 1985, Connelly et al. 1988, Wakkinen 1990, Fischer 1994). If seasonal habitats are contiguous, the population may not show movement that could be considered migratory (Schroeder et al. 1999). The extent of movement in a given population varies with dispersion of cover types, topography, and severity of winter weather.

Connelly et al. (2000*c*) outlined 4 different seasonal movement patterns, 3 that are migratory and 1 that is nonmigratory. Nonmigratory populations do not move greater than 6 miles between or among seasonal ranges. Migratory populations may be "2-stage" if they migrate among distinct winter, breeding, and summer ranges, or "1-stage" if they migrate only between 2 different seasonal habitat ranges (Connelly et al. 2000*c*).

Research work in the PPR area by Hagen (1999) and Miller et al. (2007) strongly suggests that the current PPR population is non-migratory. It is not known to what extent, if any, birds formerly occupying the Colorado River Valley from DeBeque moved to or from the high plateaus of Roan and Parachute Creeks.

Chicks are precocial and leave the nest with the hen shortly after hatching. Females with chicks move to areas containing succulent forbs and insects, often in wet meadow habitat, where cover is sufficiently tall to conceal broods and provide shade. Groups of unsuccessful females and flocks of males follow similar habitat use patterns during late spring and early summer, but are less dependent on wet meadow areas than are females with broods.

As fall approaches, intermixing of broods and flocks of adults is common, and the birds move from riparian areas to sagebrush-dominated landscapes that continue to provide green forbs. As

late fall approaches, weather events trigger movements to winter areas. The timing of this movement varies, influenced by yearly weather conditions. Very little is known about dispersal of GrSG juveniles following brood breakup. Dunn and Braun (1985) found that females moved farther than males between their natal area lek and the lek attended in the following spring.

GrSG winter range in Colorado varies according to snowfall, wind conditions, and suitable habitat (Rogers 1964). Sage-grouse may travel short distances or many miles between seasonal ranges. Movements in fall and early winter (September-December) can be extensive, sometimes exceeding 20 miles. In North Park, Colorado, Schoenberg (1982) documented female GrSG moving more than 18 miles from winter to nesting areas. Hausleitner (2003) found that in Moffat County, Colorado, female GrSG moved an average of 6 miles from nesting areas to winter sites. The range of movements was extensive, and ranged from < 0.5-19 miles.

Flock size in winter is variable (15-100+), with GrSG flocks frequently comprised of a single sex (Beck 1977). Many, but not all, flocks of GrSG males can over-winter in the vicinity of their leks, and by March they are usually within 2-3 miles of breeding areas used the previous year. These movements depend on whether the population is non-migratory or moves between 2 or more seasonal ranges (Connelly et al. 2000*c*).

4) Habitat Requirements

Sage-grouse habitat requirements may differ by season (Connelly et al. 2000*c*). Connelly et al. (2000*c*) segregated habitat requirement into 4 seasons: (1) breeding habitat; (2) summer - late brood-rearing habitat; (3) fall habitat; and (4) winter habitat. In some situations, fall and summer-late brood-rearing habitats are indistinguishable, but this depends on the movement patterns of the population and habitat availability. The breeding habitat category includes lekking, pre-laying female, nesting, and early brood-rearing habitat. Summer-late brood-rearing habitat includes habitat used during this period by males, non-brooding females, and females with broods. Fall habitat consists of “transition” range from late summer to winter, and can include a variety of habitats used by males and females (with and without broods). Winter habitat is used by segregated flocks of males and females (Beck 1977). Management of sage-grouse habitats should include all habitat types necessary for fulfillment of life history needs.

For the purpose of this Plan, we have combined the summer-late brood-rearing and fall habitat into a single habitat category, “summer-fall”, resulting in 3 overall seasonal habitats, rather than 4. Summer-late brood-rearing habitat in Colorado is typically characterized by high elevation mesic areas, cropland, wet meadows, and riparian areas adjacent to sagebrush communities. Grouse continue to use these locales as fall approaches and there is a slow conversion of the diet from forbs to sagebrush. As mentioned earlier, in many cases these 2 seasonal habitats are indistinguishable, but in the future, local information may provide additional insight as to when and where late-summer and fall habitats can be clearly separated.

All the seasonal habitats described here include habitat used by brooding females, unsuccessful females, and male flocks.

a) Breeding Habitat: Leks (March – mid-May)

Lek sites can be very traditional, with grouse displaying in the very same location from year to year. Some GrSG leks in Colorado are known to have been in use since the 1950's (Rogers 1964). Leks are usually located in small, open areas, adjacent to stands of sagebrush with 20% or greater canopy cover (Klott and Lindzey 1989). Openings are usually natural, including alkali flats and meadows within sagebrush, but they may also be created by humans, including (but not limited to) small burns, drill pads, irrigated pasture, and roads within sagebrush habitat (Connelly et al. 1981, Gates 1985).

Lek sites do not appear limiting (Schroeder et al. 1999), but they may vary in amount of escape cover and quality of sagebrush (Patterson 1952, Gill 1965, Connelly et al. 1988, Connelly et al. 2000*c*). The size of area needed for males to strut can vary greatly. Lek sites are usually flat to gently sloping areas of <15% slope in broad valleys or on ridges (Hanna 1936, Patterson 1952, Hartzler 1972, Giezentanner and Clark 1974, Wallestad 1975, Dingman 1980, Autenrieth 1981, Klott and Lindzey 1989). Lek sites have good visibility and low vegetation structure (Tate et al. 1979, Connelly et al. 1981, Gates 1985), and acoustical qualities that allow sounds of breeding displays to carry (Patterson 1952, Hjorth 1970, Hartzler 1972, Wiley 1973*b*, 1974, Bergerud 1988*a*, Phillips 1990). The absence of tall shrubs, trees, or other obstructions appears to be critical for continued use of these sites by displaying males.

Sites chosen for display are typically close to sagebrush that is > 6 inches tall and has a canopy cover ≥ 20% (Wallestad and Schladweiler 1974). Usually leks are located in the vicinity of nesting habitat (Wakkinen et al. 1992), and are in areas intersected by high female GrSG traffic (Bradbury and Gibson 1983, Bradbury et al. 1986, Gibson et al. 1990, Gibson 1992, 1996). These sagebrush areas are used for feeding, roosting, and escape from inclement weather and predators. Males are usually found roosting in sagebrush stands with canopy cover of 20-30% (Wallestad and Schladweiler 1974).

Daytime movements of adult male GrSG during the breeding season do not vary greatly. Wallestad and Schladweiler (1974) found daily movements ranged between 0.2 and 0.8 miles from leks, with a maximum cruising radius of 0.9 to 1.2 miles. Ellis et al. (1987) reported that dispersal flights of male GrSG (to day-use areas) ranged from 0.3 – 0.5 miles, with the longest flights ranging from 1.2 – 1.3 miles. Carr (1967) recorded a cruising radius for male GrSG that ranged from 0.9-1.1 miles. Rothenmaier (1979) found that 60-80% of male GrSG locations were within 0.6-0.7 miles of a lek. Emmons (1980) reported that male dispersal distances to day-use areas of 0.1 miles were common and that 67% of all use areas were greater than 0.3 miles from the lek. In addition, Schoenberg (1982) found that male daily movements averaged 0.6 miles, but ranged from 0.02-1.5 miles.

b) Breeding Habitat: Pre-laying (late-March – April)

Connelly et al. (2000*c*) recommend that breeding habitat should be defined to include pre-laying habitat, but little is known or understood about pre-laying habitat. It has been suggested that pre-laying sagebrush habitat should provide a diversity of understory vegetation to meet the nutritional needs of females during the egg development period. For pre-laying females in

Oregon, Barnett and Crawford (1994) suggested that the habitat should contain a diversity of forbs that are rich in calcium, phosphorous, and protein.

c) Breeding Habitat: Nesting (mid-April – June)

GrSG prefer to nest under tall (11-31 inches) sagebrush (Connelly et al. 2000*c*). Peterson (1980) found in North Park, Colorado that nest shrubs averaged approximately 20 inches. In Moffat County, Colorado, this value is slightly higher and ranges from 30-32 inches (Hausleitner 2003). Often, the actual nest bush is taller than the surrounding sagebrush plants (Keister and Willis 1986, Wakkinen 1990, Apa 1998). In northwestern Colorado, the nest bush was nearly 10 inches taller than surrounding shrubs (Hausleitner 2003). The canopy cover of sagebrush around the nest ranges from 15-38% (Patterson 1952, Gill 1965, Gray 1967, Wallestad and Pyrah 1974, Keister and Willis 1986, Wakkinen 1990, Connelly et al. 1991, Apa 1998, Connelly et al. 2000*c*). Sagebrush canopy cover around nests in northwestern Colorado had a similar range of values, and averaged 27% (Hausleitner 2003).

Good quality nesting habitat consists of live sagebrush with sufficient canopy cover, and substantial grasses and forbs in the understory (Connelly et al. 2000*c*, Hausleitner et al. 2005). Few herbaceous plants are growing in April when nesting begins, so residual herbaceous cover from the previous growing season is critical for nest concealment in most areas, although the level of herbaceous cover depends largely on the potential of the sagebrush community (Connelly et al. 2000*c*).

Nearly all nests are located beneath sagebrush plants (Patterson 1952, Gill 1965, Gray 1967, Wallestad and Pyrah 1974), and GrSG nesting under sagebrush plants have higher nest success than those that nest under plants other than sagebrush (Connelly et al. 1991). Herbaceous vegetation is also important in sage-grouse nest sites (Connelly et al. 2000*c*). Grass heights are variable and, as measured across the West, range from 5-13 inches (Connelly et al. 2000*c*). In addition, horizontal grass cover measurements are also variable and range from 4-51% cover. These measurements are similar to data from northwestern Colorado; Hausleitner (2003) reported that grass heights at nests ranged from 5-6 inches, grass cover averaged approximately 4%, and forb cover averaged about 7% (Hausleitner 2003).

Although not clearly understood, it is also believed that understory herbaceous cover (horizontal and vertical) is important for GrSG nesting habitat. In multiple studies, nest sites had taller and more grass cover, and less bare ground, than did random sites (Klebenow 1969, Wakkinen 1990, Sveum et al. 1998*b*, Holloran 1999, Lyon 2000, Slater 2003). In Oregon, both forb and tall grass cover appeared related to nest initiation, re-nesting, and nest success rates (Coggins 1998).

d) Breeding Habitat: Early Brood-Rearing (mid-May – July)

Early brood-rearing habitat requirements are very similar to those for nesting habitat. Early brood-rearing habitat is found relatively close to nest sites (Connelly et al. 2000*c*), but individual females with broods may move large distances (Connelly 1982, Gates 1983). Early brood-rearing habitat is typically characterized by sagebrush stands with canopy cover of 10-15% (Martin 1970, Wallestad 1971), and with understories that exceed 15% herbaceous cover (Sveum

et al. 1998*a*, Lyon 2000). In Moffat County, Colorado, sagebrush stands averaged approximately 11% canopy cover, and herbaceous understories averaged about 14% horizontal cover (Hausleitner 2003). High plant species diversity (sometimes also referred to as species richness) is also typical in early brood-rearing habitat (Dunn and Braun 1986, Klott and Lindzey 1990, Drut et al. 1994*a*, Apa 1998). Sagebrush heights ranged from 6-18 inches in Washington and Wyoming (Sveum et al. 1998*a*, Lyon 2000), and averaged about 23 inches in Moffat County (Hausleitner 2003). Adjacent shrub areas of 20-25% canopy cover have been reported as preferred for escape and day roosting (Wallestad 1971, Dunn and Braun 1986), but night roosting sites in Moffat County, Colorado had only 4% sagebrush canopy cover and sagebrush height was 20 inches (Hausleitner 2003).

In early summer, the size of the area used by GrSG appears to depend on the interspersion of sagebrush types that provide an adequate amount of food and cover. Females and broods may select riparian habitats in the sagebrush type that have abundant forbs and moisture (Gill 1965, Klebenow 1969, Savage 1969, Connelly and Markham 1983, Gates 1983, Connelly et al. 1988, Fischer et al. 1996*a*). Females with broods remain in sagebrush uplands as long as the vegetation remains succulent, but may move to wet meadows as vegetation desiccates (Fischer et al. 1996*b*). Depending on precipitation and topography, some broods may stay in sagebrush/grass communities all summer while others shift to lower areas (riparian areas, hay meadows or alfalfa fields) as upland plant communities desiccate (Wallestad 1975).

For the PPR, broods are generally not found in the alfalfa fields, hay meadows, or riparian areas in the lower valleys and canyons; they probably use mesic upland sites and headwater riparian areas. Local rancher Tim Uphoff can recall only a few instances over four decades that he's seen birds along the West Fork of Parachute Creek.

e) Summer - Fall Habitat (July – September)

As sagebrush communities continue to dry out and many forbs complete their life cycles, sage-grouse typically respond by moving to a greater variety of habitats, and generally more mesic habitats (Patterson 1952). Sage-grouse begin movements in late June and into early July (Gill 1965, Klebenow 1969, Savage 1969, Connelly and Markham 1983, Gates 1983, Connelly et al. 1988, Fischer 1994). By late summer and into the early fall, females with broods, non-brood females, and groups of males become more social, and flocks are more concentrated (Patterson 1952). This is the period of time when GrSG can be observed in atypical habitat such as farmland and irrigated habitats (Connelly and Markham 1983, Gates 1983, Connelly et al. 1988).

From mid-September into October, GrSG prefer areas with more dense sagebrush (>15% canopy cover) and late green succulent forbs before moving to early transitional winter range where sexual segregation of flocks becomes notable (Wallestad 1975, Beck 1977, Connelly et al. 1988). During periods of heavy snow cover in late fall and early winter, use of mountain and Wyoming big sagebrush stands is extensive.

f) Winter Habitat (October-February)

GrSG winter habitat use depends upon snow depth and availability of sagebrush, which is used almost exclusively for both food and cover. Used sites are typically characterized by canopy cover >25% and sagebrush >12-16 inches tall (Schoenberg 1982), and are associated with drainages, ridges, or southwest aspects with slopes < 15% (Gill 1965, Wallestad 1975, Beck 1977, Robertson 1991). In Colorado, <10% of sagebrush habitat is used by GrSG during deep snow conditions (Beck 1977) because most of the sagebrush is buried under the snow. When snow deeper than 12 inches covers over 80% of the winter range, GrSG in Idaho have been shown to rely on sagebrush greater than 16 inches in height for foraging (Robertson 1991). Doherty et al. (2008) found that females preferred landscapes with extensive sagebrush habitat and gentle to flat terrain, and avoided areas with conifers, woody riparian zones, and rough terrain.

Lower flat areas and shorter sagebrush along ridge tops provide roosting and feeding areas. During extreme winter conditions, GrSG will spend nights and portions of the day (when not foraging) burrowed into "snow roosts" (Back et al. 1987). When snow has the proper texture, snow roosts are dug by wing movements or by scratching with the feet.

Hupp and Braun (1989*b*) found that most GuSG feeding activity during the winter occurred in drainages and on slopes with south or west aspects in the Gunnison Basin. In years with severe winters resulting in heavy accumulations of snow, the amount of sagebrush exposed above the snow can be severely limited. Hupp and Braun (1989*b*) investigated GuSG feeding activity during a severe winter in the Gunnison Basin in 1984, where they estimated <10% of the sagebrush was exposed above the snow and available to sage-grouse. In these conditions, the tall and vigorous sagebrush typical in drainages were an especially important food source for GuSG.

Although no specific research has been conducted on winter habitat characteristics or food habitats of Greater Sage-Grouse in the Parachute-Piceance-Roan area, information collected in other parts of Colorado and throughout their range can be used to predict habitat use and food requirements in this area.

Connelly et al. (2000) summarizes the characteristics of productive sagebrush habitat for average western sites used by Greater Sage-Grouse in Table 2. Hausleitner (2003) has more specific information for Moffat County, Colorado breeding and brood-rearing habitat. Some of the vegetation values are higher in Moffat Co. than rest of the U.S., which may also be the case for Rio Blanco and Garfield Counties.

Table 2. Characteristics of Sagebrush Rangeland Needed for Productive Greater Sage-Grouse Habitat (after Connelly et al. 2000, Hausleitner 2003).

CONNELLY ET AL. 2000 GUIDELINES	Breeding (April – June)		Brood-rearing (June – August)		Winter[e]	
	Height	**Canopy**	**Height**	**Canopy**	**Height**	**Canopy**
MESIC SITES[a]:						
-sagebrush	15.7-31.5 inches (40-80 cm)	15-25%	15.7-31.5 inches (40-80 cm)	10-25%	9.8-13.8 inches (25-35 cm)	10-30%
-grasses and forbs	>7.1[c] inches (>18 cm)	≥25%[d]	variable	>15%	N/A	N/A
ARID SITES[a]:						
-sagebrush	11.8-31.5 inches (30-80 cm)	15-25%	15.7-31.5 inches (40-80 cm)	10-25%	9.8-13.8 inches (25-35 cm)	10-30%
-grasses and forbs	>7.1[cf]	≥15%	variable	>15%	N/A	N/A
% Area[b]	>80		>40		>80	

[a] Mesic and arid sites should be defined on a local basis; annual precipitation, herbaceous understory, and soils should be considered (Tisdale and Hironaka 1981, Hironaka et al. 1983).
[b] Percentage of seasonal habitat needed with indicated conditions.
[c] Measured as "droop height"; the highest naturally growing portion of the plant.
[d] Coverage should exceed 15% for perennial grasses and 10% for forbs; values should be substantially greater if most sagebrush has a growth form that provides little lateral cover (Schroeder 1995).
[e] Values for height and canopy coverage are for shrubs exposed above snow.
[f] Specific to nest sites.

Table 2 Continued:

MOFFAT COUNTY DATA (Hausleitner 2003)	**Breeding (April – June)**		**Brood-rearing (June – August)**		**Winter[e]**	
	Height	**Canopy**	**Height**	**Canopy**	**Height**	**Canopy**
MESIC SITES[a] (Danforth Hills):						
-sagebrush (nest and brood sites)	31.1 inch (79 cm) avg. nest bush height	26% (nest sites)	22.9 inch (58 cm) height at brood sites	10.6% at brood sites	No Winter Data	No Winter Data
-sagebrush (random sites)	22.9 inch (58 cm) avg. random sagebrush height	32% (random sites)	17.3 inch (44 cm) height at random sites	14% at random sites	No Winter Data	No Winter Data
-grasses and forbs (nest and brood sites)	5.9-7.1 inch (15-18 cm) avg. grass height at nests	3.7% grass 7.7% forbs 11.4% total canopy at nest sites	8.0 inch (20.3 cm) grass height, 4.4 inch (11.2 cm) forb height at brood sites	6.5% grass 8.0% forb 14.5% total canopy at brood sites	No Winter Data	No Winter Data
-grasses and forbs (random sites)	7.3 inch (18.6 cm) avg. grass height at random sites	7.9% grass 8.1% forbs 16.0% total canopy at random sites	6.7 inch (17.1 cm) grass height, 3.2 inch (8.2 cm) forb height at random sites	5.9% grass 3.8% forb 9.7% total canopy at random sites	No Winter Data	No Winter Data

Table 2 Continued:

MOFFAT COUNTY DATA (Hausleitner 2003)	**Breeding (April – June)**		**Brood-rearing (June – August)**		**Winter[e]**	
	Height	**Canopy**	**Height**	**Canopy**	**Height**	**Canopy**
ARID SITES[a] (Axial Basin)						
-sagebrush (nest and brood sites)	31.1 inch (79 cm) avg. nest bush height	26% at nest sites	As for mesic sites above	As for mesic sites above	No Winter Data	No Winter Data
-sagebrush (random sites)	17.7 inch (45 cm) avg. random sagebrush height	23% at random sites	As for mesic sites above	As for mesic sites above	No Winter Data	No Winter Data
-grasses and forbs (nest and brood sites)	5.9-7.1 inch (15-18 cm) avg. grass height at nests	3.7% grass 7.7% forbs 11.4% total canopy at nest sites	As for mesic sites above	As for mesic sites above	No Winter Data	No Winter Data
-grasses and forbs (random sites)	5.1 inch (13 cm) grass heights at random sites	4.8% grass 4.7% forbs 9.5% total canopy at random sites	As for mesic sites above	As for mesic sites above	No Winter Data	No Winter Data

B. Distribution and Abundance

1) Distribution

a) Historic Distribution

The historic distribution of GrSG is closely tied to and largely reflects the distribution of sagebrush, particularly big sagebrush, and to some extent, silver sagebrush (Braun 1995, Schroeder et al. 2004). Direct observations and specimens of GrSG prior to the 1900s are limited in number and may not be adequate for drawing a historical distribution map. Instead, a map of historic sagebrush distribution can provide a reasonable and more thorough approximation of GrSG distribution.

Beginning in 1957, CDOW's Glenn Rogers began to gather and update information on sage-grouse distribution in Colorado. One of his objectives was to determine the historic and current distribution of the species in the state. He conducted interviews of CDOW field personnel and landowners, flew fixed-wing aircraft searches, and counted known strutting grounds (leks). From his five-year effort, Rogers (1964) drew a map that estimated the historic sage-grouse range in Colorado (Fig. 2). In the PPR area, the map shows occupied areas west to the Utah line, on both sides of the Colorado River from roughly Silt to DeBeque, on both sides of Colorado State Highway (CSH) 13 from Rifle to Meeker, and south of Rifle.

Braun (1995) repeated the process in the early 1990's, using a literature review, interviews and field work to determine sage-grouse occupied range. He reported his findings by county and provided a map of the birds' distribution at that point in time. He estimated that "both distribution and abundance of sage-grouse in Colorado have decreased more that 50% since the early 1900's". Figure 2 also shows Braun's 1995 map over the historic distribution reported by Rogers (1964).

Schroeder et al. (2004) presented a "pre-settlement" map (Fig. 3) of sagebrush habitat, targeting a period before pioneers of European descent inhabited the area. The map is based on a vegetation map by Kuchler (1985) and 7 GrSG "core" habitat types identified by Schroeder et al. (2004). Some of these "core" habitats are considered grasslands (of various plant species), but only local portions of these habitats known to be dominated by sagebrush were included in the pre-settlement map (Schroeder et al. 2004). In addition, 6 "secondary" habitat types, which may be of importance to GrSG under certain conditions, were included in the map if they were in currently or previously known occupied habitat, or if they were within 6 miles of core habitat (Schroeder et al. 2004). The vegetation data layer used by Schroeder was adequate for depicting rough historic range, but many inaccuracies became apparent at a statewide level with more robust vegetation datasets for comparison.

In Colorado, sagebrush was historically distributed in a discontinuous pattern, interrupted by topography and forested habitat (Braun 1995). GrSG occupied some portion of 13 counties in Colorado (Braun 1995, Schroeder et al. 2004). The Colorado portion of the historical map by Schroeder et al. (2004) was adjusted based on finer scale knowledge of local topography and the current distribution of habitat. Specifically, we used data from the Colorado Vegetation

Classification Project (CVCP, Colorado Division of Wildlife 2004*b*), a geographic information system (GIS) data set that uses recent satellite imagery and field verification to classify vegetation into specific categories. What appear to be minor differences in mapping at the rangewide scale have more significance at the statewide scale, so a more precise data set is valuable.

Several small additions were made to the Colorado portion of the historic distribution map in Schroeder et al. (2004), where sagebrush currently occurs in the CVCP (Colorado Division of Wildlife 2004*b*), and where no evidence exists that vegetation other than sagebrush was historically present (Fig. 3). A few areas that are very small even at the state scale were added, but are not identified in the figure or table. Some areas, known to have no historical sagebrush occurrence, were also deleted from the map.

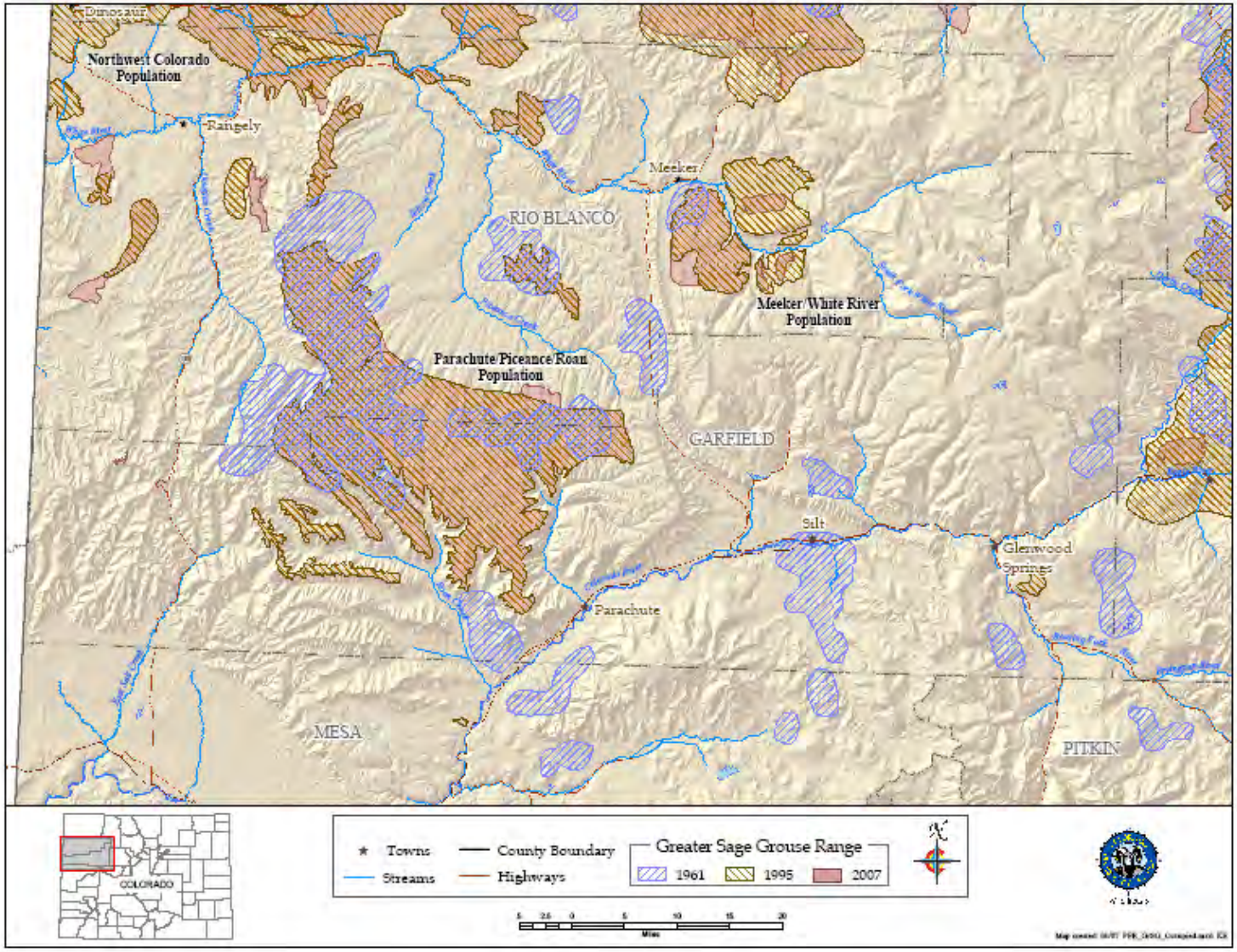

Figure 2. Known GrSG Distribution in Colorado, 1961-2007

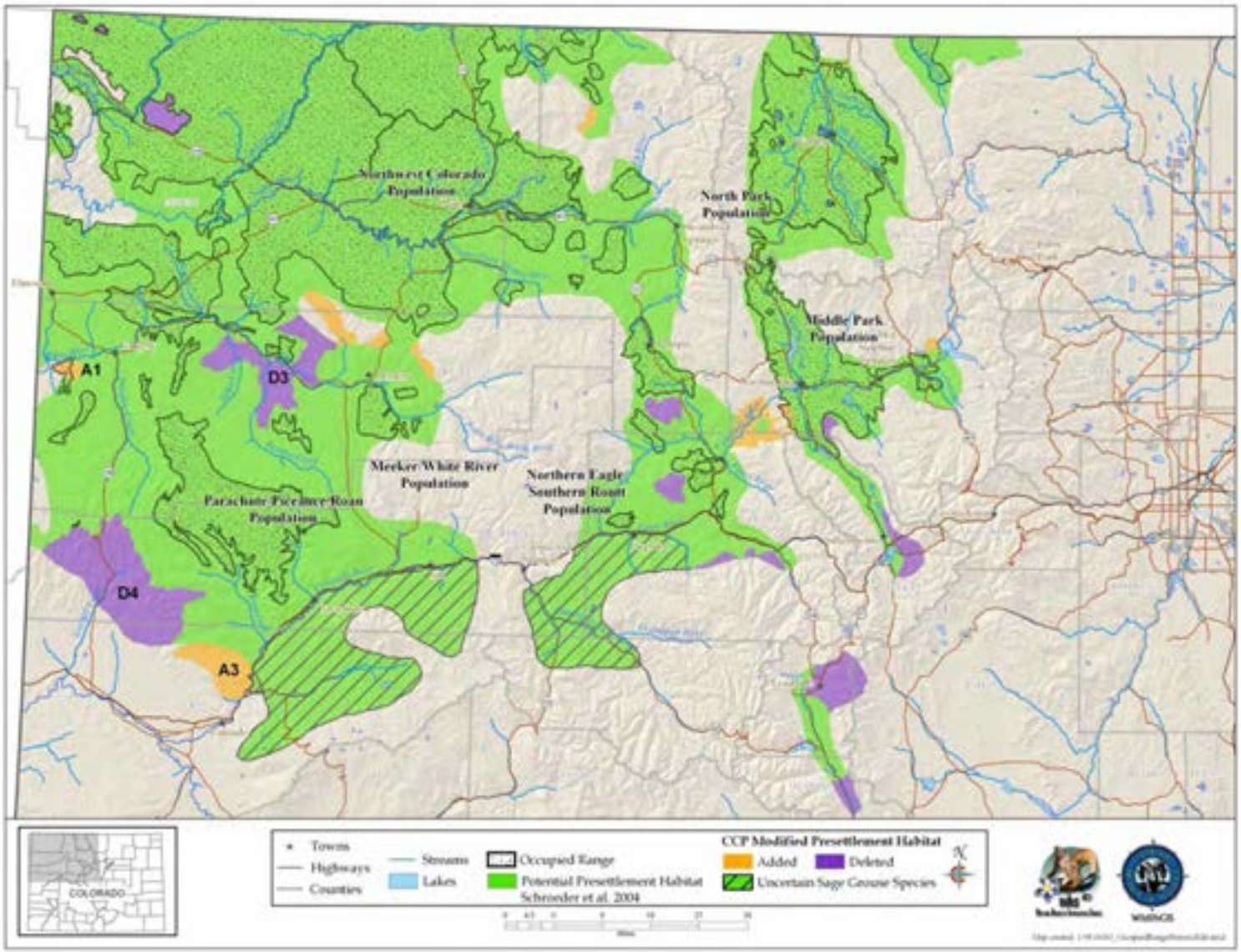

Figure 3. Historic GrSG Distribution in Colorado

The historic Colorado GrSG distribution map (Fig. 3) is based on Schroeder et al. (2004), but has been modified in 3 ways: (1) areas were added; (2) areas were deleted; and (3) areas were identified as range of "uncertain" sage-grouse species.

1. Areas Added to Historic Map

Areas added to the historic map were locales in which sagebrush occurs within the CVCP, (Colorado Division of Wildlife 2004*b*), and no evidence exists to indicate sagebrush was not in those areas historically. Areas were also added that have recently been identified as being potential habitat, based on the occurrence of sagebrush understory that could be enhanced with restoration treatments. The CVCP project mapped vegetation classes using finer resolution data than Schroeder et al. (2004) did when they broadly depicted historic habitat throughout the former range of the species. Hence, exclusions that seem minor at a rangewide scale have more significance at a statewide scale.

(A1) Shavetail Park, south of White River near the Colorado/Utah state line: area is currently occupied by sage-grouse and contains sagebrush.

(A2) Three areas around Strawberry Creek and Nine Mile Gap, north and northwest of Meeker, are mapped as potential habitat and contain sagebrush communities.

(A3) South Shale Ridge (Winter Flats & Deer Park), northwest of Colorado River, is mapped as potential habitat. Large areas of sagebrush communities are in the area, as well as piñon-juniper with sagebrush understory, indicating piñon-juniper encroachment into a former sagebrush site.

Other small areas that are difficult to see at the depicted scale were added to the historic map. The pre-settlement map was adjusted in these areas to include currently occupied or potential sage-grouse habitats.

2. Areas Deleted from Historic Map

Areas were deleted from the historic map due to them having non-GrSG habitat (according to CVCP vegetation classes), elevation constraints, and topography that led to conclusions of no occupation of sagebrush communities either presently or historically. For instance, some of the areas are in spruce-fir forests, in the alpine, or on steep, south-facing shale cliffs. The scale differences between the Schroeder et al. (2004) historic range mapping effort and the CVCP explain these discrepancies.

(D3) NWCO population and Piceance portion of Parachute – Piceance – Roan population (PPR): this area includes Black Mountain and North Ridge, near the White River, where elevation and vegetation types, predominantly thick piñon-juniper, exclude present or historic sage-grouse use.

(D4) PPR: this area includes a portion of the Bookcliffs, north of the Grand Valley, which is a steeply rising mountain range made up of shale cliff faces on the south side and piñon-juniper, spruce-fir, and aspen on top.

3. Uncertain Sage-grouse Species - Added

Schroeder et al. (2004) identified the 2 polygons shown as "Uncertain Sage-grouse Species" as being pre-settlement habitat for Gunnison sage-grouse, based upon 12 museum specimens (Table 3). The Statewide Steering Committee questioned the accuracy of the inclusion of these areas as GuSG pre-settlement habitat instead of GrSG habitat because the museum specimens were not actually reviewed by Schroeder et al. (2004). The CDOW requested and received photographs of the museum specimens that were from Garfield County (Table 3), but the photos were not conclusive in identifying the specimens (A. D. Apa, CDOW, personal communication). Morphological measurements or ancient DNA analysis of the specimens are needed to accurately determine species. Until this is accomplished, the SC has agreed to refer to these areas as pre-settlement habitat for "Uncertain Sage-grouse Species". The Statewide Steering Committee and the PPR Work Group do not intend for any historical GrSG habitat in these 2 areas to be managed as potential GrSG habitat until or unless it is proven that the museum specimens in question are GrSG.

A small area in the Colorado River/Plateau Creek triangle was added to the Uncertain Sage-grouse Species western-most polygon to account for existence of sagebrush communities and the area being mapped as potentially suitable habitat.

Table 3. Museum Specimens Collected for Area Identified in Fig. 3 as "Uncertain Sage-grouse Species".

SEX	AGE	NUMBER	DATE	SPECIFIC LOCATION	COLLECTION	COLLECTOR
Female	Adult	DMNH-27087	7/12/1905	Between Colter and Spitzer's Neck near Grand River	Denver Museum of Natural History	A. H. Felger
Female	Adult	DMNH-27088	7/12/1905	Between Colter and Spitzer's Neck near Grand River	Denver Museum of Natural History	A. H. Felger
Male	Unknown	AM-315107	3/7/1906	Garfield County	Agassiz Museum, Harvard University	J. E. Thayer
Male	Unknown	AM-315106	3/22/1906	Garfield County	Agassiz Museum, Harvard University	J. E. Thayer
Female	Unknown	FMNH-131312	10/27/1902	Newcastle, Garfield County	Field Museum-Chicago	H. W. Marsden, L. B. Bishop (9295)
Female	Unknown	FMNH-131313	10/27/1902	Newcastle, Garfield County	Field Museum-Chicago	H. W. Marsden, L. B. Bishop (9296)
Male	Unknown	FMNH-131315	9/14/1903	Newcastle, Garfield County	Field Museum-Chicago	H. W. Marsden, L. B. Bishop (9792)
Female	Unknown	FMNH-131314	9/15/1903	Newcastle, Garfield County	Field Museum-Chicago	H. W. Marsden, L. B. Bishop (9791)
Female	Unknown	FMNH-131316	9/15/1903	Newcastle, Garfield County	Field Museum-Chicago	H. W. Marsden, L. B. Bishop (9793)
Unknown	Juvenile	AM-272666	7/7/1904	Newcastle, Garfield County	Agassiz Museum, Harvard University	From Peabody Museum
Male	Unknown	AMNH-353699	9/15/1903	Newcastle, Garfield County	American Museum of Natural History	Unknown
Female	Unknown	AMNH-353700	9/15/1903	Newcastle, Garfield County	American Museum of Natural History	Unknown

b) Current Distribution

Colorado is on the southeastern edge of the current GrSG rangewide distribution (Fig. 4). It is, nevertheless, solidly within the range of the species, unlike some areas where populations were historically very limited in distribution and have since been extirpated (e.g., Nebraska; Fig. 4). Although GrSG distribution within Colorado has diminished (Braun 1995), the loss of range has been substantially less than in a number of other states, including Idaho, Oregon, and Washington. Thus, maintaining habitat and populations in Colorado will be important to conservation of GrSG on a rangewide basis.

A closer view of the Colorado, Utah, and Wyoming region (Fig. 5) appears to indicate that some Colorado GrSG populations cross state borders. Radio telemetry research has confirmed that GrSG in NWCO are part of a tri-state population (A. D. Apa, CDOW, personal communication). Although this is not surprising, it does underscore the need for agencies to coordinate population and habitat management efforts among the 3 states. The current tri-state distribution map (Fig. 5) is based on Schroeder et al. (2004), except that current GrSG distribution in Colorado is based on a more detailed Colorado habitat mapping effort. Differences in map scale and data resolution between Schroeder et al. (2004) and the Colorado data are likely responsible for the apparent discontinuities in distribution that occur along state borders (Fig. 5).

GrSG currently occur in 6 separate areas in the northwestern quarter of Colorado (Fig. 6; there is also a small group of birds that occur in the Laramie River Valley that are part of a larger Wyoming population). We term these areas "populations", without implying that the populations are genetically distinct, or that they are completely isolated from each other. Rather, these "populations" are identified separately because they are, in most cases, physically separated to some degree, and individual local work groups have grown up around these separate GrSG areas to manage the "local" GrSG. Although many of the challenges facing GrSG are similar throughout the state, both biological and sociological issues may differ in importance among the different populations and local work groups.

The populations occur in portions of 9 Colorado counties: Eagle, Garfield, Grand, Jackson, Larimer, Moffat, Rio Blanco, Routt, and Summit. The most abundant and widely distributed population is the Northwest Colorado (NWCO) population, centered in Moffat County (Fig. 6). In some populations, we have identified "zones", or smaller areas within the population that are described separately and may be managed differently. In NWCO, the zones are based on GrSG management units used by the local Work Group. In the Northern Eagle – Southern Routt Counties population (NESR), 2 zones are described, based on the path of the Colorado River. The "Routt" zone lies north of the Colorado River and the "Eagle" zone lies south of the Colorado River. Note that this line of demarcation is close to, but not identical to the line between Eagle and Routt counties. A small numbers of GrSG occur in Larimer County (Laramie River population).

The current overall range mapped by CDOW biologists and field personnel is also presented in Figure 7. It shows a further contraction in the range of the PPR population. The three maps provide a visual representation of the loss of overall range by the population during the 1900's. Some of the early maps do not include much of the area we now include in the PPR population

area, likely due to the difficulty of getting around in that remote country during the soft snow and muddy spring conditions when grouse are most visible.

The primary range contraction has occurred on the southern end of the population. Assuming for this discussion that the grouse formerly found on both sides of the Colorado River were what are now known as Greater Sage-Grouse (there is not agreement on this in among sage-grouse experts; definitive proof one way or another is not known at the time of this writing), the range of what is now referred to in this Plan as the Parachute-Piceance-Roan population probably once extended below the Bookcliffs/Roan Plateau to the Rifle, Silt, Harvey Gap and Newcastle areas north of the river, and south of the river in Divide Creek, west to DeBeque, and across the "Sunnyside" area from DeBeque toward Collbran in the Plateau Creek Valley. Active leks were counted in the vicinity of Harvey Gap, north of Silt, and Hunter Mesa south of Rifle. Sage-grouse in these areas disappeared during the 1960's, most likely due to loss of large expanses of sagebrush to agriculture (hay production and dryland farming). Grouse were present in the Plateau Valley more recently, but were gone by the 1980's, with no one factor apparent as an obvious cause.

On the western flanks of the former range, contraction has been more limited; three sage-grouse were seen on Kimball Mountain in the Roan Creek drainage in 1980; despite repeated observations over the years, primarily from fixed-wing aircraft, no GrSG were observed there again until June 2007, when 4 chicks were seen. To the north, one strutting grouse was seen on 4A Mountain in 1981, with no other sightings until 2006, when 2 males and one female were seen on one flight, and one female on a different flight that same spring. As recently as early 1989, sage-grouse were known in the low country west of DeBeque; three grouse were shot there by poachers who were subsequently apprehended by District Wildlife Manager Joe Gumber. Work Group member Chris Clark has a picture of 25-30 sage-grouse in winter on Colorado Highway 139 south of Rangely in winter during the mid-1990's. These birds could have come from the Cathedral Bluffs area of the PPR population, or from the Zone 6 sub-population of the NW Colorado population (see Fig. 7).

On the north, "gaps" appear to have opened up between grouse considered to part of, or at least addressed in the context of, the Northwest Colorado Work Group, with some small areas south of the White River. The northern boundary of the PPR population is drawn at Yellow Creek and the birds in Zone 6 of the NW population occupy the upper reaches of the Duck Creeks near Calamity Ridge. Undoubtedly there is, or was historically, interchange between the two populations.

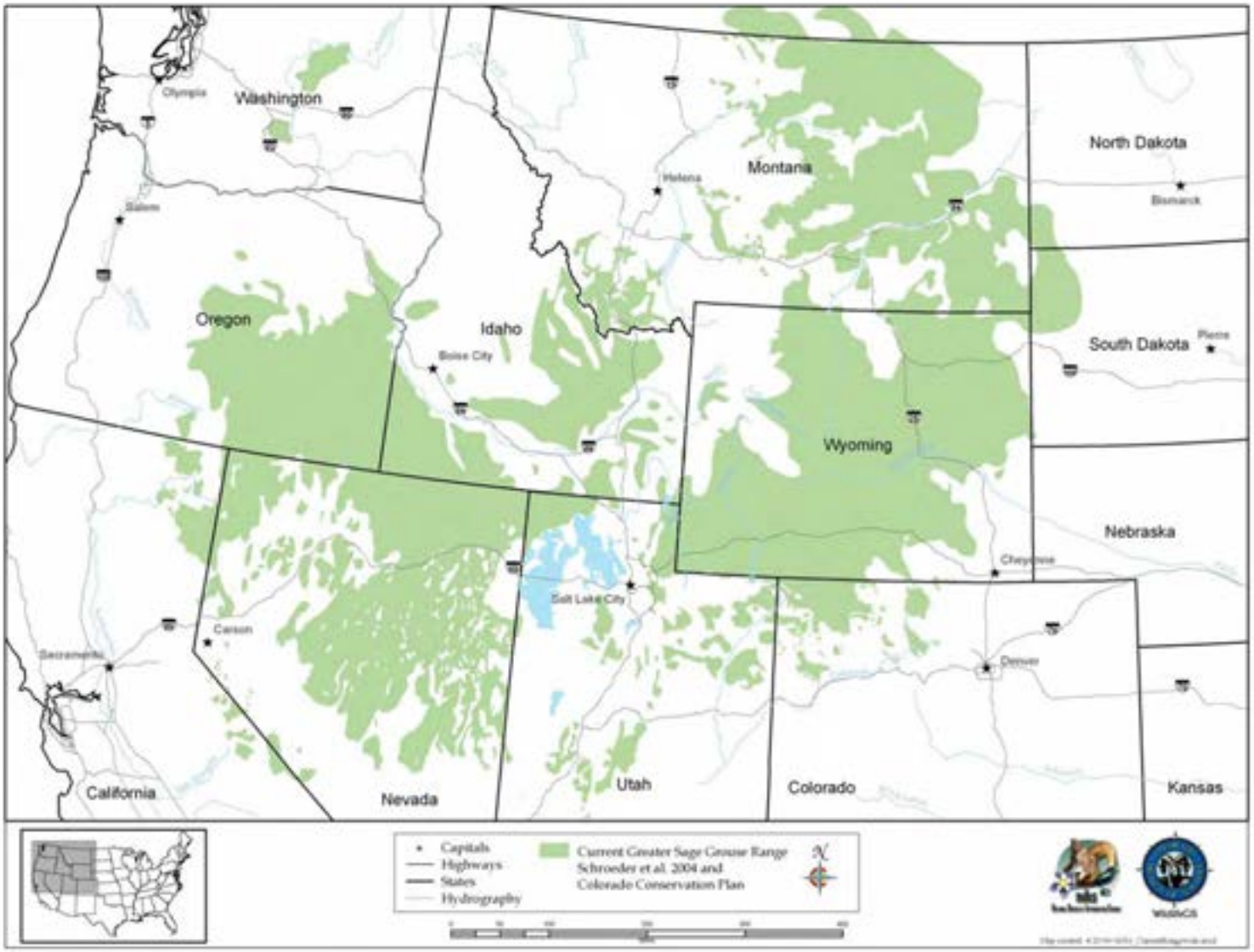

Figure 4. Current GrSG Distribution, Rangewide

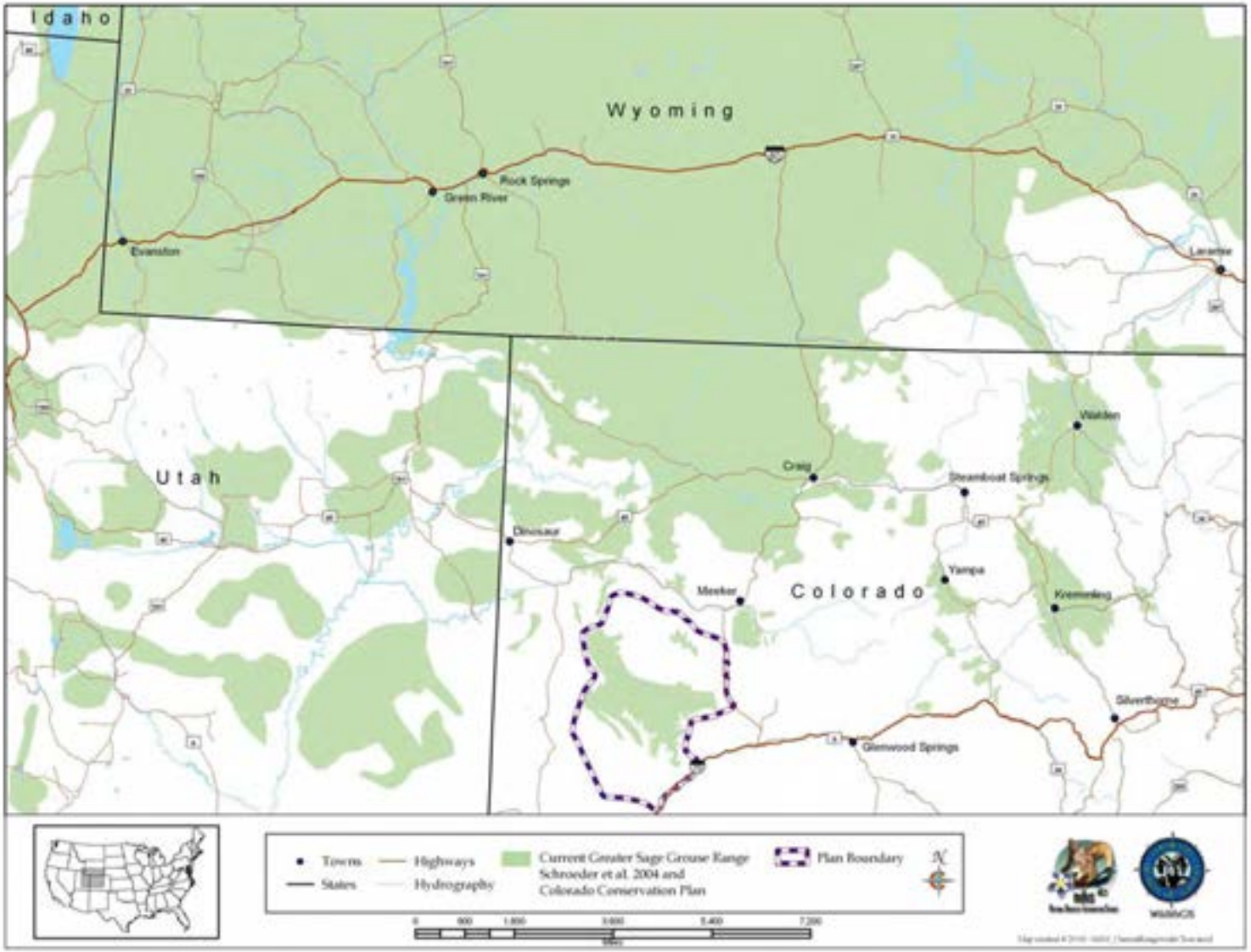

Figure 5. Current GrSG Distribution, Colorado, Utah and Wyoming

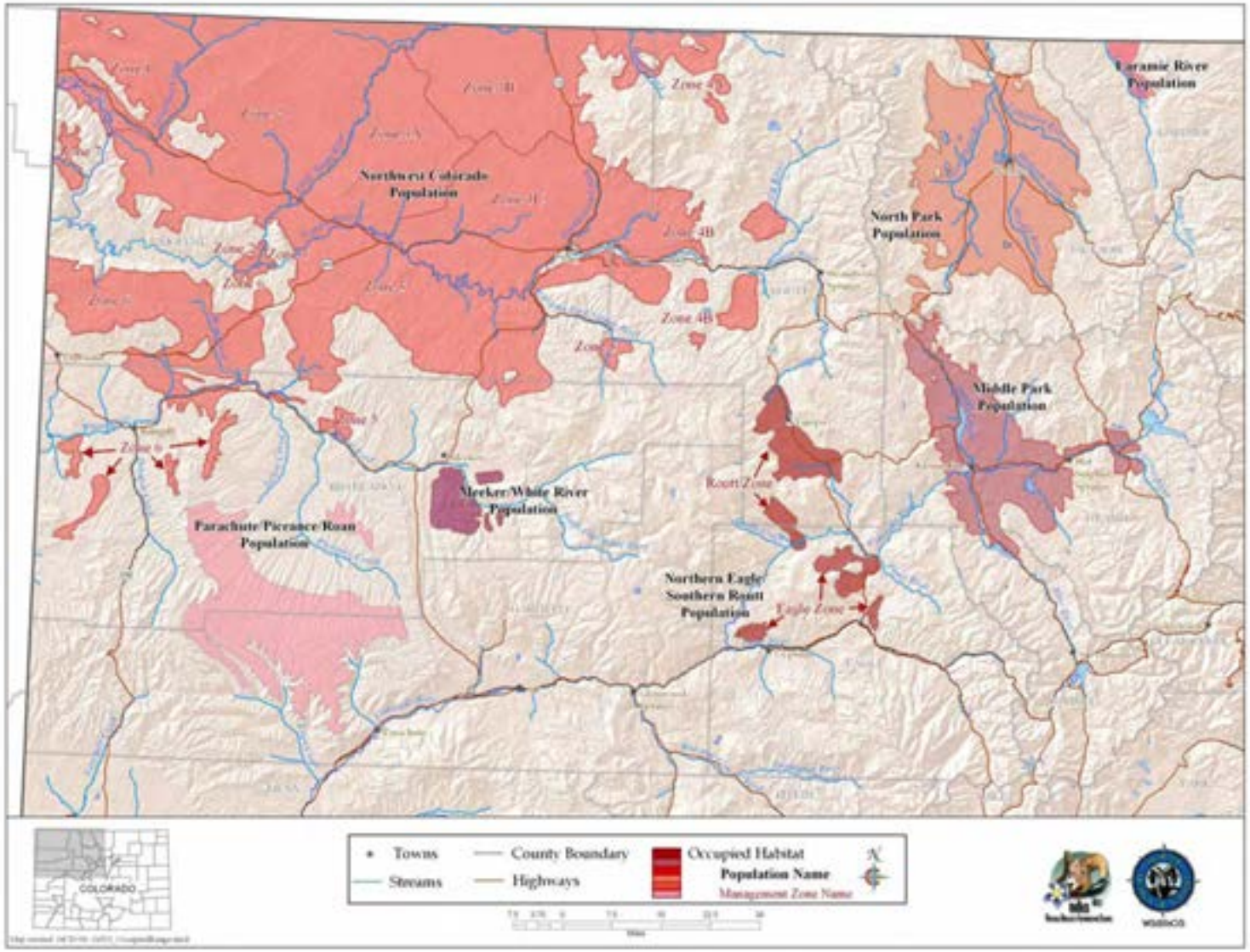

Figure 6. Current GrSG Distribution, Colorado

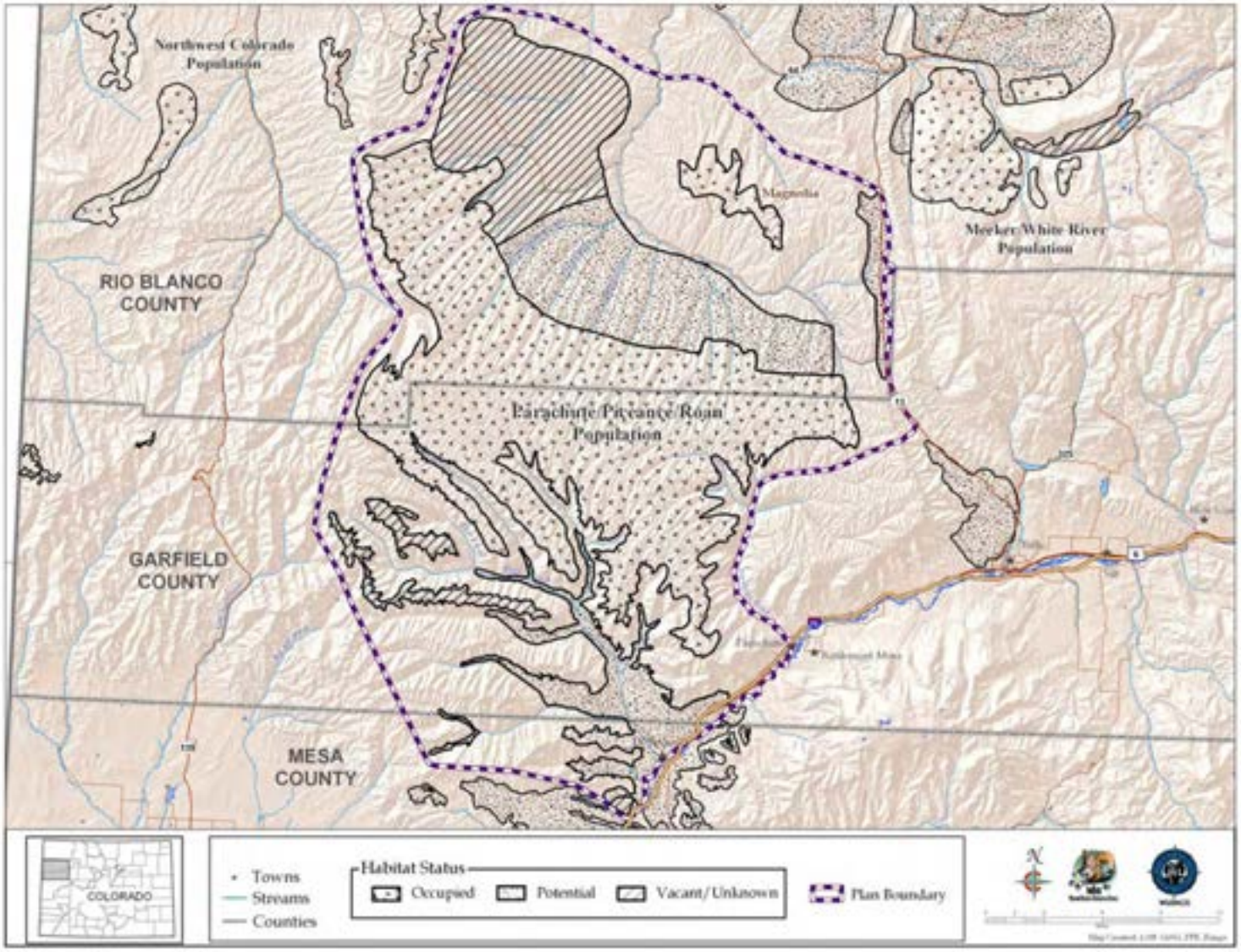

Figure 7. Current GrSG Distribution, Garfield, Mesa & Rio Blanco Counties, Colorado

2) Abundance

a) Lek Counts and Population Estimation

Inventory and monitoring of wildlife populations is an obvious prerequisite to conserving them, and is especially important when quantitative goals for species conservation have been developed. What is not obvious is how to accomplish inventory, and what level of resources is appropriate to commit to this task, since resources devoted to inventory and monitoring will not be available for other critical conservation tasks. Having accurate and precise estimates of GrSG numbers does not in and of itself improve the species' status.

Population trends of sage-grouse have been monitored across the western U.S. using variations on a lek count methodology first described by Patterson (1952), who studied sage-grouse in Wyoming. Patterson speculated that the maximum number of males counted over 3 or 4 counts spread throughout the display period might be a useful index of sage-grouse population trends. Wildlife managers have monitored populations of many species through the use of indices, where a count or measurement is made of some characteristic of a population that is both convenient to measure and is thought to be related to abundance. With birds, indices are often based on vocalizations made during the breeding season, such as pheasant "crow" call counts, dove coo-count indices, and bobwhite whistling counts (Lancia et al. 1994). Anderson (2001) noted the weaknesses of this type of sampling, which may be convenient for wildlife managers, but does not lead to defensible estimates of population size or status. The index, whether it is pheasant crows or the number of male sage-grouse counted on a lek, has an unknown relationship to the larger population of interest.

As a result of the publication of Patterson (1952), the lek count became the standard for sage-grouse population monitoring. Patterson (1952) based the census on the belief that all males regularly attend leks. His suggested maximum of 3 or 4 counts made sense under this assumption, because given normal environmental variables associated with lek counts (e.g., cold temperatures, snow and predator harassment), it might take 3 or 4 trips to get a "good" count of all the males present.

The lek count protocol proposed by Patterson (1952) has weaknesses. Dalke et al. (1963:833) thought lek counts provided a reasonably accurate method of determining breeding population trends, but noted the high degree of variability in daily counts and suggested a "…need for more refined census methods as sage-grouse management becomes more intensive in the future." Jenni and Hartzler (1978:51) used and supported the technique but speculated that high variance in counts was because "…some un-established birds wandered about visiting different leks on different mornings."

Beck and Braun (1980) presented a critical review of the practice of using lek counts to assess population trends or size. They pointed out that without information on the total number of leks in an area, attendance patterns of adult and yearling males, inter-lek movements, and the relationship between the maximum count and the population size, nothing could be concluded about population size or trends from lek counts. Despite these criticisms, the Western States Sage Grouse Committee essentially codified lek counts as a means to assess population trends two years later when it published its Sage Grouse Management Practices (Autenrieth et al. 1982).

The publication advises caution in the interpretation of counts because of the high level of variance in the data, but no additional aid in interpretation of lek count data is given. The committee's most recent guidelines (Connelly et al. 2000*c*) also suggest viewing lek data with caution, but state that lek counts (per Autenreith et al. 1982) provide the best index to breeding population levels. In an extension of that assumption, Connelly et al. (2000*c*) reaffirm specific statements from Connelly and Braun (1997) that suggest there has been a 17 - 47% decline in breeding populations across their range.

Applegate (2000) and Anderson (2001) pointed out that index data cannot be extrapolated to estimates of animal density or abundance unless the proportion of the total population that is counted in the index method is known. For sage-grouse populations, this depends on (1) the proportion of leks that are known and counted; (2) the number and timing of counts conducted; (3) time of day in which counts are conducted; (4) lek attendance rates by yearling and adult males; and (5) the sex ratio of the population. All of these parameters are likely to vary significantly spatially and over time, yet when population estimates are derived from lek count data these parameters are assumed to be fixed constants.

Lek count data have been used to make inferences about sage-grouse population trends for at least 50 years, without any credible scientific investigation into the relationship between lek counts and population size. Because of the interest in having population estimates for sage-grouse (and because of the lack of other efficient methods for population estimation of sage-grouse), it is now a common practice to use lek data to estimate the size of various populations of sage-grouse. Multiple untested assumptions are often made in using lek count data to estimate sage-grouse population size (Table 4). These usually include assumptions regarding population sex ratio, an estimate of the percentage of leks that are counted, and the percent of males in the population that are counted at leks. The Washington State Recovery Plan for Greater Sage-grouse (Stinson et al. 2004) also mentions that males could make inter-lek movements, but does not address this in its estimates (Stinson et al. 2004).

Table 4. Untested assumptions made in using lek count data to estimate sage-grouse population size. (In some cases the population estimate made was used to bracket one end of range of estimated population sizes.)

Region/Source	Assumptions		
	Sex Ratio M:F	**Percentage of all leks that were located and counted**	**% of males (associated with the lek) that are actually counted**
Middle Park, CO / local plan (MPCP 2001)	1:2	90 %	75%
North Park, CO / local plan (NPCP 2001)	1:2	90 %	75%
Northern Eagle - Southern Routt Counties, CO/ local conservation plan (NESRCP 2004)	1:2.2	Not described	53%
Gunnison Basin, CO / local conservation plan (GBCP 1997)	1:2	80 %	(50 – 100 %) used 75 %
Nevada / statewide conservation plan (Neel 2001)	1: 1.5-2.3	80 %	75 %
Washington / statewide conservation plan (Stinson et al. 2004)	1:1.6	100 %	100 %

b) Assumptions Made in Sage-grouse Population Estimation from Lek Counts

Here we examine 4 assumptions made in estimating population from lek counts.

(1) *Percent of Leks Counted.* Lek counts may be useful as a trend indicator. Under this assumption it is believed that a constant percentage of leks are detected. It is not necessary to know what the percentage of leks detected is, but to estimate population size, either all leks must be counted, or the proportion of the total that is counted must be estimated (lek detection probability).

Numerous studies have documented that lek densities can vary considerably over time. Bradbury et al. (1989) found a persistent excess of large and small lek sizes. Within an area, lek numbers seem to increase roughly in proportion to population size (Cannon and Knopf 1981). Core or "traditional" leks increase in size, while satellite leks appear and disappear as populations increase and decrease. Thus, it is probably not reasonable to assume that the proportion of leks detected is constant over time unless search effort increases proportionally as populations increase. Managers and researchers are also far more likely to detect and count a higher proportion of leks at low population densities than at high densities. It is probably also

not reasonable to assume potentially active leks are of "average" size, because potentially active leks are more likely to be satellite leks and thus smaller. Lastly, because detectability may be a function of number of males, larger leks may be more noticeable.

(2) Inter-lek Movements. Attendance by males at more than 1 lek is problematic, because birds may be counted multiple times at different leks, thus inflating population estimates, or they may not be counted at all if they are attending a different lek when counts occur. The ability of lek counts to serve as an index to population trends will not be affected by inter-lek movements if the movements are relatively constant from year to year. Unfortunately, inter-lek movements are both significant and variable. Dalke et al. (1963) reported inter-lek movements by individual (banded) adult males varied by year from 22 - 47%. Dunn and Braun (1985) recorded no marked birds moving between leks in 1982, but 14 of 91 (15%) were observed at 2 or more leks in 1983. Emmons and Braun (1984) reported all (11) juvenile males attended from 2-4 leks during the breeding season, while inter-lek movements of adults were infrequent (3 of 11; 27%).

(3) Lek Attendance. Population estimates from lek count data assume that a constant proportion of males, often 75%, are detected by the maximum of 3-4 counts (e.g., Table 4). There is considerable evidence that lek attendance is highly variable due to age, social status, weather, body condition, and parasite load or disease. Patterson (1952:152) suggested that all males regularly attended leks, although the only data he presented to support this assertion was: "All these marked birds were identified morning after morning occupying the same territory on the strutting ground." He was examining marked birds with respect to territoriality in this reference, and the marking referred to birds he captured on leks and dyed, or birds he identified by tail feather patterns. Dalke et al. (1963:820) didn't calculate attendance rate for banded birds, but indicated that "…banded males were ordinarily absent from the strutting grounds from 1 to 3 days at a time…", and "The less dominant males were irregular in their visitations. The dominant males were present almost daily under all conditions." Dalke et al. (1963:822) also noted, "Banded males were often seen in the sagebrush adjacent to the strutting grounds," although this was attributed to trapping disturbance. Hartzler (1972) documented males with almost daily lek attendance and others that only sporadically attended leks in Montana. Wiley (1973*a*) stated that there was an abundance of males that didn't attend leks, and he further speculated (Wiley 1974) that attendance patterns of males were likely to be a function of density (lek size). Dunn and Braun (1985) reported daily attendance rate of marked adult males was only 43%, ranging from 3-96% for individual males. Daily attendance by yearling males was only 33% (Dunn and Braun 1985).

One bias in assessing attendance based on observations of banded birds is that apparent low attendance may be caused by mortality of banded birds. Emmons and Braun (1984:1023) studied male sage-grouse lek attendance with the objective "…to examine the daily attendance patterns on leks of male sage-grouse during the breeding season," but lumped attendance across 5-day, 15-day, or season-long averages. Although their data indicated significant within-year and across-year variation even when lumped into 5-day intervals, they did not report what fraction of radio-marked males would be detected by normal counting protocols. Since 93% of the birds they based their attendance rates on were trapped while night-roosting on leks, it is probable they (and others) caught highly territorial, dominant males who regularly attend leks, and thus it is likely the estimate of lek attendance may be biased high.

The physical condition of sage-grouse can also affect their attendance at leks. Hupp and Braun (1989a) found that sage-grouse had depleted lipid and protein reserves following a severe winter in Colorado. This, and snow cover, caused the birds to largely delay initiating display activities until late April. There was substantial variation in lipid reserves across 3 years, which could impact lek attendance and display rates. The authors noted substantially higher variation in lek counts within a season for GuSG than for GrSG in North Park.

Boyce (1990) reported that males with avian malaria were significantly less likely to attend leks than males without malaria, and that malaria varied spatially and temporally across 11 leks in southeast Wyoming. Thus, disease prevalence has the potential to impact attendance rates and lek counts, and variability in disease prevalence may increase variability in attendance rates.

Walsh et al. (2004) studied attendance rates of radio-marked and color-banded male and female sage-grouse captured during winter in Middle Park, Colorado during 1 mating season. They found male daily attendance rates were highly variable (7-86% for adults, and 0-42% for yearlings), and influenced by age, date, and time of day. They documented that counts conducted between half an hour after sunrise and 1.5 hours after sunrise (typical when managers count more than 1 lek in a morning) detected only 74% and 44% of the actual high count of adults and yearlings for that day, respectively.

(4) Sex Ratio. Most population estimates derived from lek counts assume 2 females/males in the breeding population (e.g., Table 4). This assumption is based on long-term wing data obtained by determining sex and age of wings obtained at wing barrels or check stations (CDOW, unpublished report). It is apparent both from wing data and from population modeling that sex ratios vary markedly from year to year. This is because males encounter higher mortality rates as they mature and enter the breeding population (Zablan et al. 2003). Therefore the sex ratio will be a function of the age structure of the population; older age-structured populations will have high female-to-male sex ratios because this differential mortality will have had longer to operate. Following years of above average recruitment, populations will have female-to-male sex ratios closer to 1:1, since yearling and first-year adults will dominate the population and will have experienced little differential mortality. Sex ratios for all age classes (immature, yearling, and adult) of GrSG from wing data (CDOW, unpublished report) yielded varying sex ratios. In Middle Park from 1976 – 1993, wing data yielded 1.5 ± 0.5 females/male. In Northwest Colorado wing data yielded 1.6 ± 0.4 females/male from 1976 – 1998. In North Park, from 1974-1998 wing data yielded a sex ratio of 1.7 ± 0.3 females/male. More specifically in Northwest Colorado, Cold Springs, Blue Mountain, and Central Moffat County wing data yielded sex ratios of 1.8 ± 0.5, 1.4 ± 0.4, and 1.6 ± 0.3 females/male, respectively. We assume that a constant sex ratio is not defensible since it masks annual variability in nature. The long-term (1974 – 1998) average sex ratio for all GrSG age classes in Colorado was 1.6 ± 0.4 females/male, which is significantly lower than the 2.0 females/male that is typically used in population estimation equations.

c) Alternative Methods of Population Estimation

Given the unreliability of the assumptions used, how do estimates derived from them compare to other, more rigorous estimates? Using mark-recapture statistical techniques, Walsh (2002)

estimated the size of adult and yearling male and female GrSG populations in Middle Park during 1 breeding season. He compared them to population estimates derived from lek counts using standard assumptions (90% of leks are known and counted, 75% of males are counted, and there are 2 females/male in the population). He found that adjusted lek count estimates underestimated population size from mark-recapture estimates by 28%, because attendance rates were much lower than assumed and there were more females (2.3/male) than assumed.

Stiver, using mark-recapture techniques, estimated there were 53 male and 115 female GuSG in San Miguel County in Colorado in the spring of 2003 (J. Stiver, University of Nebraska, personal communication). Extrapolation from the maximum of 4 lek counts using standard assumptions listed above yielded estimates of 41 males and 82 females, underestimating the mark-resight estimates by 23 and 29 %, respectively. The maximum of 4 counts of males represented only 53% of the male population (as estimated by mark-resight), well below the assumed 75%. Thus, estimates of population size extrapolated from lek count data using standard assumptions appear to significantly underestimate population sizes.

Mark-recapture methods have shown promise in developing population estimates with confidence intervals, but the difficulty in capturing and marking the proportion of the population necessary (Walsh 2002) suggest it will be practical only for small populations. Recent research (Wilson et al. 2003) has explored using individual DNA as a marker, eliminating the need to handle and mark individual birds. The CDOW is exploring the utility of using DNA assayed from fecal droppings (collected on leks) as a mark-recapture technique. CDOW will also explore the practicality of using other methods to estimate lek and/or population density such as line-transects (Burnham et al. 1980). CDOW will continue to test the assumptions about male attendance and sex ratios implicit in estimating population size from traditional lek counts.

d) Conclusions

It is not defensible to generate breeding population estimates for sage-grouse from lek counts by assuming that (1) all (or some fraction of) leks are known; (2) potentially active leks are of average size; (3) the maximum of 3 or 4 counts represents 75% of the males in the population; (4) there are exactly 2 (or any fixed ratio) females per male in the population; and (5) there is no variability in the assumptions across time, space, or population size. Unfortunately, that does not diminish the need for population estimates. It is difficult to evaluate past population trends, or to assess where we are relative to population targets or population viability without estimates of current population size. Either new methods need to be developed, or assumptions used to extrapolate from lek counts need to be evaluated and refined.

Estimating population size of GrSG by whatever means will be expensive and potentially disruptive to individual sage-grouse at varying levels. In the long-term, annual estimates of population size are probably unnecessary and may be counter-productive from the standpoint of diverting resources and impacting birds. Currently annual lek counts represent the only method for monitoring trends in GrSG populations, and should be continued until better, more precise estimates can be obtained. Therefore, even though we recognize the lack of statistical reliability, we estimate population sizes from lek counts. They are the only long-term index available to document trends. However, for the purposes of this Plan, to eliminate at least one parameter with

unknown variability (sex ratio), we estimate breeding males only. In our estimates we make the following assumptions:

1) All leks are known and counted (estimate is thus conservative, if some leks are unknown).
2) The maximum of 3-4 counts represents 53% of males in each population (Stiver, University of Nebraska, unpublished data).

The formula that incorporates these assumptions follows:

C = maximum male count on lek

$$\text{Estimate of males in population} = \frac{C}{0.53}$$

e) Estimated Number of Males in Colorado GrSG Populations

Using 2007 lek count data and the assumptions listed for this Plan, we generated estimates of the current number of males in each GrSG population (Table 5).

Table 5. Colorado GrSG 2007 Lek Counts and Population Estimates

Population	**Male High Count (Total for all leks)**	**Estimated Number of Males in Population**	**% of Total Estimated Males in Colorado**
Middle Park (MP)	214	404	4.6
Meeker – White River (MWR)	8	15	0.2
Northern Eagle – Southern Routt Counties (NESR)	86	162	1.9
North Park (NP)	912	1,721	19.8
Northwest Colorado (NWCO)	3,218	6,072	69.7
Parachute – Piceance – Roan (PPR)	178	336	3.9
Laramie River – No information	--	--	--
TOTAL	**4,616**	**8,710**	**100.0**

f) Decline of Greater Sage-grouse

In Colorado, GrSG historically occurred in at least 13 counties (Braun 1995). GrSG have been extirpated in Lake and Chaffee counties, and for 2 other counties sage-grouse have also been lost, although whether they were GrSG or GuSG is not certain (see Fig. 3). Braun (1995) suggested that Greater Sage-Grouse are currently found in 9 Colorado counties. He considered populations with more than 500 breeding GrSG (totals of males and females in the spring) as persistent, and concluded that persistent populations were found in Jackson, Moffat, Rio Blanco, and Routt counties. Populations Braun (1995:6) considered "at risk" of extirpation include Larimer, Grand, Summit, Eagle, and Garfield counties.

Although Braun (1995) considered the populations in 4 counties secure, he did not cite any original reference to clarify or justify the basis for "500 breeding individuals" constituting a secure population. Following further review of the literature (in an attempt to support or refute the validity of the 500 breeding male benchmark) this Plan will assume that the 500 breeding individual estimate was derived from Franklin (1980) and Soulé (1980). Those authors proposed that a population (or "effective" population) of 500 is sufficient for long-term maintenance of genetic variability in a population. Lande (1988) suggests that this number was quickly adopted as the basis of management plans for captive and wild populations. Additionally, Lande (1995*a*) suggested that in experiments with fruit flies (*Drosophila melanogaster*), a population size of 5,000 is necessary rather than the Franklin-Soulé number of 500. Lande (1995*a*) cautioned using the value of 5,000 because of differences among characters and species in genetic mutations and environmental fluctuations.

Later, Connelly and Braun (1997:230) suggested that grouse populations in Colorado were "at risk," although earlier Braun (1995:6) concluded that the major populations in Colorado were "persistent." Connelly and Braun (1997:230) did not provide any definition of the term "at risk". Connelly and Braun (1997) also argued that breeding populations (males/lek) of sage-grouse decreased by 33% across GrSG range, and males/lek declined by 31% and chicks/hen declined by 10% in Colorado since 1984.

Braun (1998) further emphasized the population decline in Colorado and reported an 82% decline in lower Moffat County (all of Moffat County excluding the Cold Springs and Blue Mountain areas), in the three-year average of the number of strutting males counted on leks between 1978-80 and 1996-98. Braun (1998) concluded that there had been a 57% decrease in the number of active leks during the same time period. More recent and updated calculations (Fig. 8) suggest that the declines are not as severe as suggested by Braun (1998). Counts of strutting have been conducted in the same areas. If the 1978-80 timeframe is used as the "benchmark," the current lek counts illustrate a 25% decrease in the number of strutting males, a 20% increase in the number of active leks, and a 38% decrease in the number of males/lek in the latest 3-year running average (Figs. 8 and 9).

Although there has been a decline in the number of males counted from the 1978-1980 period, the decline in Moffat County has not been as severe as Braun (1998) concluded. These dramatic shifts in numbers of strutting males may be a result of the hypothesized cyclic nature of greater sage-grouse populations (Rich 1985, Braun 1998). Braun (1998) suggested that the strutting

male counts (males/lek) in Jackson County support the hypothesis of cyclic highs on 10-year intervals. Essentially no research has been conducted on this subject.

Simple calculations of the percent of change are instructive, but the lack of severity of the decline is also supported by Connelly et al. (2004). Connelly et al. (2004) reported that Colorado sage-grouse populations increased at an average rate of 4.3% from 1986-2003. In addition, although the number of grouse counted on strutting grounds is lower (0.7-1.6 times) than counted in the late 1960s and early 1970s, Colorado GrSG populations have been increasing in the last 17 years and there is no suggestion of a dramatic overall decline the last 39 years (Connelly et al. 2004).

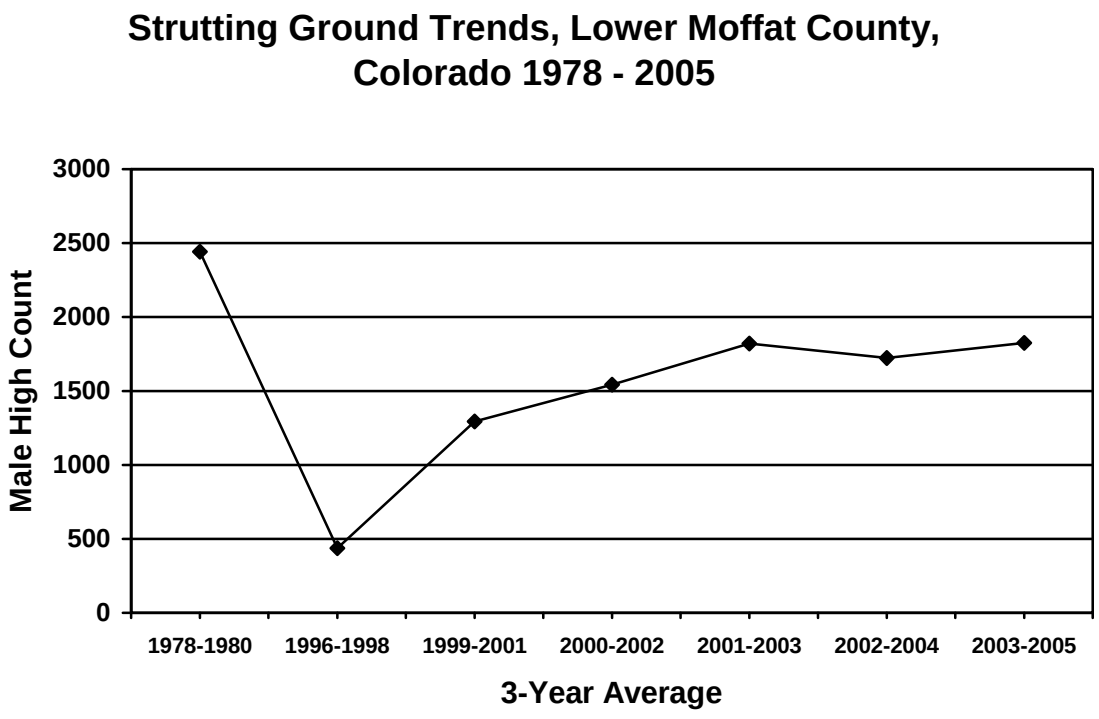

Figure 8. Trends in the Annual Total High Count of Males, Lower Moffat County, Colorado, 1978-2005.

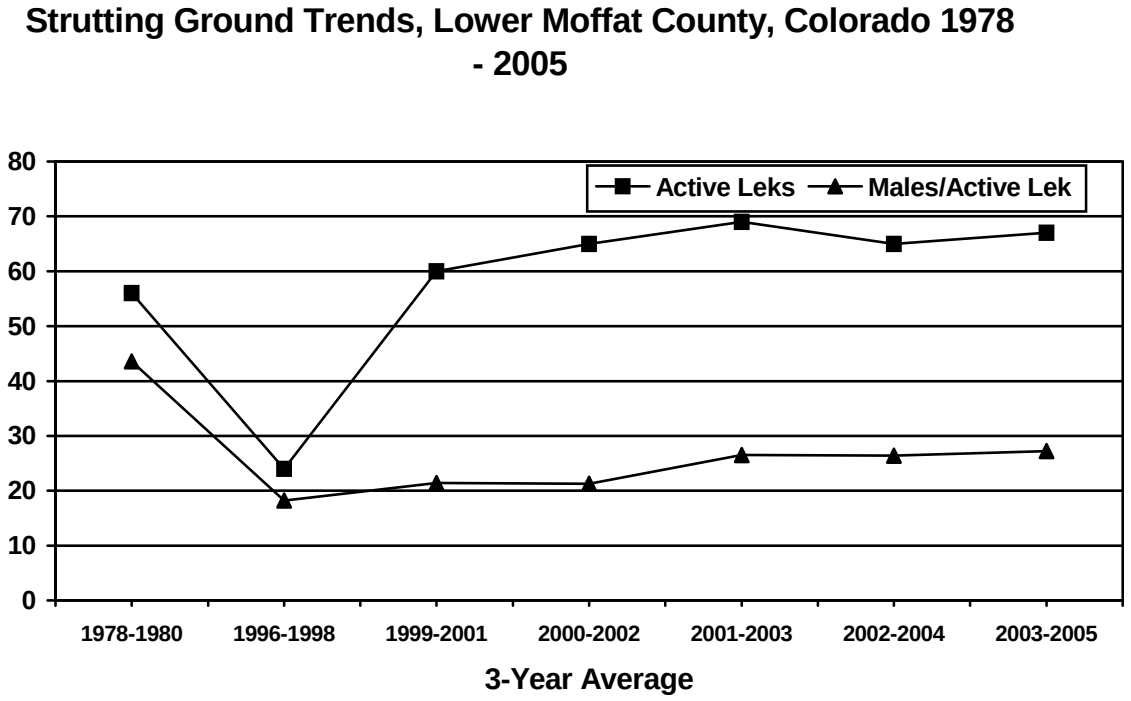

Figure 9. Known Active Leks and Males/Active Lek, Lower Moffat County, Colorado, 1978 - 2005

C. Genetics

The distribution of genetic variation among populations across the entire range of GrSG has been unknown, despite increasing pressure on managers to make difficult decisions about which populations may be, from a species conservation perspective, more "important" than others. The identification of any genetically discrete groups of GrSG is paramount in the development of GrSG management plans. If conservation plans include strategies to augment populations by translocating birds from outside populations, it is imperative to understand if and how the populations vary genetically. In addition, because GrSG distribution continues to become more fragmented (resulting in smaller and more isolated populations), it is important to determine the relative amount of genetic diversity contained in each population. Populations with relatively low levels of genetic diversity can suffer from inbreeding effects and can be more susceptible to parasitic agents and disease.

Genetic data can provide information relevant to an understanding of gene flow, isolation, genetic diversity, and the evolutionary history of a species. Further, it can facilitate a cohesive management strategy that takes genetic distinctiveness into account, based in part on a clear picture of the entire "genetic landscape" of a species. This increases the efficiency of management decisions and adds to their scientific foundation.

Previous population genetic studies of sage-grouse have focused on assessing taxonomic status (Kahn et al. 1999, Oyler-McCance et al. 1999, Benedict et al. 2003). These studies provided useful taxonomic information and knowledge of the distribution of genetic variation locally, yet they lacked the range-wide perspective necessary to make management decisions regarding GrSG at the species level.

A recently completed analysis of the PPR population compared with 5 other Greater Sage-grouse populations in Colorado (Laramie River not included) revealed that the genetic make-up of PPR is generally consistent with the other 5 populations (Oyler-McCance, 2007). Using mtDNA sequence data, 5 of the 8 haplotypes found in PPR (66% of the PPR birds) were also found in the other populations in Colorado. Of the three PPR haplotypes not found in Colorado, 2 (EU and W) were found in the neighboring states of Utah and Wyoming. One haplotype was unique to PPR (New3) and at relatively high frequency (20%). Two other Colorado populations (Blue Mountain and Cold Springs) each also had a unique haplotype representing 10 and 8% of the populations respectively (Oyler-McCance et al. 2005a). The PPR population had a much higher sample size (65 compared to ~ 20 in the other populations) and the sampling method was different (trapped birds in PPR vs. hunter killed birds in the rest of the Colorado birds), which may influence the potential for relatedness among samples. Additionally, the PPR population did have similar levels of genetic diversity (both in the number of haplotypes and in haplotypes diversity) as the other Colorado populations, and again, a higher sample size likely resulted in more haplotypes being identified. Nonetheless, it appears that the PPR population does not suffer from low diversity and appears to have diversity levels that are comparable to the other Colorado populations. The mtDNA neighbor-joining network, which was constructed using F_{ST} genetic distances among populations, suggests that PPR is more closely related to North Park, Cold Springs, and Blue Mountain, than to Middle Park and Eagle. The fact that PPR is not shown to have branch lengths longer than the other Colorado populations suggests that it is not genetically distinct from all other Colorado Greater Sage-grouse populations.

The microsatellite data are relatively concordant with that of the mtDNA data. The STRUCTURE analysis found that the most appropriate number of discrete genetic clusters (K) was 1 given the data from these 6 populations, suggesting that there was little genetic structure within the data. Pairwise population R_{ST} tests, based on allele frequencies of populations, revealed a few significant differences among populations yet these differences were primarily between Cold Springs and the other populations. This finding is highlighted with the microsatellite neighbor-joining network that shows Cold Springs as the most genetically distinct population. This network suggests that PPR is more closely related to Middle Park and Eagle, contrary to the network built with mtDNA data. This discrepancy is likely due to the different patterns of inheritance of these two types of genetic markers (maternal vs. bi-parental). An additional factor that could lead to minor differences between the two data sets has to do with the number of loci sampled (sampling error). While the mitochondrial genome represents one locus, multiple sites were sampled in the nuclear genome. Levels of genetic diversity in PPR were again similar to what had been previously been reported for populations in Colorado (Oyler-McCance et al. 2005a). The levels of mean observed heterozygosity in PPR were the lowest reported in Colorado yet the values are only slightly lower than those reported elsewhere (0.55 as opposed to 0.61-0.69). This could be due to a number of factors including smaller population sizes, increased fragmentation among sagebrush habitat resulting in sampled birds being more

related, or merely due to the different sampling method used in this study (trapped birds vs. hunter killed birds).

1) Summary

The study by Oyler-McCance et al. (2005) documented the distribution of genetic variation across the entire range of GrSG. They found that isolation by distance has left an imprint on GrSG gene pools, and that local adaptation is a realistic possibility for the species that should be considered in decisions involving translocations. They argue that this genetic data used in conjunction with large scale demographic and habitat data will provide an integrated approach to conservation efforts for GrSG. For Colorado, there appears to be a genetic line of demarcation (north to south) between Colorado GrSG populations, suggesting that if translocations are undertaken, birds should be moved north – south, and not east – west.

In summary, the Greater Sage-Grouse in PPR do not appear to be substantially different from other Greater Sage-grouse sampled in Colorado. There is some level of uniqueness (as represented by the new haplotype found in 20% of the PPR birds) yet this is not unusual as both Cold Springs and Blue Mountain also contained haplotypes that were unique to that particular population. Additionally, the levels of genetic diversity in PPR do appear to be comparable to other populations although they were reported to have the lowest levels of observed heterozygosity levels.

D. Greater Sage-grouse Habitat Mapping Efforts

1) Colorado Conservation Plan (CCP) Habitat Mapping

CDOW is using the Wildlife Resource Information System (WRIS) and GrSG habitat use data to map GrSG habitat. The following habitat definitions were used during the initial mapping portion of this project, and appear in maps in the PPR Plan. Future mapping should also focus on distinguishing between areas that are “Suitable and Vacant”, vs. those that are “Suitable but Unknown”. In addition, initial mapping of these habitats was done at a fairly coarse level and is not suitable for project-level planning. More detailed mapping will be necessary for specific projects.

Occupied Habitat: Areas of suitable habitat known to be used by GrSG within the last 10 years from the date of mapping. Areas of suitable habitat contiguous with areas of known use, which do not have effective barriers to sage-grouse movement from known use areas, are mapped as occupied habitat unless specific information exists that documents the lack of sage-grouse use. This category can be delineated from any combination of telemetry locations, sightings of sage-grouse or sage-grouse sign, local biological expertise, GIS analysis, or other data sources.

Vacant or Unknown Habitat: Suitable habitat for sage-grouse that is separated (not contiguous) from occupied habitats that either (1) has not been adequately inventoried, or (2) has not had documentation of grouse presence in the past 10 years.

Potentially Suitable Habitat: Unoccupied habitats that could be suitable for occupation of sage-grouse if practical restoration were applied. Soils or other historic information (photos, maps, reports, etc.) indicate sagebrush communities occupied these areas. As examples, these sites could include areas overtaken by piñon-juniper or converted to rangeland.

2) BLM State Habitat Mapping

A mapping effort was also initiated by the Colorado BLM in 2002, through a contract with the Colorado Natural Heritage Program (CNHP), as part of a national agency mapping effort. With the help of other agency biologists, the Colorado BLM completed a statewide habitat risk map. BLM and CDOW biologists (primarily) hand-edited spatial information about sagebrush and sage-grouse habitats on 1:100,000 topographic maps based on Basin-wide vegetation inventory data and local knowledge of the area. They identified existing sage-grouse habitat in Colorado that appears to be in good condition, as well as habitat that is "at risk." For those habitats considered to be at risk, biologists identified the specific issue(s) potentially affecting the habitat (e.g., weeds, fire, lack of fire), and whether the "risk" threatened habitat quality or might result in habitat loss and/or fragmentation. In identifying habitat quality ("good" or "at risk"), biologists also considered whether the habitat quality in a habitat polygon was likely to significantly degrade within 5 years if no management actions were taken. CNHP organized, compiled, facilitated and produced the results of this mapping effort. These maps were not included in this Plan due to their large size; they are available at local BLM field offices.

Four habitat quality risk factors were identified: (1) weed invasion; (2) piñon-juniper encroachment; (3) old and even-aged sagebrush overstory; and (4) poor herbaceous understory condition. Six factors causing habitat loss or fragmentation were noted: (1) weed domination; (2) piñon-juniper replacement; (3) oil and gas development; (4) powerline infrastructure development; (5) subdivisions (human development); and (6) existing or proposed land-uses (ranging from land exchange to agricultural conversion).

For each polygon, any occurrence of sage-grouse was noted, and site-specific comments (e.g., wildfire, gravel pit, weed infestation associated with oil field) were recorded. The BLM habitat map will be updated every 5 years to reflect changes in habitat due to management, new information, or a consequence of nature (e.g., drought, fire, disease). These maps are expected to help identify and prioritize BLM budget, conservation actions, and management for sage-grouse on public lands. The maps will also be made available to other agencies and local work groups to use as a tool in sage-grouse management proposals and decisions.

In addition, BLM has developed a national sage-grouse mapping effort designed to provide range-wide information about the location, status, and trend of GrSG habitats, and the influence of a variety of land-uses/disturbances on those habitats. This modeling effort is not intended to portray quality of existing habitat, but rather to depict relative connectivity of existing sagebrush ecosystems across the West. Colorado GrSG habitats fall within 2 regions covered by this project, the Wyoming Basins Region in the northwest portion of the state, and the Colorado Plateau Region. This project was spearheaded by the National Science and Technology Center in Denver. BLM, CDOW, and other biologists had an opportunity to review and validate some of the modeling assumptions that were used in this GIS mapping exercise. These maps may be

useful in prioritizing proposed GrSG projects in the state, and identifying those areas with habitat fragmentation issues. These data sets may be updated in the future as new activities or habitat modifications occur across the landscape.

3) PPR Vegetation Mapping

In order to develop landscape-scale conservation strategies specific to the PPR, the BLM (White River Field Office) initiated a 3 year, landscape-level greater sage-grouse habitat inventory for the Piceance Basin in the summer of 2006. The PPR population is unique because the available habitat is naturally fragmented due to topography and because sagebrush parks are often interspersed with mountain shrubs. The habitat inventory is being conducted on both public and private land and will provide critical local information on the quantity and quality of available sage-grouse habitat in the PPR at a scale not possible from state or national mapping efforts. Specifically, the habitat inventory will provide: 1) a biologically-based estimate for the number of acres of sage-grouse habitat in the Piceance Basin, 2) the spatial arrangement of suitable habitat and unsuitable habitat, and 3) the quality of available habitat (i.e. herbaceous understory, encroachment from pinyon/juniper, etc).

The primary objective of the Piceance Basin sage-grouse habitat inventory is to create a relatively simple landscape-scale map of the different vegetation types found within potential sage-grouse habitat. Since the map is GIS-based, it can easily be shared, updated, and overlaid with other landscape features such as leks, roads, well pads, etc. We plan to use the habitat inventory map as a means to: 1) determine the suitability of specific areas as potential sage-grouse habitat, 2) prioritize areas in need of habitat restoration, and 3) evaluate land uses that may impact either suitable habitat or restoration efforts. More information on this project is included in Appendix F.

E. Parachute-Piceance-Roan Populations: Status and Distribution

1) Area Description

The Parachute – Piceance - Roan population is located within the area bounded by the towns of Meeker, Rifle, Palisade, and Rangely (Fig. 1). Currently occupied habitat within this area lies in 2 patches: (1) the larger western Roan Plateau and Cathedral Bluffs area; and (2) the smaller Magnolia area.

The Roan Plateau lies at the headwaters of the Douglas, Parachute, Piceance, and Roan Creeks, and forms a divide between the White and Colorado Rivers. The physiography of the plateau area varies from south to north. The top of the plateau appears to be a broad, rolling plain, but to the south in the Parachute and Roan Creek drainages, the plateau drops off abruptly into the deep canyons of these creeks and their tributaries. The ridgetops between the canyons are broad (up to 2.5 miles wide) and relatively level. Similarly, the west side of the area drops off extremely abruptly at the Cathedral Bluffs into East Douglas Creek. In contrast, the terrain drops fairly gently into the tributaries of Piceance Creek Basin to the north and east; this area is dissected by numerous relatively shallow parallel canyons, with relatively narrow ridgetops in between.

The majority of the birds in the PPR population inhabit the higher elevations (7000-8900 ft.) of the Parachute, Piceance, and Roan Creek drainages. Some of the headwater areas of East Douglas Creek (Cathedral, Lake and Soldier Creeks) are within this area as well. A small group of birds inhabit the Magnolia area, in the higher elevations (approximately 6500-7500 feet) of Greasewood and Collins gulches, north of Piceance Creek. The maximum elevation of approximately 8950 feet occurs on the west side of the Square S Summer Range (CDOW property) at the headwaters of Brush Creek and Soldier creeks. Precipitation within occupied habitat in the PPR ranges from 16-25 inches per year, varying primarily with elevation (Fig. 11).

Vegetation cover also varies from south to north. On the southern, lower ends of the ridges between Parachute and Roan Creeks and their tributaries, mountain shrub communities (a mix of serviceberry, Gambel's oak, bitterbrush, and big sagebrush) dominate, interspersed with patches of big sagebrush and aspen, depending on topography. Aspen pockets are found on north to northeast facing slopes, and sagebrush appears along gentle slopes in the bottoms of washes. Ridgetops to the north are dominated by big sagebrush, and aspen pockets are found on the northern slopes, occasionally on the ridges. This situation holds along the highest ridges forming the White River - Colorado River divide, as well as along the Cathedral Bluffs to the north. In the Piceance Creek drainage, mountain shrub is a lesser component, found on north-facing slopes only, with big sagebrush on ridgetops, and as one travels north or northeast downs these ridgetops, piñon and juniper woodlands are more prevalent, and appear to be encroaching into the sagebrush as time has passed over the years. The Magnolia area is similar in this regard. In the PPR population area, sage-grouse are largely restricted to sagebrush-covered ridges and plateaus at higher elevations, whereas slopes with mountain shrubs and narrow valley bottoms (even those with some sagebrush) are not used (Fig. 12).

Mountain shrub communities, particularly serviceberry, are more common and extensive in PPR than elsewhere in GrSG range. Serviceberry is well-established in the PPR, with dense areas of serviceberry occupying the lower and drier ridges within occupied habitat. Big sagebrush is the dominant shrub species in the highest elevations of occupied GrSG habitat, but is interspersed with serviceberry in many locations. While PPR sage-grouse have been demonstrated to use the margins of serviceberry stands for nesting and brood-rearing habitat, higher lek counts occur where sagebrush is the dominant shrub.

Landownership within Occupied Habitat is approximately 65% private and 35% public (see Table 6 and Fig. 10) and overall 46% and 54% respectively. On the south side, in the Parachute and Roan drainages, approximately 90% is private, and a large portion of that is owned by large energy corporations. To the north in the Piceance Basin, a majority is in public ownership, particularly at the lower elevations, with the exception of canyon bottoms along streams, which tend to be privately held. The traditional land-use in the area has been domestic livestock grazing. However, the potential for large-scale energy resource development has been recognized since the discovery and patenting of oil shale claims in the 1920s. The presence of oil shale and natural gas in the area accounts for the large proportion of ownership by energy companies. Currently, natural gas development is rapidly expanding in the area as pipelines tied into national supply networks have been constructed and prices have risen. Residential development is not a factor in the area at this time, although there is the possibility that worker camps will be constructed within sage-grouse habitat as gas development increases, due to the

remote locations of this activity from towns and the difficult nature of travel in this rugged country.

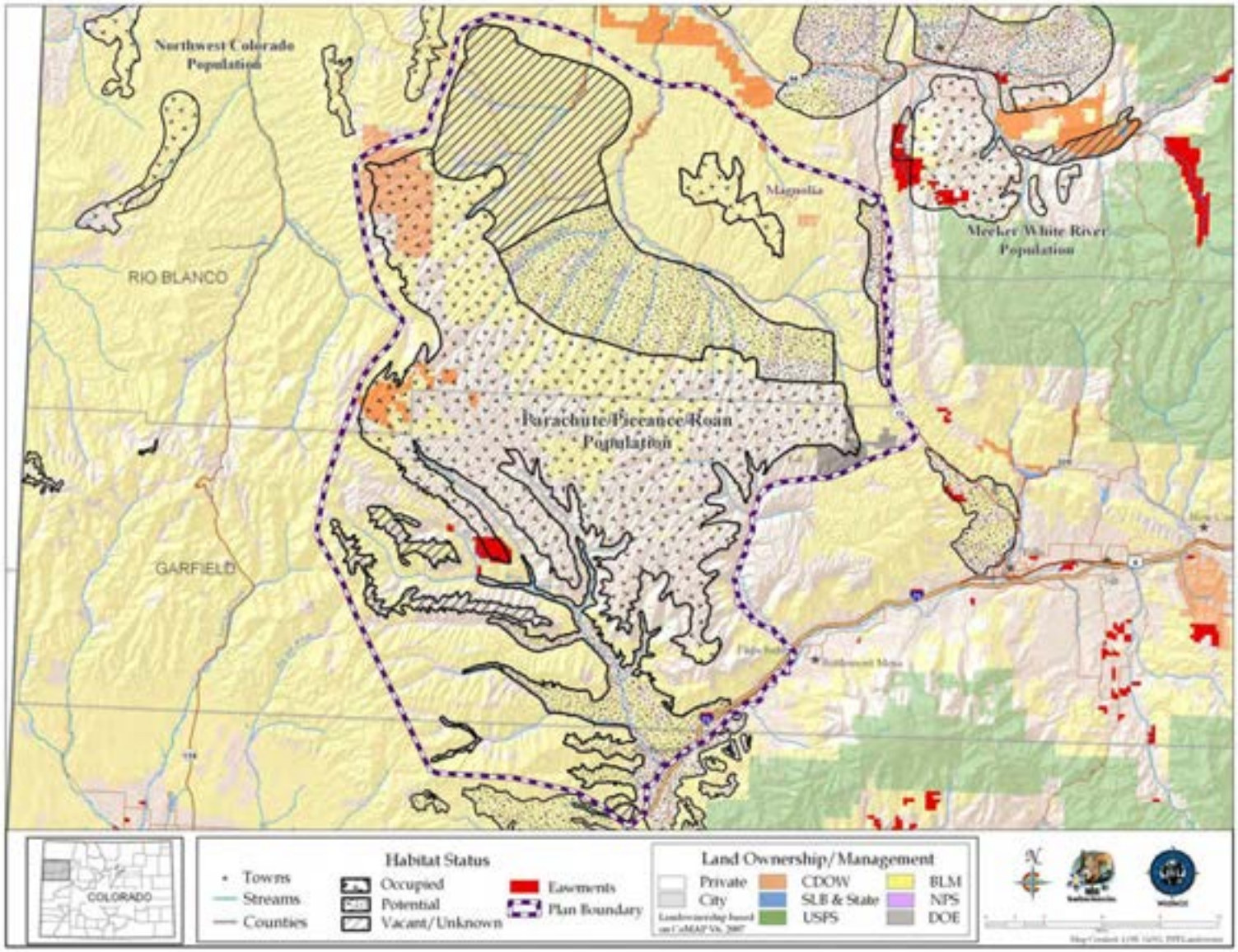

Figure 10. Land Ownership/Management in PPR Plan Area

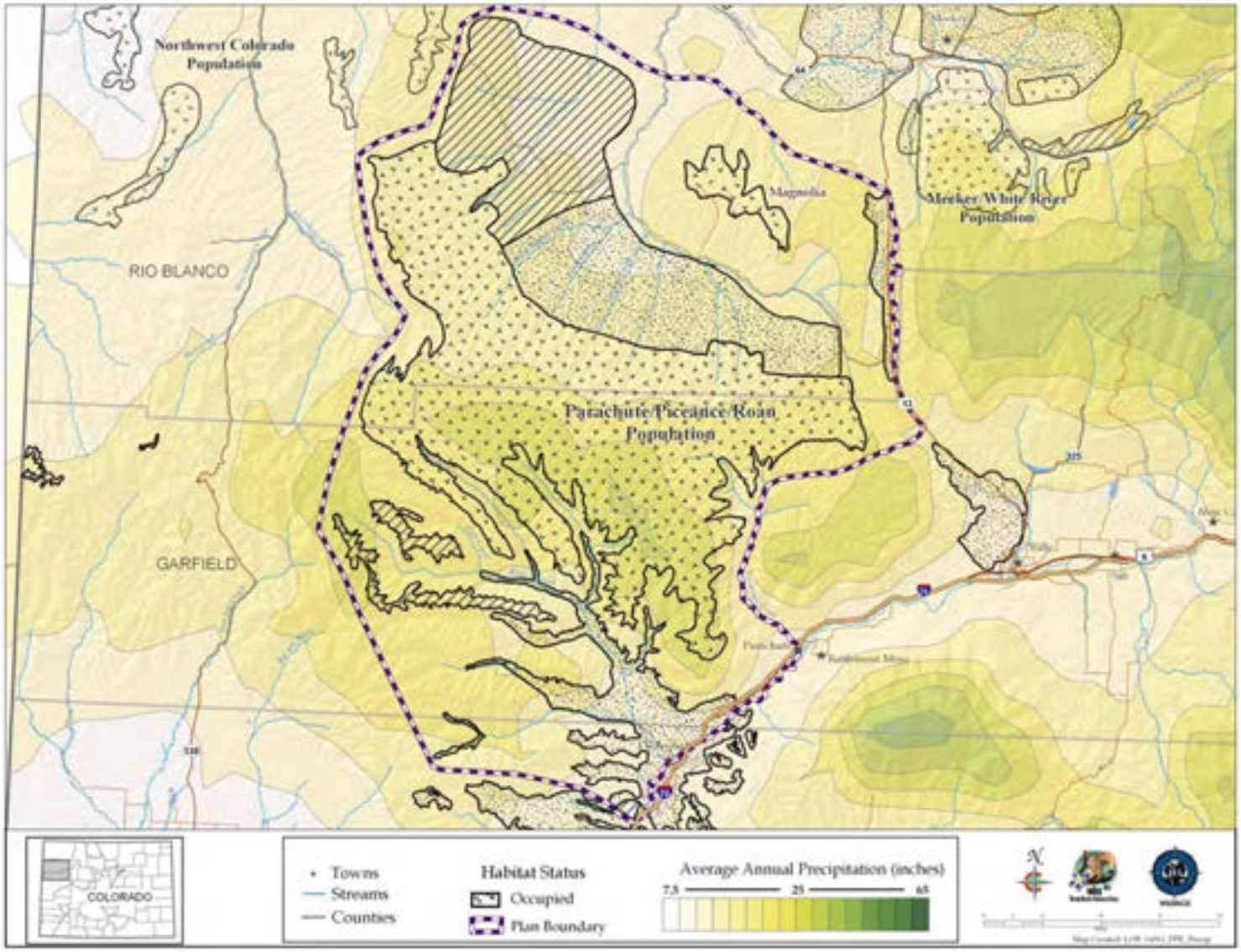

Figure 11. Average Annual Precipitation in PPR Plan Area

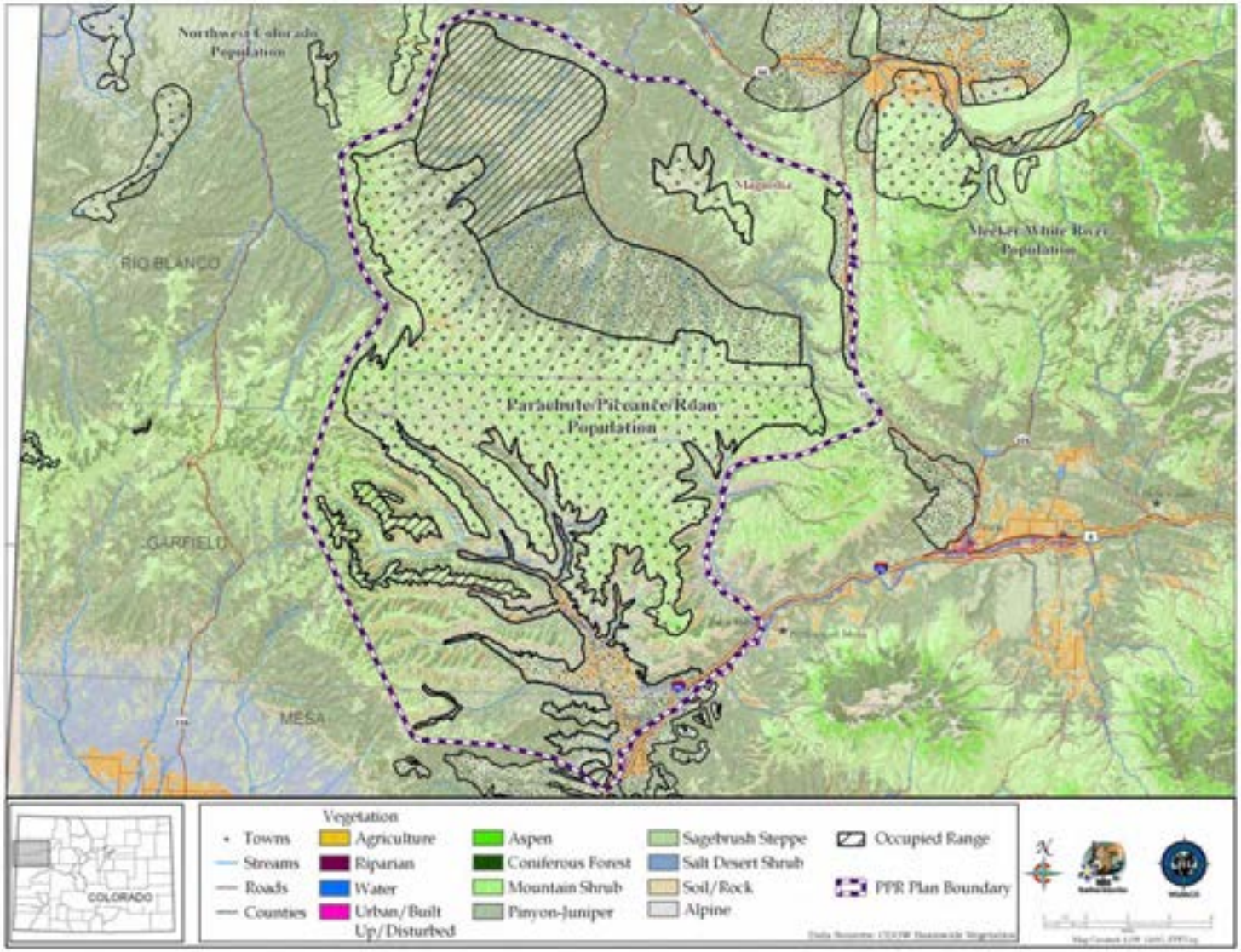

Figure 12. Vegetation in PPR Plan Area

The Parachute/Piceance/Roan population of GrSG is found in Rio Blanco and Garfield counties in northwest Colorado. The majority of the population is found south of Piceance Creek, but a small group of birds remain near the Magnolia Energy Camp at the head of Greasewood Gulch in T2S R96W.

Piceance Creek has numerous tributaries separated by long narrow ridges that generally run south to north and southwest to northeast. Valleys between the ridges are rarely greater than 500 feet deep. The ridge tops vary in width from 500 yards to 2 miles and from ¾ mile to over 20 miles in length. The Roan Creek and Parachute Creek drainages are characterized by deep canyons often exceeding 1000 feet with nearly vertical walls and several spectacular waterfalls.

The current Wildlife Resource Information System (WRIS) map on the CDOW website (Natural Diversity Information Source [NDIS] 2007. http://ndis.nrel.colostate.edu/wildlifespx.asp?SpCode=041201) for the PPR population includes 304,588 acres of Occupied Habitat, 99,683 acres of Vacant/Unknown Habitat, and 221,788 acres of Potentially Suitable Habitat (Table 6).

Habitat for the PPR population is naturally fragmented because the birds live in sagebrush communities on ridgetops that are separated by deep drainages. In addition, the elevation on precipitation and temperature and soils interact to produce an extremely diverse vegetative mosaic. Many areas on the ridges and surrounding slopes are hard to classify in terms of vegetative composition – standing in one spot, one could literally reach out and touch the major components of three or even four major vegetation communities – sagebrush, serviceberry, Gambel's oak, pinyon pine, juniper, and aspen. This terrain and vegetation mosaic makes the PPR habitats distinct from the habitats of other GrSG populations in Colorado. Classic GrSG habitat provides large expanses of sagebrush on gently rolling terrain. The area is considered semi-arid with a wide range of temperatures and weather conditions. Climatalogical data were taken from the NOAA website (http://www.wrcc.dri.edu/summary/Climsmco.html) for two sites closest to the range occupied by the population of birds: one at the Altenbern Ranch in Roan Creek (58 years of data) and the other at the Little Hills facility owned by the Colorado Division of Wildlife (CDOW) on the Dry Fork of Piceance Creek (43 years of data). The data for both sites was averaged with mean annual precipitation at 15.14 inches, average annual snowfall at 59.4 inches, mean maximum temperature 61.9 degrees F and mean minimum temperature 27.3 degrees F. In the general area, snowfall accounts for about 50% of the total precipitation. The lowest temperature recorded was -48 degrees F and the highest was 104 degrees F. The average annual precipitation at the upper elevation where the majority of the birds live should equal or slightly exceed that observed at the two weather reporting stations which are at lower elevations.

Soil type, elevation, slope and aspect determine the vegetation at any given site. Three subspecies of big sagebrush (*Artemesia tridentata*) can be found in the area, with basin big sagebrush (*A. t. tridentata*) most common in the drainage bottoms below 6500 feet in elevation. Wyoming big sagebrush (*A.t. wyomingensis*) is found on ridges between 6200 and 6600 feet in elevation, and mountain big sagebrush (*A. t. vaseyana*) is prevalent at elevations above 6800 feet (Cottrell and Bonham 1992).

Juniper (*Juniperus spp*.) and Pinyon pine (*Pinus edulis*) are intermingled in woodlands from the lowest elevations along Piceance Creek to about 6800 feet, depending on aspect. Big sagebrush, Utah serviceberry (*Amelanchier utahensis*), Gambel's oak (*Quercus gambelii*) and antelope bitterbrush (*Purshia tridentata*) are common on the ridgetops, even at the highest elevations. Groves of aspen (*Populus tremuloides*), spruce (*Picea spp*.) and Douglas fir (*Pseudotsuga menziesii)* are found on north-facing slopes with adequate moisture. Above 8000 feet, a good understory of forbs and grasses persist through most summers (Krager 1977).

As shown in Table 6 below, the majority of "Occupied" GrSG habitat is in private ownership (65%). Large tracts of private land are owned by the energy companies (petro-corporations). The majority of public lands in the area are administered by the BLM. No United States Forest Service or State Land Board lands occur in the area. The CDOW owns several parcels in the Piceance Basin. The largest parcel is the Square S Summer Range which is located at the western edge of the PPR population.

Land uses are relatively similar across most ownership types in the area. Federal, state and private lands are grazed with domestic livestock to varying extents, gas development has been begun or will occur across most ownerships depending on mineral ownership, wildlife go where they can, and water developments occur where there is water. The one exception is recreation, which is far more limited in extent on most private lands as compared to federal or state lands. Some hunting recreation does take place on a fairly controlled basis on certain private ownerships.

Table 6. PPR Greater Sage-Grouse Habitat by Land Ownership

Ownership	**Occupied Habitat Acres (% of total occupied)**	**Vacant/Unknown Habitat Acres (% of vacant/unknown)**	**Potentially Suitable Habitat Acres (% of total potential)**	**Total Acres (% of total)**
BLM	97,839 (32%)	80,470 (81%)	143,622 (65%)	321,931 (51%)
BOR	0 (0%)	0 (0%)	474 0(%)	474 0(%)
CDOW	6,272 (2%)	4,515 (5%)	667 (0%)	11,454 (2%)
U.S. Dept. Energy	1,264 (0%)	0 (0%)	193 (0%)	1,457 (0%)
Private	199,212 (65%)	14.698 (15%)	76,675 (35%)	290,585 (46%)
Total (acres)	304,430	99,525	221,630	625,902

In addition to development of the natural gas resource, experiments are on-going to determine the feasibility of commercial production of oil shale. As reported in the High Country News (March 4, 2002) "Northwestern Colorado has been viewed for a century as a potential oil treasure. By some calculations, the Piceance (pee'-awnce) Basin alone contains 300 billion barrels of recoverable petroleum, equal to 48 percent of Middle Eastern reserves. Yet no one has

been able to extract profitably the keragen, a waxy petroleum, from the shale." More than 70% of the total oil shale acreage in the Green River Formation, including the richest and thickest oil shale deposits, is under federally owned and managed lands (Oil Shale & Tar Sands Programmatic EIS Information Center. http://ostseis.anl.gov/guide/oilshale/index.cfm).

Currently, the BLM has issued leases for 5 experimental operations in Colorado's Piceance Basin to test different technologies to extract oil from the shale deposits.

Facilities to extract sodium bicarbonate have been built in the Piceance Basin (hydrologic) from underground nacolite deposits; only one of the facilities is still in operation.

Grazing by domestic sheep and cattle started in the area in the 1870's. Currently, there are few sheep and a fraction of the cattle numbers that were historically driven to the summer range at higher elevations and then wintered along the bottoms in the three major drainages.

2) Population Information

Leks in the PPR are concentrated at high elevations and remote locations, particularly in the Parachute - Roan portion of this population. Many of these leks are inaccessible from the ground during optimal periods for lek counts due to snow and mud conditions. This makes consistent lek counts difficult to accomplish, complicating comparison of data among years. Aerial lek counts have been the only possible method for counting sage-grouse on leks for some of the PPR. These aerial counts have historically been conducted by fixed-wing aircraft, which results in reduced sightability of birds and less consistent counts from year to year. CDOW has used helicopter surveys in 2005, 2006, and 2007 to count leks in this population. These counts have resulted in substantially higher counts that so far appear more consistent among years.

Extensive field work in 1975-77 provided the first complete look at sage-grouse distribution and numbers in the PPR (high male count = 234 in 1976; Krager 1977). Lek counts conducted by CDOW in the spring 2005, (the most exhaustive count completed since 1976), yielded a high male count of 180 birds, followed by high counts of 226 and 178 in 2006 and 2007, respectively (Fig. 13). Because of the limited amount of consistent data available, it is too soon to describe any trend in this population. Note that, for the purposes of documenting trends, we report only the number of GrSG males counted, not the total population size (see Fig. 13).

Going forward from 2007, the primary trend indicator will be the 3-year running average of high male lek counts. A three-year running average dampens annual fluctuations in annual counts that may be caused by variables such as weather conditions affecting the birds or the conduct of count flights, variations in observer expertise, and lek accessibility. The triangle on the graph on the next page represents the first data point of the three-year running average (195 males)

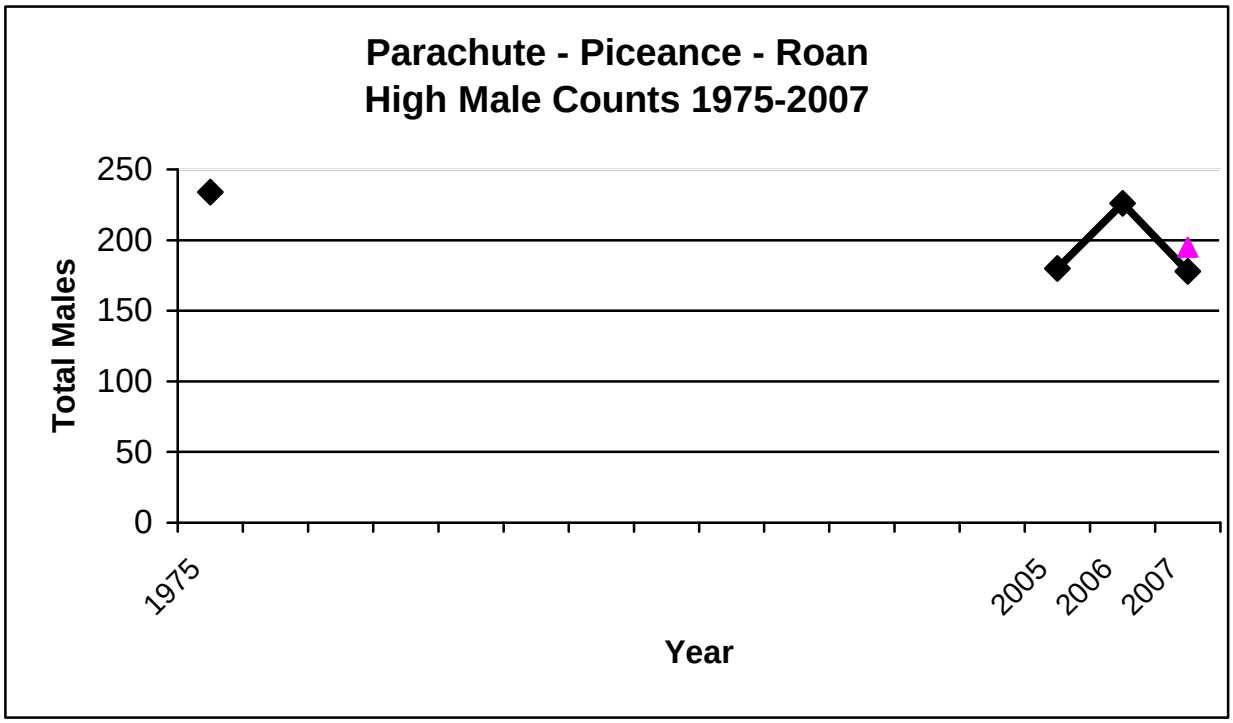

Fig. 13. Lek Count Data for PPR GrSG Population, 1975-2007
The data point for 1976 was estimated from categorical data (4 categories: 1-2, 3-5, 6-15, 15+), and though the specific value is approximate, the data are considered reliable. Data collected in the interim years are not reliable because of the difficulty in obtaining lek count data in the PPR area, and varied effort and different methods in conducting lek counts during those years. The triangle in the graph represents the first year of the 3-year running average of high male lek counts.

3) Historic Information

a) Historic Distribution

Rogers (1964) described a "light" population of sage-grouse on the Bookcliff (Roan) Plateau from Wagonwheel Ridge at the headwaters of Parachute Creek, west to Douglas Pass (this includes the headwaters of Douglas, Parachute, Piceance, and Roan Creeks.) He also noted sage-grouse in areas to the northwest, northeast, and south of the town of Rifle, as well as east and south of DeBeque in the Roan, Wallace, and Sunnyside drainages near the Mesa County line. Anecdotal information from local long-term residents of DeBeque, Colorado indicates that greater sage-grouse may have occupied lower areas of the Roan Creek valley during winter periods during the 1930s and 1940s. Following a severe winter storm that brought deep snow and sub-freezing temperatures in February of 1989, a small group of GrSG were observed by the CDOW in an area dominated by big sagebrush in the Castle Rock area, about 3.5 miles southwest of DeBeque in Mesa County (J. Gumber, retired CDOW, personal communication).

The Gunnison Sage-grouse Rangewide Steering Committee (2005) questioned whether sage-grouse previously found south of the Colorado River in the DeBeque-Collbran-New Castle area

are GrSG or GuSG. No published evidence exists to prove this one way or another, but a river as small as the Colorado would not present a barrier to travel by sage-grouse. Sage-grouse are strong fliers and have the ability to cross a river the size of the Mississippi. Regardless, sage-grouse have been extirpated south of the Colorado River in Garfield and northeastern Mesa counties, as well as north of the Colorado River and east of Parachute Creek in Eastern Garfield County.

b) Population Monitoring

Rogers (1964) reported only three strutting grounds (leks) in Garfield County and two in Rio Blanco County. In Garfield County, one lek was near Harvey Gap Reservoir, one on West Coulter Creek and one on Hunter Mesa south of Rifle. There have been no birds in those areas for decades. In Rio Blanco County, the known leks were 84 Mesa, south of Duck Creek, and Oil Wells, Little Hills near the present-day Magnolia Energy Camp. Birds are present in only one of those five areas today, but the total number of known leks is now over 80.

Much of the difficulty in obtaining counts in the mid-1900's was a shortage of field personnel to search for and inventory leks and the difficulty in reaching much of the area occupied by the birds during the breeding season. The old adage, "You can't get there from here" applies to much of the PPR in the late winter/early spring. Many of the leks were "discovered" by searches in fixed-wing aircraft in the 1970's. Ron Krager (1977) found 28 "new" (previously unreported) leks flying systematic searches along ridges during the breeding seasons of 1975-77.

Appendix E includes a map of currently known leks and lek status definitions. Many of the lek locations were plotted on USGS topographic maps from the front seat of a fixed-wing aircraft flying at 100 mph, so lek locations may not be exact. Some work remains to ground-truth lek locations, eliminate duplication and determine current status. This appendix also contains CDOW definitions of lek status: active, inactive, historic and potentially active.

After Krager's work in the 1970's, lek inventories were conducted each spring, some by ground counts but most by fixed-wing aircraft. In some years, scheduling and weather problems precluded the flights, so the data set is lacking, especially when you consider that CDOW guidelines for lek counts call for a minimum of 3 counts of each lek between March 15 and May 15. In some years, only lek "activity" checks were conducted to determine if the lek site had been visited by GrSG that spring; numbers of birds on leks was not determined. More than anything else, the data set reflects the difficulty in reaching the lek sites for accurate counts. To inventory the leks of the PPR population requires a greater effort than anywhere else in Colorado. In most areas of the state, CDOW field personnel can access leks by vehicle and complete multiple counts of each lek each spring, while the PPR leks require aerial surveys which are more difficult, weather-dependent, and less accurate.

During the winter 2005-06, the ad hoc committee that preceded formation of the working group determined that a more aggressive inventory effort should be conducted. Because of the access issues described above, it was decided that multiple helicopter flights would provide the best data. Over $21,000 was donated to the CDOW by energy-related companies. Six helicopter flights were conducted, three on each side of the drainage divide, plus three fixed-wing flights

were conducted for the southern portion of the population. Flying both fixed-wing and helicopter counts allowed for comparison of the efficacy of each method. The increased effort and the use of the helicopter resulted in the observation of many more birds on the lek, and discovery of several new lek locations. The same inventory effort, with the helicopter flights paid for largely by industry, was conducted in 2006. The donations collected in early 2005 paid for the 2005 and the majority of the 2006 helicopter flights.

The following list provides a comparison of the advantages of each aircraft:

- Helicopters are more maneuverable. The approach to the lek can easily be made from varying directions, which provides the observer numerous angles of light/view to detect the grouse, without flushing the birds from repeated flyovers.
- Helicopters can approach the lek more slowly and allow the observer(s) more time to view the birds.
- Helicopters can fly lower and closer to the lek providing a better view of the grouse– the fixed wing aircraft stays 500-700 feet off the surface while the helicopter can hover if necessary below 300 feet.
- Fixed wing aircraft generally tend to flush birds even at higher aircraft altitudes, probably due to the raptor-like shape of the fixed-wing aircraft.
- Fixed wing counts provide more consistency of data. Only two years of data from helicopter counts are available, but the data set from fixed wing counts covers many years.
- Distances between the leks can be covered more quickly with the fixed wing.
- Fixed wing flights are much less expensive. In 2005, DBS Helicopters from Rifle provided the aircraft at a cost of $875 per flight hour; in 2006, Heliquest Helicopters from Grand Junction flew the counts at a cost of $750 per hour. The 2007 flights were done with Olathe Spray Service at $644.00/hr. The DOW regional fixed wing aircraft (Cessna 185) can be operated at a cost of $150 per flight hour (2005 estimates).
- More accurate lek locations (UTM coordinates) can be determined with a helicopter. It's difficult to obtain the exact coordinates from a fixed wing aircraft that is moving 80-100 mph.

Data from lek counts on the south side allow comparison of fixed-wing and helicopter counts. In 2006 as well as in 2005, the counts on the south side of the Piceance-Roan/Parachute Divide were flown with both the fixed-wing aircraft and helicopter. In 2005, the high count with the helicopter was 84 birds while 45 birds were observed from the fixed-wing; this computes to 87% more birds being seen from the helicopter. In 2006, the high count was 154 birds observed from the helicopter and 83 from the fixed-wing; thus 86% more birds were seen from the helicopter. It seems clear that use of the helicopter results in many more birds observed. The downside is the expense; at current prices it costs approximately $12,000 to fly the six counts each spring with the helicopter while the CDOW fixed-wing aircraft requires no additional expenditure.

4) Local Conservation Plan

Efforts to develop a local conservation Plan began in the summer of 2005. Informational meetings were held in Roan Creek, Piceance Creek, and Parachute in June 2005, and a Work Group was formed in July, 2005. Work Group meetings have been held monthly since then, and

work on the Plan is progressing steadily, with expected Plan completion in early 2008 (PPRCP 2008). The most complex issue the Work Group has addressed is energy and mineral development (and associated infrastructure). Other issues include grazing, predation, habitat quality, recreation, piñon-juniper encroachment, and water development. Strategies have been developed for all issues and final preparation of the Plan is in progress.

The Work Group has decided that it will not set a specific population goal or target because of the lack of a consistent, long-term data set, a lack of perspective as to how current data fits into a long-term trend, and a general sense of uncertainty both about the past population numbers and projected natural gas development in the area. The data problems are discussed below. The lack of perspective comes from looking at the graph of counts from 2005-2007 (Fig. 13). Three data points on a graph cannot provide a realistic, defensible indication of where we've been, upward or downward trend, or even where this population is in relation to other populations in Colorado. This general uncertainty comes from concerns revolving around potential federal listing of the bird, the Population Viability Analysis in the Statewide Conservation Plan and the potentially gloomy potential forecasts put forth therein. The Work Group is acutely aware of the potential problems facing sage-grouse in the area and is dedicated to addressing these problems. At this time, the Work Group will not establish population objectives until sufficient data is collected.

Instead, the group intends to conduct a detailed annual analysis of what has gone on during the previous year followed by recommendations on addressing issues that appear to be negatively influencing grouse and/or their habitat. More details on this process later in this narrative.

Determination of a population objective for the Parachute-Piceance-Roan population of Greater Sage-Grouse is a difficult issue compared to some other Colorado populations. Lek count data, the flawed but primary method of estimating a population, are far more intermittent and variable for this population than for others in NW Colorado. North Park has thirty+ years of consistent data; NW Colorado has nine years, etc. Essentially, there are very few years of quality lek count data for this population: 1976 (flawed as well, but more complete than anything prior to 2005), and 2005 to the present. This Plan contains strategies to improve data collection (see "Data Collection and Management" section).

The lack of a long-term quality data set presents difficulties in attempting to determine a population objective. One reason for setting a population objective is to have some kind of objective or goal to maintain or strive for. It's also inherently interesting to know how things are going from one year to the next with a wildlife population that is of interest. When looking at these types of numbers, it's natural to wonder what is "normal." When there is concern for a species' long term survival, and petitions to list a species as "Threatened" or "Endangered," questions of past and present population levels become more urgent. This is the situation as this Plan is being written in no small part to address concerns for this sage-grouse population.

What we know about the PPR population is that in 1976, a minimum of 204 males were counted; in 2005, 184 males were counted, 226 in 2006, and 178 in 2007. These are really the only years that something remotely approximating an "apples to apples" comparison can be made (though even this is a stretch, since the 1976 counts were with fixed wing aircraft only, and not all known leks were counted). In all of the other years beginning with the first counts in 1962, there

isvariation in the amount of effort, the type of count (ground, fixed wing aircraft or helicopter), the number of leks visited, the number of times leks were visited, whether any effort was made at all, etc. All of those years are "oranges" to the "apples" of 1976 and 2005 onward. A graph representing the numbers of males counted over the years from 1962 to the present is totally misleading and ultimately meaningless and is not presented here.

So what can we say about males lek counts over the years? We can say there were probably around 234 males in 1976 (as estimated from categorical data); we don't know if that represents a high or low number compared to the years around it, or before that or after that until 2005. We can say that there were more males on leks in 1976 than in 2005-2007. We can speculate that since the some of the leks that had birds in 1976 on the northwestern end of the population no longer have birds, and most of the other general areas of leks continue to have birds, that it stands to reason that if the total area of occupied habitat has decreased, there would be fewer birds now than in 1976. But we still don't know whether 1976's 234 males represent a high, medium, or low number for years prior to 2005. As if there isn't enough variability, the comparison between numbers in 1976 and recent (2005 on) is confounded by different count methods (fixed wing aircraft in 1976, helicopters recently). Comparisons between fixed wing counts and helicopter counts in the years 2005-2007 suggest that a fixed wing flight counts roughly 60% of the birds seen on helicopter flights, which could mean the 1976 number could have been substantially higher if helicopters had been used on the count. For a detailed explanation of how the 1976 number was determined, see Appendix D.

The Work Group decided during its deliberations over the draft Plan that Conservation Action 4d. (p. 92) should apply not only to energy-related activities, but to any disturbance activity that may appear to be leading to a downward trend in lek counts. Where a 3 year consecutive downward trend in lek counts (as measured by the 3-year running average) is seen in the area as a whole and/or portions of the area, consider aggressively pursuing additional strategies to address population sustainability including:

- options for increasing GrSG female survival;
- shorter duration of disturbances and expedition of reclamation:

See "Population Augmentation" strategy section of Statewide Plan for GrSG.

5) Completed Conservation and Habitat Actions

Table 7. GrSG Habitat Projects Reported in PPR GrSG area (CDOW, unpublished reports)

General Location or Ownership	**Project Description and Purpose**	**Acres Treated (if applicable)**	**Project Completed By**	**Year Completed**
Habitat surrounding Magnolia Lek	Hydroaxe used to control encroaching tall shrubs	50	CDOW	2000-2002
Piceance SWA	Dixie harrow; sagebrush thinning to enhance nest cover and brood forage	1,200	CDOW	2000-2002
Near Magnolia Lek	Brush beating for understory restoration	500	BLM	2000-2002
Piceance SWA	Understory enhancement: reseeding with palatable forbs	400	CDOW	2000-2002
Barnes Ridge	Large natural gas/soda ash pipeline corridor reclaimed with grasses and palatable forb species	87 (8 miles of corridor)	Industry	2000-2002
N/A	Field collection of native forbs for germination description and native seed stock development	N/A	Upper Colorado Environmental Plant Center, NRCS	2003
BLM, Wolf Ridge	Prescribed burn in juniper encroachment area	280	BLM	2004
Skinner Ridge / Colorado Nature Ranch (now Kessler Canyon Ranch)	Sagebrush and serviceberry treatments (brush hog), to reduce shrub overstory for nesting and brood-rearing habitat	N/A	NRCS, ranch, CDOW	2005 and ongoing
Boies Burn (ridge between Eureka and Yankee Gulches)	Prescribed burn in heavy pinyon encroachment area. Nov. 2007 attempt unsuccessful; will continue.	600+	BLM	2007 and ongoing
Barnes & Bailey Ridges	Selective removal of pinyon seedlings/saplings	550	BLM, EnCana	2007

Table 7. GrSG Habitat Projects Reported in PPR GrSG area (CDOW, unpublished reports)

General Location or Ownership	**Project Description and Purpose**	**Acres Treated (if applicable)**	**Project Completed By**	**Year Completed**
Jackrabbit Ridge Experimental Lek Creation	Clearing of sagebrush and rabbitbrush to open an area to see if GrSG might begin to strut there.	0.5	CDOW, UnoCal (EnCana)	2001; GrSG droppings found, no strutting thus far.
Mud Springs Lek Clearing	Clearing/broadening opening around active lek	0.15	CDOW, Chevron	2001
Bar D Ridge Lek Clearing	Clearing/broadening around active lek and adjacent 20+ yr. old well pad (never drilled)	0.4	CDOW, Chevron	2001

6) Easements

No easements specifically for sage-grouse or sage-grouse habitat exist in the area covered by the conservation Plan effort. A conservation easement, originally secured through the Rocky Mountain Elk Foundation, exists in the south portion of Brush Mountain (Roan Creek), within GrSG occupied range (Fig.11). There are at least 2 easements in former GrSG range in the Plateau Valley in Mesa County (south of the Colorado River) in areas at the margins of what may have been historic range for whichever species of grouse used the area. Total easement acreages for the area are 1,355 acres in occupied habitat and 1,808 acres in potentially suitable habitat.

F. Issues and Threats

Issues and threats are discussed in the next section, “III. Conservation Strategies for the PPR Plan.”

III. CONSERVATION STRATEGIES FOR THE PPR PLAN

Strategy Overview
The working group identified the following issues/threats for the PPR population. The following section provides an elaboration of the issue or threat as it applies to the local population of GrSG, then lists conservation strategies that were developed through negotiation and consensus by the working group.

A. Data Availability
B. Habitat Change
C. Grazing
D. Predation
E. Energy Industry and Mineral Development
F. Recreation
G. Water Project Development and Water Management

A. Data Availability

1) Issues Related to Data Availability

Problem Definition: lack of consistent historic information on population numbers, seasonal habitat use & movements, lack of coordination within and between agencies.

The issues intended to be resolved by the following actions are described previously in Section II. E. 4) Local Conservation Plan, and revolve around the lack of a consistent long-term data set of lek counts. The intent is to continue lek counts at least the level of effort begun in 2005.

2) Conservation Actions Relating to Data Availability

Goal:	Objectives:	Actions:	Who:	When:
Improved knowledge based on data to better inform wildlife manger(s), landowner(s) and public on decisions impacting Sage-grouse in this area.	1. Establish a consistent, coordinated lek count effort for Greater Sage-Grouse throughout the conservation Plan area.	1a. Continue helicopter counts begun in 2005	CDOW	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
		1b. Check each lek at least 3 times, 7-10 days apart, late March through mid-May	CDOW & other stakeholders assisting with counts	Annually
		1c. Begin count ½ hour before sunrise (in air, at first lek); end no later than 2 hours after sunrise.	CDOW	Ongoing
		1d. Continue fixed-wing aircraft counts annually to maintain a data set.	CDOW	Ongoing
		1e. Investigate development of a detectability index between the two methodologies.	CDOW	Ongoing
		1f. Review count methodology used by other state wildlife agencies, and develop written helicopter survey protocol for counts in this area.	CDOW share with Work Group stakeholders	Feb. 15, 2009
		1g. Report current count data to Work Group in June of each year with comparison to previous years.	CDOW	At annual June Work Group meeting
		1h. Report data on three year "running average." (2005-2007, 2006-2008, 2007-2009, etc.)	CDOW report to the Work Group	At annual June Work Group meeting
		1i. Pursue funding to ensure the continuation of helicopter counts in the future	CDOW & Work Group stakeholders	Annually
	2. Establish a Geographic Information System GIS for Greater Sage-	2a. Establish who is responsible for handling updating various types of data in system	CDOW, BLM, Natural Resources Conservation Service	January 2009

Goal:	Objectives:	Actions:	Who:	When:
	Grouse information that can be shared and used relatively easily by members of the Work Group. Information would include soils, vegetation, various grouse information, rainfall/snow cover data, past and future land treatments, etc.		(NRCS), CO Oil & Gas Commission (COGCC), Energy Companies, Landowners, etc.	
		2b. Determine who will "house" and maintain the system. Establish agreements if necessary.	CDOW & stakeholders in Work Group	January 2009
	3. Consider establishing a system to incorporate incidental grouse sightings or other evidence into the GIS established in Objective 2.	3a. Investigate the possibility of CDOW or another agency using a software program such as "BIOTA" to compile, manage, and analyze grouse information, or perhaps set up an internet-based system similar to the CDOW's Amphibian and Reptile Atlas, or the Cornell Laboratory of Ornithology's "E-Bird" system.	CDOW	January 2009

B. Habitat Change

1) Issues Related to Habitat Change

The Work Group identified goals, objectives, and conservation actions for the issue of habitat change to move toward the desired quantity of and quality of sage-grouse habitat in areas appropriate for sagebrush-grassland plant communities. The goal is to improve or sustain the quantity and quality of habitats to benefit both sage-grouse and livestock.

Habitat changes differ in the lower, central portions of Piceance Creek area as compared to the Parachute and Roan area, due to the differing elevations and associated plant communities. .In the lower elevation areas of Piceance Creek, sagebrush areas on relatively narrow ridge tops are likely diminishing in size and total area due to encroachment of pinyon and juniper woodlands into sage areas currently or formerly used by Greater Sage-Grouse. On the south side of the area, in Parachute and Roan Creeks, the sage-covered ridgetops are wider and higher in elevation. Adjacent vegetation types are aspen forest and serviceberry shrublands. Sage-grouse are using areas where serviceberry is a greater component of the shrubs; the extent to which this type of area is preferred by the grouse over sagebrush-dominant areas is open to question, as is the question of whether serviceberry is stable or increasing in the southern areas.

"Habitat" and the vegetation types that comprise it change constantly in response to short-term influences such as annual precipitation and long-term influences such as gradual ecological succession (aging and eventual replacement of a plant community). In addition, events such as drought, storms, fire (or lack thereof), flooding, landslides, and human management activities may have long-term influences as well. Although we do not have detailed information and mapping on specific changes, some of the following events are known to have happened over the last 100-120 years:

- Changes from one vegetation type to another; in particular, changes from sagebrush-grassland communities to mixed sage-grass/pinyon-juniper woodland types in the Piceance Creek watershed. Sagebrush-grass communities across the conservation Plan area may differ in terms of their long term stability. The lower elevation ridgetops on the Piceance side likely tend toward pinyon-juniper woodland over time in the absence of disturbance such as fire. On the higher ridgetops on the Roan and Parachute sides, sagebrush-grass vegetation probably tends to maintain itself over the long-term; these sites may be too dry for aspen, and too wet, high, or cold for pinion and juniper. Encroachment of serviceberry may be a factor here, however.
- The abandonment or change of hay meadows to native range.
- The loss of wet meadow riparian areas due to stream-channel down-cutting and water diversions.
- Changes in age, structure, and density of sagebrush.
- Changes in the understory (grasses and forbs) in sagebrush communities.
- The invasion of noxious weeds.
- Changes in climatic conditions.

Characterizing specific areas as good, poor, or mediocre in terms of sage-grouse habitat is a site-specific exercise and will need to be completed in the field. Some areas with poor understory vegetation or poor sagebrush growth may be a result of naturally poor site conditions and, thus, are not likely to respond to habitat manipulation. On the other hand, some areas may be productive sites that have been preferred by wild and/or domestic livestock resulting in modified plant communities. Some of these potentially productive sites may benefit from active vegetation management. All conservation actions listed below are voluntary. However, the hope is that landowners and land managers will take action to improve or sustain the quantity and quality of sage-grouse habitat in the conservation Plan area. Appendix A lists some possible funding sources to cost-share with landowners on habitat improvement projects

2) <u>Conservation Actions Relating to Habitat Change</u>

Goal:	**Objectives:**	**Actions:**	**Who:**	**When:**
Develop vegetation resource goals that provide the desired quantity and quality sage-grouse habitat on a landscape level that benefits both livestock and sage-grouse.	1. Define healthy vegetative communities for the local environment and develop management practices to achieve healthy rangeland & sage-grouse habitat.	1a. Develop a list of best management practices that will help achieve the vegetative community goals for sage-grouse habitat. The list will be adaptive to allow for practices, as new information becomes available.	CDOW, BLM, NRCS, Landowner & user groups	2006 or upon Plan completion.
		1b. Inventory and develop mapping database (GIS). Include specific information on soils (where possible), sage-grouse habitat and, historical habitat treatments, etc.	CDOW, BLM, NRCS	Beginning 2006
		1c. Educate and encourage landowners and land managers to use the best management practices for vegetative communities and sage-grouse habitat.	Landowners, Colorado State University (CSU) Extension, NRCS, CDOW, BLM	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
		1d. Provide expert assistance on management recommendations to willing landowners and land managers. If acceptable to landowner, provide opportunity for Work Group to participate in site visit.	CSU Extension, NRCS, CDOW, Partners for Wildlife	Ongoing
		1e. Monitor effectiveness of best management practices as they are applied. Provide updates and results of best management practices to Work Group.	CDOW, BLM, NRCS	Ongoing
	2. Develop goals for healthy habitat for the different seasonal needs of sage-grouse. Use local knowledge and available research to define the seasonal needs and habitat requirements. Take appropriate voluntary actions to improve sage-grouse habitats.	2a. Improve areas of poor quality nesting habitat by actions such as the following (pending inventory results); i. Seed area with grasses and forbs, go heavy on forbs if brood-rearing occurs in the area. Light disking & interseed, or drill seed	CDOW, BLM, NRCS, Landowners, & users	Ongoing
		ii. If sage is too dense, consider thinning by roller-chopping, light disking, Dixie Harrow, Lawson Aerator or other methods. Apply best management practices on a case by case basis. Use Connelly et al. (2000) guidelines as reference-page 19.	CDOW, BLM, NRCS, Landowners & users	Ongoing
		iii. Encourage multi-species plantings of grasses and forbs.	CDOW, BLM, NRCS, Landowners & users	Ongoing
		iv. Retain residual cover through fall and winter into nesting season.	CDOW, BLM, NRCS, Landowners	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
			& users	
		2b. Improve brood-rearing habitats by actions such as the following (pending inventory results).	CDOW, BLM, NRCS, Landowners & users	Ongoing
		i. Restore riparian systems.	CDOW, BLM, NRCS, Landowners & users	Ongoing
		ii. Raise water table – raise channel bottom from deeply incised gullies.	CDOW, BLM, NRCS, Landowners & users	Ongoing
		iii. Restore old ponds/Construct new ponds in areas lacking water, while minimizing potential for promoting mosquito breeding habitat at elevations below 8,000 feet.	CDOW, BLM, NRCS, Landowners & users	Ongoing
		iv. Preserve irrigated hay meadows.	CDOW, BLM, NRCS, Landowners & users	Ongoing
		2c. Improve Lek Areas by actions such as the following (pending inventory results).	CDOW, BLM, NRCS, Landowners & users	Ongoing
		i. Mechanically treat historic lek areas where sagebrush density has increased.	CDOW, BLM, NRCS, Landowners & users	Ongoing
		ii. Clear new lek sites.	CDOW, BLM, NRCS, Landowners & users	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
		2d. Improve Winter Habitat by actions such as the following (pending inventory results).	CDOW, BLM, NRCS, Landowners & users	Ongoing
		i. Manage for vigorous stands of sagebrush in known critical winter range (based on current knowledge, telemetry study may provide more detailed information).	CDOW, BLM, NRCS, Landowners & users	Ongoing
		2e. Identify and map key seasonal habitat areas.	CDOW, BLM, NRCS, Work Group, landowners & users	Initial data in Fall 2006 then annually
	3. Manage for interconnected vegetative communities that minimize habitat loss.	3a. Plan proposed treatments in context of past treatments and other proposals on adjacent ownerships to maintain continuity of healthy vegetative communities.	Landowners & users, BLM, CDOW, NRCS	Ongoing
	4. Determine limiting habitat conditions within the landscape. *If any of the following are found to be limiting, the recommended actions are suggested:*			
	4a. Lack of suitable quantity or quality of vegetative cover resulting from past events or actions (e.g., drought, diseases,	i. Carefully consider further reduction in sagebrush acreage in key seasonal habitat areas (would not necessarily preclude thinning or other treatments if appropriate)	Landowners & users, BLM, CDOW, NRCS	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
	spraying, brush beating, intentional burning, or wildfire, excessive herbivore (any animal that eats plants) etc.)	ii. Restore Sagebrush –allow re-establishment over time if underway.	Landowners & users, BLM	Ongoing
		iii. Manage for interconnection of sagebrush stands – some degree of interspersion of sage with grass areas is desirable, as is interspersion of sagebrush stands of different ages.	Landowners & users, BLM, CDOW, NRCS	Ongoing
		iv. Allow for adequate sagebrush management to meet sage-grouse habitat requirements.	Landowners & users, BLM	Ongoing
	4b. Large expanses of old dense sagebrush with little understory.	i. Consider thinning by roller-chopping, light disking, Dixie Harrow, Lawson Aerator, mowing, herbicide applications or other methods.	Landowners & users, BLM, CDOW, NRCS	Ongoing
		ii. Consider treatments of varying patch sizes and shapes to create a mosaic of open areas interspersed with sagebrush.	Landowners & users, BLM, CDOW, NRCS	Ongoing
		iii. When planning sagebrush treatments, treat older more dense sagebrush while allowing sagebrush regeneration in other areas. (Sagebrush treatments in winter range areas may not be appropriate.)	Landowners & users, BLM, CDOW, NRCS	Ongoing
	4c. Sagebrush is giving way to another vegetation type (e.g. pinyon-juniper (P-J), serviceberry and noxious or	i. Mechanically remove vegetation while retaining the sagebrush community: a. Chainsaw vegetation if widely scattered or rough terrain (draws) b. Roller-chop vegetation–	Landowners & users, BLM, CDOW, NRCS	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
	invasive weeds).	destroys/mulches, some larger sage, thins sage, can seed simultaneously c. Hydro-Axe vegetation–mulches more finely than roller-chopping d. May require continuous management every 10-15 yrs, unless seedling/saplings shorter than sage are hand cut		
		ii. Prescribed Burning a. Probably solves P-J problem longer term, but sage does not resprout and will not recover for 15-20 years or more. b. Burns should be planned for small areas to allow for continued dominance of sagebrush in landscape. For example, small burns up draws may help restore some riparian vegetation and water table while retaining sagebrush on uplands.	Landowners & users, BLM, CDOW, NRCS	Ongoing
		iii. Herbicide Treatment	Landowners & users, BLM, CDOW, NRCS, CSU Extension, County Weed Supervisor	Ongoing
		iv. Consider and mitigate the potential for undesirable species invasion when planning and implementing habitat treatments.	Landowners & users, BLM, CDOW, NRCS, CSU Extension, County Weed Supervisor	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
		v. Encourage landowners to seek assistance from county weed supervisor and extension when treating noxious weeds.	Landowners & users, BLM, CDOW, NRCS, , CSU Extension, County Weed Supervisor	Ongoing

C. Grazing

1) Issues Related to Grazing

Grazing animals are part of the landscape. Some grazers are wild and some are domestic. The animals can have positive or negative effects on the landscape, depending on land use objectives. In considering grazing and sage-grouse, the effects of wild and domestic grazers cannot easily be separated, so the Work Group is addressing both in this section.

The Work Group does not believe that any one factor, including grazing, is the sole reason for sage-grouse decline in the area. There is a lack of credible scientific evidence that directly links grazing (wild or domestic) with declines in sage-grouse numbers (Crawford et al. 2004). Having said that, the Work Group does not desire to see this species disappear from the area and will work with the CDOW and other interested parties to make sure that grazing practices are compatible with sage-grouse to the extent possible.

Domestic and wild ungulate grazing are dominant land uses on public and private lands in Rio Blanco & Garfield counties. Sound grazing management promotes the use of forage resources, while having a neutral or positive effect on plant vigor. The Work Group recognizes that drought is a critical factor in grazing management as it relates to pounds of available forage for both domestic and wild ungulates. Proper livestock grazing and wildlife management can maintain and perhaps enhance desirable plant communities by preventing the invasion of noxious weeds, improving the palatability of vegetation, and promoting residual cover. Proper grazing can also increase plant diversity and improve riparian areas. Improper grazing has the potential to reduce the availability of food and cover for sage-grouse by affecting the composition and structure of grasses, forbs, and shrubs. It is important to consider sage-grouse habitat needs when evaluating big game population objectives and livestock stocking rates.

Currently, the primary grazers in the conservation Plan area are deer, elk, cattle, wild horses and domestic sheep. (For purposes of this discussion, “grazing” includes browsing unless otherwise specified.) Over the last 50 years, numbers of deer, cattle, and sheep have declined or remained stable in varying proportions, while elk numbers have increased and wild horse numbers have fluctuated and are above BLM objectives.

The CDOW manages deer and elk populations toward objectives set in herd management plans, also known as Data Analysis Unit Plans (DAU Plans). The purpose of a herd management plan is to provide objectives for managing a big game species in a specific geographic area that includes the species’ seasonal movements. These objectives are based on sound wildlife management principles, as well as the desires of landowners, residents, land management agencies and other interested publics. Herd management plans must ultimately be approved by the Colorado Wildlife Commission and are reviewed every 10 years and changes are made if warranted. A traditional herd management plan contains two primary goals: a “herd objective,” (i.e., the number of animals the area should contain) and the sex ratio of males to females in that herd. Population estimates are derived using computer model simulations that involve estimations for mortality rates, hunter harvest, wounding loss and annual production. These simulations are then adjusted to align on measured post-hunting season age and sex ratio

classification surveys. Cattle and sheep numbers are determined by landowners on their own lands, and in conjunction with BLM on public lands. Current domestic sheep grazing occurs primarily in the Cow Creek-McCarthy Gulch area west of Rio Blanco.

Wild and domestic grazing animals follow the same general pattern, that is, they use lower elevations in winter, moving to higher elevation ranges as spring turns to summer, and back to lower elevations in the fall as winter approaches. In the PPR area, sage-grouse currently occupy the higher elevations areas year-round. Grazing animals are generally spending mid-spring to early winter in these higher elevation areas (up to 9000'). Domestic livestock are usually fed hay in winter and early spring in pasture areas; deer and elk move freely unless restricted by snow depth.

Two key issues relate to grazing and sage-grouse are: 1) the potential impact of herbivores on grouse nesting and hiding cover depending on the timing of grazing; (grazing in grouse nesting areas from late summer through early spring can remove grasses that could provide nesting cover in early spring before new growth provides cover) and 2) the potential for wild herbivores to negate the benefits of a domestic livestock grazing plan intended to leave cover for grouse.

a) Domestic Livestock Grazing

Healthy and productive public and private rangelands are the foundation of a profitable and sustainable ranching industry and abundant wildlife. Many ranches depend on public land grazing for economic viability, and many species of wildlife, including sage-grouse, depend on private lands during one or several periods during their annual life-cycle. Private ranches contribute some of the highest quality sage-grouse habitat in western Garfield and Rio Blanco counties.

Emphasis should be placed on maintaining these lands as viable economic units to preserve large and significant areas of privately owned habitat. The alternative is habitat fragmentation and increased human impacts when agricultural lands are sold for development. It is important to recognize that many ranches with significant private land holdings depend on public land grazing allotments for the viability of their operations. Therefore management decisions on public land can influence private land use patterns.

b) Wild Ungulate Grazing

This issue is closely related to the issue of domestic livestock grazing. The question revolves around whether or not the extent and timing of grazing by wild ungulates, (particularly elk) can negatively affect sage-grouse and their habitat. First, are elk eating vegetation that might otherwise provide food, hiding, or nesting cover for sage-grouse? Second, could foraging elk negate positive grazing management actions taken on public or private lands meant to leave cover for sage-grouse?

Many agree that these scenarios are possible, and that there are areas where the first occurs. There may be other areas where elk are not a problem (case by case basis). The second point arises from the concerns of ranchers that altering domestic grazing practices at inconvenience

and expense to their operation may yield no positive effect for sage-grouse habitat if elk negate the benefit.

In addition to being closely related to the livestock grazing issue, the issue of elk management and herd numbers is particularly contentious. Various attempts and efforts have not resulted in significant reductions of the elk herd. The winter of 2003-2004 exhibited a decrease in elk numbers so some of the efforts may be working. Reducing elk numbers is beyond the scope of this conservation Plan. The Parachute-Piceance-Roan Conservation Plan area overlaps several different deer DAUs, but the primary DAU of interest is elk unit E-10, which comprises the lower White River basin and the north side of the Colorado River Basin from Rifle to the Utah state line. The herd objective for DAU E-10 is 8,000-10,000 elk, while the current population estimate is 8,000 animals.

Regarding deer, the DAU picture is more complicated and overlaps large areas outside of the grouse conservation Plan area. There is not the same concern about deer grazing/browsing having negative effects on sage-grouse, as with elk. There are places where wintering deer can severely trim back sagebrush foliage, but these tend not to be areas that are important to sage-grouse nesting; there could be impacts to sage-grouse wintering habitat if there is overlap between deer and grouse winter ranges. This is not known to be the case in the conservation Plan area.

Deer DAU D-7 includes Piceance and Yellow Creeks, and Maybell on the west, and ranges to Steamboat Springs, Oak Creek and Yampa on the east. It is a huge area, and attempting to estimate the number of deer in the Piceance and Yellow Creek areas is very difficult. However, CDOW biologists estimate there are 5,000 resident deer and 5,000-8,000 wintering deer in this area. This compares to wintering deer numbers thought to be in the neighborhood of 50,000 deer in the 1950's and 1960's, when Piceance Creek was considered the largest migratory deer herd in the world. The current herd objective for all of D-7 is 67,500, the current population estimate is 72,000 deer post-hunt 2007.

The southern end of the conservation Plan area is part of the much smaller deer DAU D-41, which is wholly comprised of the Roan and Parachute Creek drainages. The herd objective here is for 16,500 deer, and it is estimated that post-hunt 2007 there were 9,600 deer, well short of the objective.

Current CDOW herd management objectives attempt to stabilize elk herds in this area.

It is difficult to quantify specific issues related to grazing of wild and domestic animals. On one hand, sage-grouse have adapted to existing ranching and livestock grazing systems because the grouse still exist at these sites. However, it will never be known whether the pre-domestic grazing (prior to 1870) GrSG population was higher or lower, thus making the issues and impacts of grazing an important part of the strategy for sage-grouse conservation. Few studies have directly addressed the effect of livestock or wildlife grazing on habitat use by sage-grouse. Thus, rangeland and wildlife biologists must rely on indirect evidence as it relates to grazing and sage-grouse (Crawford et al. 2004). This leaves the central issue of what it is about grazing that is good, neutral or detrimental towards sage-grouse recovery. The Conservation Actions related

to Livestock Grazing are meant to address this issue, and the Conservation Actions relating to other ungulates are intended to address the wildlife component of the grazing issue.

c) Other Wildlife Issues

The Work Group discussed the potential effects of grass consumption and cutting by ground squirrels in the Plan area. Many range managers contend that ground squirrels consume large quantities of range grasses and, therefore, conduct extensive control programs on rangelands (Fagerstone and Ramey 1996). Grinnell and Dixon (1918) estimated that 200 California ground squirrels consumed as much forage as one steer. Shaw (1920) estimated that Columbian ground squirrels consumed 187% of their weight daily and that consumption by 385 Columbian ground squirrels would be equivalent to one cow and 96 squirrels equal to one sheep.

Fagerstone and Ramey (1996) suggest careful evaluation before undertaking control programs. Ground squirrels may have positive roles in grassland ecosystems, particularly as prey for other wildlife species, as well as soil loosening and redistribution, aeration, and nutrient cycling.

2) Conservation Actions Relating to Domestic Livestock Grazing

Goal:	Objectives:	Actions:	Who:	When:
Continue to foster a sustainable and economically viable ranching community while also providing high quality sage-grouse habitat.	1. Maintain and enhance large scale open range habitats to provide both sage-grouse habitat and livestock forage.	1a. Encourage private, local, state, and federal policy makers to consider the importance of the economic viability of ranching (both public and private land) in providing sage-grouse habitat. Examples include: managing elk populations, county planning.	Work Group	Ongoing
		1b. Educate stakeholders about grazing systems and grazing strategies for improved grouse habitat and survivability.	Work Group	Ongoing
		1c. Document (monitor) herbaceous plant cover before and after domestic livestock grazing to determine if the removal of the herbaceous plant cover is a result of wildlife grazing or other environmental factors.	BLM, NRCS, CDOW, Private Landowners& users & land managers, Industry	Ongoing
		1d. Continue to enhance and maintain improved rangeland (public and private) by using all available tools to land managers. These tools include, but are not limited to, timing and intensity of domestic grazing, weed control, fire, water development, vegetation management, and wildlife population management.	CSU Extension, CDOW, NRCS, BLM, Private landowners & users & land managers, Industry	Ongoing
	2. Improve, if possible, livestock &vegetative	2a. Fund further research that scientifically shows how or if domestic grazing and wild ungulate grazing affects grouse	Universities, CDOW, NRCS, CSU Extension, Landowners &	Upon completion of Plan

Goal:	Objectives:	Actions:	Who:	When:
	management for sage-grouse habitat and livestock forage sustainability.	populations during breeding and nesting.	users & land managers, Industry	
		2b. Develop watering systems away from riparian areas on both private and public land to better disperse livestock and wildlife while also providing moist areas for broods.	Private Landowners & users & land managers, BLM, CDOW, HPP, NRCS, Industry	Ongoing
		2c. Manage livestock movement through use & rotation/placement of salt or minerals to benefit sage-grouse.	Private Landowners & users & land managers, BLM, NRCS, Industry	Ongoing
		2d. If research and/or range conditions show that grazing system changes or vegetative management would benefit sage-grouse, propose those changes to grazing systems on a case-by-case basis. If grazing changes are needed, consider elk/wildlife numbers first before adjusting livestock numbers.	CSU Extension, BLM, CDOW, landowners & users & land managers, NRCS, HPP, Industry	As necessary
		2e. Identify and develop cost-share programs to help landowners implement actions to benefit sage-grouse.	NRCS, BLM, HPP, CDOW, Non-Profits, Partners for Wildlife, Industry	Ongoing

3) Conservation Actions Relating to Wild Ungulate Grazing

Goal:	Objectives:	Actions:	Who:	When:
In conjunction with sustainable livestock interests & sport hunting industries, ensure that grazing by other ungulates is not adversely affecting sage-grouse habitats.	1. Determine the extent of the effects elk may be having on sage-grouse habitat.	1. Identify, monitor, and map big game/sage-grouse conflict areas.	CDOW, BLM, Private Landowners & users & land managers, Work Group, Industry	Upon completion of Plan
	2. Manage other ungulate populations to meet desired sustainable plant communities that provide sage-grouse habitat.	2a. Strive to reach elk harvest objectives on public and private land.	CDOW, BLM, Private Landowners & users & land managers, Work Group, Industry	Ongoing
		2b. Review and encourage coordination of big game herd objectives in future DAU plans and modify as necessary to improve conditions for sage-grouse.	CDOW, Work Group	Within DAU planning schedule or as needed
		2c. Manage big game population levels and habitat to minimize or avoid resource conflicts on grouse habitats. This could include enhancing big game habitat elsewhere to attract big game off certain grouse habitats. Examples: burning, seeding, water development, etc.	CDOW, BLM, Private Landowners & users & land managers, Work Group, Industry, NRCS, HPP	Ongoing
		2d. Manage wild horse population levels and habitat to minimize or avoid resource conflicts on grouse habitats.	BLM, CDOW, Landowners & users & land managers	Ongoing

D. Predation

1) Issues Related to Predation

Although the Work Group recognizes that no one factor is likely the cause for the shrinking of the range or population decline of sage-grouse in Garfield and Rio Blanco counties, many Work Group members believe that predation is one of the most important issues to consider. Some Work Group members believe that predator numbers have increased dramatically. The predator control setting in Colorado changed in 1996 with voter passage of Amendment 14. The constitutional amendment states "It shall be unlawful to take wildlife with any leg hold trap, any instant kill body-gripping design trap, or by poison or snare in the state of Colorado." While the intent of the amendment was to stop lethal trapping, it also curtails the control of animals causing damage. The amendment does contain an agricultural exemption allowing farmers and ranchers to lethally trap animals causing damage to their livestock and crops during one 30-day period per year. Also, governmental health departments are allowed to use lethal traps to protect public health and safety. Lethal traps remain legal to kill all types of rodents except beavers and muskrats. (You can still use mousetraps to kill mice in your house, shed or barn). Non-lethal traps can be used for scientific research, falconry, for relocation, or for medical treatment pursuant to regulations established by the Colorado wildlife commission. The text of amendment 14 is contained in Appendix B.

Some members of the Work Group note that sage-grouse are killed by predators and have always been killed by predators. These Work Group members believe that predation is not a limiting factor in sage-grouse populations provided that adequate cover is available. In addition, some Work Group members believe that predator control over broad geographic areas is impractical and will not be effective without habitat improvement. Predator control to increase production and recruitment in bird populations has been used in extreme cases such as endangered species, but has been effective and incorporated only on small, intensively managed areas.

Sage-grouse and other ground nesting birds have developed effective strategies for hiding from predators when they occupy habitat of sufficient quality. Schroeder and Baydack (2001) suggest that predation has the potential to affect the annual life cycle of sage-grouse in three primary ways 1) success of nests, 2) survival of juveniles, and 3) annual survival of breeding-age birds. However, little is known about the relative importance of predation on the viability of grouse populations.

Documented nest predators include ground squirrel, weasel, badger, elk, coyote, common raven, American crow, red fox, striped skunk, black-billed magpie and various species of snakes. Numerous species have also been documented killing and/or consuming adult sage-grouse and include Cooper's, ferruginous, red-tailed and Swainson's hawks, northern goshawks, coyote, red fox, bobcat, and golden eagle. Numerous predator species are also known to kill juvenile sage-grouse. Because of the small size of juvenile grouse, additional predators have been documented and include American kestrels, merlin, northern harrier, common raven, and weasel. Some Work Group members also feel that birds such as great horned owl, and loggerhead shrike, might kill sage-grouse in the area.

Some of the Work Group members are particularly concerned with the increased diversity of predators in local sagebrush communities. For example raccoons, striped skunk, and red fox are not believed to have inhabited sagebrush communities prior to intensive Euro-American settlement. However, humans have introduced additional food supplies (grain, garbage, carrion) and places for such predators to over-winter and rear their young (abandoned buildings, barns, haystacks). Raccoons and red fox were not considered common in western Colorado 50 years ago. In addition, raptors, eagles, and ravens now have more places to nest and perch in the form of planted trees and artificial structures built by humans. Connelly et al. (2000) suggest that as habitat has become more fragmented, the addition of nonnative predators (red fox, domestic dogs and cats) and the increased abundance of native predators (i.e. common ravens and crows) can result in decreased nest success. Red fox have been implicated in affecting nest success and the annual survival of breeding age birds. Researchers in Utah's Strawberry Valley area suggest that red fox are responsible for preying upon the sage-grouse population in that area (Flinders 1999). Red fox have been implicated in other areas, but rigorous field studies are needed to support or refute these hypotheses (Connelly et al. 2000).

Landowners are also concerned with increasing numbers of Wyoming ground squirrels. Ground squirrels have been documented as a sage-grouse nest predator, however, it is not known if ground squirrel nest predation significantly impacts sage-grouse populations. Connelly et al. (2000) suggested that several studies on nest success have found nest success to be greater than 40% and that nest predation does not appear to be a problem across the range of sage-grouse. In contrast, Gregg (1991) and Gregg et al. (1994) suggested that nest predation may be limiting grouse numbers in Oregon. Research in Moffat County has found nest success between 45-60% (Hausleitner 2003, A. D. Apa unpublished data).

Most of the Work Group believes that we need more information on specific sage-grouse predators in the local area. More information is needed on whether predators are having a negative impact on the viability of the sage-grouse population in western Garfield and Rio Blanco Counties. Research could help determine if specific predators are having a negative impact during specific periods of sage-grouse survival (e.g., nest success, juvenile survival, and adult survival).

Research is necessary before the Work Group recommends specific predator control. Any recommended control will be species and site specific. In addition, it is important to consider unanticipated effects of predator control. For example, controlling red fox and coyotes might have the unanticipated effect of increasing ground squirrel numbers, which in turn may increase sage-grouse nest predation. On the other hand, reducing ground squirrels, which are common prey for some of the predators that also prey on sage-grouse, could possibly increase other types of predation pressure on sage-grouse.

2) Conservation Actions Relating to Predation

Goal:	Objectives:	Actions:	Who:	When:
Evaluate predation of sage-grouse.	1. Move toward a better understanding of local predator/prey relationships relating to sage-grouse.	1a. Clearly define data quality objectives for monitoring & research.	Work Group	Beginning 2005
		1b. Develop plan, obtain funding for, and initiate research to monitor local predator populations and how they affect the sage-grouse population.	CDOW, Work Group, BLM, CSU Extension	As necessary
		1c. Evaluate the data (as available) & determine if continued monitoring is necessary.	CDOW, Work Group, BLM, CSU Extension, NRCS	Ongoing
		1d. If research documents that predation is having a significant negative effect on the local sage-grouse population, obtain funding and implement appropriate site and species-specific practices in accordance with CDOW and United States Department of Agriculture (USDA) p79redator management plans and policies.	CDOW, USDA, NRCS	Ongoing
	2. Maintain productive quality sage-grouse habitat to reduce predation opportunities.	2a. Use best management practices (identified in the Monsen manual) in habitat management to improve or maintain vegetation in sage-grouse habitats (see Conservation Actions for Habitat Change, and Conservation Actions for Grazing).	CDOW, Work Group, BLM, NRCS	Ongoing
	3. Reduce or	3a. Follow Conservation	Utility	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
	modify factors that facilitate predation.	Actions for power lines in order to reposition new power lines and install raptor deterrents when applicable and feasible.	companies, CDOW, Work Group	
		3b. Selectively remove trees, remove/modify raptor perches, and maintain quality sagebrush habitat, where raptor predation concerns on sage-grouse have been identified.	CDOW, BLM, Work Group, NRCS	Ongoing

E. Energy Industry and Mineral Development

1) Issues Related to Energy Industry and Mineral Development

Development and transmission of energy and mineral resources in the geologic Piceance Basin (which includes the Parachute, Piceance, and Roan Creek watersheds) has been a possibility since at least 1920, when energy interests began acquiring lands, patents, and leases in this area. Varying efforts involving oil, oil shale, and natural gas have taken place over the years leaving relatively small footprints on the landscape, with impacts concentrated at several experimental oil shale plants and the Magnolia oil field.

Advances in drilling technology and rising natural gas demand and subsequent rising prices have led to a significant increase in natural gas drilling activity in the Parachute-Piceance-Roan area. Recently, Garfield County became the most active drilling area in Colorado. Simultaneously, oil-shale leasing has resumed, interest in oil-shale development has increased, and several companies have initiated pilot projects. The timing of this increased activity corresponds with increasing concern for the status of Greater Sage-Grouse range-wide, and locally for the population of grouse in western Garfield and Rio Blanco counties. Natural gas activity is currently the most common and constant type of human activity occurring across much of the conservation Plan area. Other mineral development (e.g. sodium minerals) is ongoing but has not been coincident or influential on sage-grouse in the Parachute-Piceance-Roan area.

Wildlife managers and local Work Group stakeholders are concerned that the amount and timing of energy and mineral development has the potential to impact Greater Sage-Grouse populations. Of particular concern is the rapidly expanding (see Table 8) nature of the natural gas activities, including exploration, increased traffic, increased number of roads, well pad spacing, associated pipelines, powerlines, compressor stations, etc. The primary dilemma faced by wildlife managers and energy operators is the close overlap in the types of terrain used by sage-grouse and the type of terrain required to access and locate energy production facilities from engineering, economic, and environmental standpoints. This common terrain is the relatively level, narrow ridge tops lying between steep, and often very deep, canyons. These ridge tops are generally where the largest patches of sagebrush are located within the area. Further complicating the situation is the fact that the suitable habitat (<20% slope) comprises a relatively small portion of the terrain in most of the area.

Table 8. Number of Drilling Permits Issued Statewide and by County, 2004-2007

Area	2004	2005	2006	2007	Pending
Garfield County	796	1509	1834	2663	405
Rio Blanco County	154	161	360	317	65
State total	2915	4373	5905	?	?

(Data current as of 2/4/2008, Colorado Oil and Gas Conservation Commission [COGCC] web site)

A key factor affecting the development of this conservation Plan is that approximately 65% of the land within the Plan area is privately owned. A large majority of that private land is owned by energy companies. While there are stipulations and regulations in place on public lands that are intended to protect key sage-grouse habitat components, similar restrictions are discretionary on private lands. Private lands encompass a majority of the wetter, higher elevation, high-quality grouse habitat. Public lands within the Plan area are generally lower and drier. The long-term persistence of Greater Sage-Grouse within the Parachute-Piceance-Roan area could be largely affected by the voluntary cooperation of private landowners. Energy and mineral development is happening and will continue to happen. It is essential to develop a plan that promotes the survival of the sage-grouse population in the area during the relatively more intense development phase of natural resource extraction.

To maintain a Greater Sage-Grouse population in the Parachute-Piceance-Roan area while developing the various energy and mineral resources, the local working group will endeavor to develop and integrate new and existing information on sage-grouse, continuously communicate and share information among all parties, develop plans and strategies for avoiding, reducing, minimizing, and mitigating impacts on grouse and grouse habitat, and to research and monitor the response of the grouse population as development continues.

The Work Group discussed whether or not to include the Colorado Conservation Plan Population Viability Analysis (PVA) report in our local Plan. The PVA was created by a consultant, hired by CDOW for the state-wide plan (Colorado Greater Sage-grouse Steering Committee, 2008). It is a tool to simulate real situations to help forecast what might happen with different risk scenarios. To our knowledge, none of the other local work groups included the PVA, in most cases because it was not available when those plans were written. It was suggested that "*we should reference it in our Plan, but we need to be clear that it is just a model, and we will not add the PVA in its entirety into our Plan. In the text of our Plan we need to include that the information presented in the PVA was the basis for much of this group's discussions and decisions. Decisions on population targets and strategies attempted to incorporate the findings of the PVA model.*" (PPR Work Group meeting summary, 4-27-07.) If in the future, this Plan is criticized, the Work Group felt we should be able to defend our decisions because of the awareness of the PVA, but we are not using it as a sole basis for our decisions. Over the next several years as more data is collected, this Work Group hopes that the PVA model will be refined with new data and cross-checked. Among the risks examined in the PVA are "Impacts of Oil and Natural Gas Development on Greater Sage-grouse Population Dynamics."

2) Conservation Actions Relating to Energy Industry and Mineral Development

Goal:	Objectives:	Actions:	Who:	When:
Maintain a viable population for Greater Sage-grouse while developing energy & mineral resources	1. Develop & consolidate maps that show important GSG habitats to guide energy industry and agencies	1.a. Develop a map that depicts SG seasonal habitat (i.e. occupied, etc.) based on current knowledge and ongoing updates. Assemble into a GIS program useable by agencies and industry.	CDOW, BLM, NRCS, Industry, Work Group, USFWS	Immediately and ongoing
		1.b. Design maps to fit the audience structure (leave the details out or in as needed for the focus of the presentation).	CDOW, BLM	Immediately and ongoing
		1.c. As means to evaluate extent and distribution of physical habitat modification and sources of behavioral disruption, develop real time map (GPS accuracy standards) of on-going activity, surface disturbance, and habitat reclamation status. Require accurate project delineation submitted as compatible shapefile to appropriate regulatory agencies in an ongoing collaborative fashion.	CDOW, BLM, NRCS, Industry, Work Group, USFWS, CDRMS	Immediately and ongoing
		1.d. Continue, integrate and accelerate current agency and industry efforts to identify, evaluate, and map grouse habitat in PPR --goal of approximately 90,000 acres by end of 2009 --obtain access on private holdings	CDOW, BLM, NRCS, Industry, Landowners	Immediately and ongoing
		1.e. Use and refine existing vegetation and other map data to develop a better understanding of piñon-juniper/mountain shrub and industrial encroachment on GrSG habitat	Industry, CDOW, BLM, Landowners	Ongoing
	2. *Improve communication* among	2.a. Incumbent on agencies to clearly define and educate industry reps on desired wildlife objectives.	Work Group, BLM, CDOW, NRCS,	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
	agencies, industry, and affected publics involved with mining and energy development, to facilitate improved trust, working relationships, planning, and more effective management of GrSG and their habitats	Work with industry to develop matrix for 1) general guidance to understand sage-grouse habitat requirements seasonally and geographically; and 2) for site specific project analysis for well fields or mine sites.	Industry, COGCC, CDRMS	
		2.b. Incumbent on industry to clearly define and educate agency biologists on desired industry objectives for gas & mineral production; 1) develop matrix for general guidance to understand types and timing of activities necessary to produce and transport gas and/or other minerals; 2) site specific project analysis for well fields or mine sites. Including identifying and sharing benefits of new technology with wildlife officials.	Industry, Work Group, BLM, CDOW, COGCC	Ongoing
		2.c. Use local Work Group as a forum for coordination of resources for integration of ideas. • Continue the Work Group well after the Plan is done. Meeting frequency to be determine (refer to I.C. Process). • Promote and provide regular opportunities for public involvement to improve energy and mineral planning as it relates to management of GrSG and GrSG habitat.	Work Group, Industry, BLM, CDOW, counties, COGCC, CDRMS	Ongoing
		2.d. Recognizing private lease and surface rights, develop a voluntary communication process to assist the energy industry to work with LWG's in planning energy activity on non-federal surface-owned leases.	Work Group, Industry, Agencies, Landowners	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
		2.e. Share energy development plans with agencies ASAP to facilitate improved planning, analysis, and management of GrSG within sagebrush habitats, recognizing confidentiality sensitivities.	Industry, Consultants, Agencies	Ongoing
		2.f. Encourage open communication between companies to entertain opportunities to reduce impacts and/or maximize benefits to GrSG	Counties, COGCC, CDOW, BLM, Work Group, Industry	Ongoing
		2.g. Encourage oil, gas, and mining companies to participate on local GrSG Work Groups.	BLM, CDOW, Industry, Landowners, Work Group, Counties, COGCC, CDRMS	Ongoing
		2.h. Promptly and frequently update information related to energy and mineral development and GrSG to foster a better understanding of impacts to the species.	Industry, BLM, CDOW, CDRMS, COGCC, Landowners, etc. (Everyone!)	Ongoing
		2.i. Communicate and improve the understanding, sharing, and acceptance of research and modeling efforts regarding GrSG and mining/energy development.	Industry, Work Group, CDOW, BLM, Landowners, NRCS, CDRMS	Ongoing
		2.j. Confer with all interested parties on current findings and new information for actions that benefit GSG to adapt accordingly.	BLM, LWG, Industry, Landowners, CDOW, COGCC BLM, CDOW, Industry, CDRMS, Landowners	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
	3. Develop and implement appropriate *on- and off-site mitigation practices* within GrSG habitat	3.a. Evaluate the need for near-site and/or off-site mitigation possibilities to maintain sage-grouse populations during oil and gas development and production and energy and mineral development through mining.	CDOW, BLM, Industry, Landowners	End of 2007 and Ongoing
		3.b. Define what constitutes meaningful mitigation to meet site- and/or issue-specific GrSG population and/or habitat objectives, based on current, regularly updated information, site capacity and timeline restrictions. Monitor the response of sage-grouse population.	BLM, CDOW, Industry, Landowners, COGCC	End of 2007 and Ongoing
		3.c. Identify impediments inclusive of environmental regulation to implementing beneficial mitigation measures (e.g. storm water management).	BLM, CDOW, Industry, Landowners, COGCC, CDRMS	Ongoing
		3.d. Continue to invite/query/charge industry group with ideas that may reduce disruption of habitat. Wherever possible, incorporate site-specific COAs, SUAs, BMPs (on-site mitigation measures) on proposed operations in GrSG habitat, in accordance with decision matrix and mitigation practices (see Appendix C) consistent with lease rights, or as negotiated with operators, leasees, and landowners.	CDOW, CDOW Research, in cooperation with Industry, BLM, NRCS, CDRMS, etc.	Ongoing
		3.e. Determine whether sage-grouse will move to mitigation areas as mine and energy development sites develop in active habitat. Based on research and monitoring.	BLM, CDOW, Industry, Landowners	Ongoing
		3.f. Identify and conduct habitat enhancements on potential	BLM, CDOW, Work Group,	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
		locations where there may be opportunities for off or on-site mitigation for GrSG. Identify suitable mitigation practices within those areas. Use mapping information.	Industry, Landowners	
		3.g. Consider site capability and the timeline necessary to restore areas to suitable GrSG habitat, when determining which mitigation practices should be implemented on a site-by-site basis. Use mapping information.	BLM, CDOW, Industry, COGCC, Landowners, CDRMS	Ongoing
		3.h. Conduct mitigation measures (e.g. off site habitat enhancement) prior to mine site development or expansion, or energy field development, where possible, to minimize sage-grouse population disruption.	BLM, CDOW, Industry, Landowners, Work Group	Ongoing
		3.i. Investigate, evaluate, and implement mitigation trust/banking opportunities within PPR (as the first priority) area where appropriate for GrSG habitat. Secondly consider opportunities outside of PPR area.	BLM, CDOW, Industry, Landowners, Work Group	Ongoing
		3.j. Augment populations or promote occupation in areas not influenced by development or where development is less likely.	BLM, CDOW, Industry, COGCC	Ongoing
		3.k. Refer to BMP's located in appendix for mitigation options for different phases: Planning Project Siting Construction/Drilling Completion Production & Operations Reclamation (interim & final) (check if there is a BMP that addresses water development for	Industry, CDOW, BLM, COGCC, CDRMS	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
		SG).		
	4. Minimize the *impacts during gas field life cycle, mining, and energy development* in GrSG habitat, in order to sustain viable GrSG populations in Colorado.	4.a. Where substantial development may occur, prepare a plan that evaluates the impacts to sage-grouse from the entire project development, not just from individual site development.	BLM, Counties, CDOW, Industry	Ongoing
		4.b. Investigate opportunities and provide incentives to promote cluster development in key GrSG habitats. Cluster the development of roads, pipelines, electric lines, and other facilities, and use existing, combined corridors where possible.	BLM, Counties, CDOW, Industry, NRCS	Ongoing
		4.c. Investigate opportunities and provide incentives to promote GrSG conservation measures.	CDOW, BLM, Counties, Industry	Ongoing
		4.d. Where a 3 year consecutive downward trend in lek counts (as measured by the 3-year running average) is seen in areas with intense energy development, consider aggressively pursuing additional strategies to address population sustainability including: • options for increasing GrSG female survival • short duration of energy development and expedite reclamation • see "Population Augmentation" strategy section of Statewide Plan for GrSG.	Industry, BLM, Counties, COGCC	Ongoing
		4.e. Minimize disturbance/mortality during construction/development/production of oil & gas resources (see Appendix C/BMP's)	Industry, CDOW, BLM, COGCC	Ongoing
		4.f. Share the management results	All	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
		and mitigation efforts that are occurring within different companies and agencies within PPR.		
	5. Research & monitoring.	5.a. Integrate and share the various research occurring in the PPR area on a regular and reoccurring basis.	All	Ongoing
		5.b. Develop and encourage opportunities to cooperate on research efforts in the PPR area. (Research could include broader topics e.g. threshold of noise tolerance, augmentation, relocation, cumulative impacts, etc.)	All	Ongoing
		5.c. Evaluate potential additional impacts from alternative energy development to minimize impacts to GrSG.	All	Ongoing

F. Recreation

1) Issues Related to Recreation

When recreational activities occur on a recurring basis in sage-grouse habitat during critical periods, such activities have the potential to disturb or alter sage-grouse habitat use. Critical periods include the breeding period, which includes strutting and nesting, and winter months when available habitat may be limited. In addition to direct disturbance, various recreational activities can also cause habitat degradation such as soil erosion and damage to plant communities.

Public recreation in the Parachute-Piceance-Roan area occurs primarily in the fall during the big game seasons and somewhat concurrently with small game hunting, primarily blue grouse. Most of this activity takes place on BLM and CDOW lands in the area, and seems to be at lower levels now than 10-50 years ago. Due to the high percentage of private land ownership (65% in occupied range, 46% within the Plan area), recreation is and likely will continue to be limited in scope in the area. However, the Work Group recognizes the potential for increases in recreational activities on public lands, including, but not limited to, hiking, mountain biking, horseback riding, OHV use, dispersed camping, cross-country skiing, snowshoeing, and snowmobiling. The Bureau of Land Management manages most public lands in the Piceance Creek drainage and these areas are, with some exceptions, open to motorized vehicles.

Another potential source of recreation disturbance to sage-grouse is viewing of the grouse themselves on leks in the spring. At this time, this is not known to be a problem, and seems unlikely to become an issue given the remoteness and difficulty in access associated with private land and poor road conditions. There are other areas in Colorado to view strutting sage-grouse that are more accessible and more likely to yield sightings of birds.

The issue of hunting in the area includes two aspects. The first is potential effects of hunting associated activities on sage-grouse. Currently, hunting of game animals in the area occurs in the fall. By fall, a sage-grouse's diet has switched primarily to sagebrush leaves, and as a result, the potential habitat for food and cover for the grouse is probably at its broadest compared with any other time of the year. Thus, although birds may be disturbed and flushed by hunters chasing other quarry, it is not a critical time for sage-grouse since their vulnerability to disturbance is relatively low during this time.

The second hunting-related issue is the potential impact of hunting sage-grouse. At that time, it was estimated that there were fewer than 100 males in the population, the number considered necessary to allow hunting. The hunting season for grouse in the Parachute-Piceance-Roan area has been closed since 1995. Due to better techniques and more consistent effort, recent (2005-2007) lek counts have averaged 195 males, well above the 100 male threshold necessary to permit a hunting season for the PPR population." The Work Group expressed little or no interest in asking for an opening of the season on sage-grouse at this time, given the potential threats from activities addressed elsewhere in this Plan.

2) Conservation Actions Relating to Recreation

Goal:	Objectives:	Actions:	Who:	When:
1. Maintain a viable population of GrSG while allowing appropriate levels of recreational use within GrSG habitat.	1. Minimize the impacts of recreation in GrSG habitat, in order to sustain viable GrSG populations and their habitat.	1.a. Develop signs and brochures that illustrate differences between GrSG and Dusky (Blue) Grouse and post in area due to overlap in habitat in area.	CDOW, Landowners	Fall 2008
		1.b. Monitor recreation use in area during spring and summer; if roads/trails or recreational uses conflict with sage-grouse habitat requirements, pursue management options such as seasonal use restrictions, closure, removal, re-alignments, buffers, etc.	BLM, Landowners	Ongoing

G. Water Project Development and Water Management

1) Issues Related to Water Project Development and Water Management

New water developments, or changes in existing water use, have the potential to change grouse habitat for better or for worse. An issue in some geographic areas is that plans for water reservoirs could cover important grouse habitats, potentially brood-rearing habitat and /or winter range. In some cases, significant amounts of acreage could be converted into reservoirs. Small reservoirs might be beneficial to GrSG, providing them a new water source, particularly at lower elevations (Water availability is generally not a problem above 8,000 ft). Also, changes in points of diversion of natural springs and rivers may also impact the GrSG (also more relevant in the lower areas), e.g., loss of hay meadows used as brood-rearing habitat.

2) Conservation Actions Relating to Water Project Development and Water Management

If plans for water developments and water management changes in the area begin to take shape, the Work Group should become actively involved in analyzing such plans as they arise, with an eye toward the potential effects on Greater Sage-Grouse. However, given the nature of water issues and that potential projects will arise from a variety of sources, it will be difficult to address this issue comprehensively. Therefore developing a specific set of strategies is difficult. Rather than doing so, points to keep in mind with regard to such potential are listed below:

- Encourage proponents to advise or come to Work Group with proposals
- Work informally with proponents and other interested parties within Work Group setting if possible and agreeable prior to regulatory process
- Work within established regulatory processes
- Analyze water development projects on a case-by-case basis for effects on GrSG
- Analyze changes in current water management on a case-by-case basis.

The Work Group will maintain contacts with the Colorado River Water Conservation District and the local Bluestone and Yellowjacket conservancies.

IV. MONITORING AND EVALUATION OF CONSERVATION PLANNING EFFORTS

This Plan contains over 100 conservation actions relating to 7 primary issues that the Work Group identified as factors that have the potential to affect sage-grouse populations or sage-grouse habitat in Parachute Piceance and Roan Creek drainages of Rio Blanco & Garfield Counties, Colorado.

Monitoring efforts will focus on evaluating methods of enhancing, and protecting breeding, brood-rearing, and wintering sage-grouse habitats as well as mitigation techniques for behavioral effects. Conservation actions and management efforts relating to sage-grouse and their habitats will be monitored and adaptive management applied. Adaptive management is characterized by management that monitors results of policies and/or management actions, and then integrates these results into future actions to adapt policy and management actions as necessary.

As this plan was being prepared, the U. S. Fish and Wildlife Service made an "unwarranted" listing finding for the Greater Sage-Grouse (December 2005). A court complaint was filed on July 14, 2006, by the Western Watersheds Project, alleging that the USFWS 12-month finding is incorrect, arbitrary, and unwarranted by the facts. In December, 2007, the court granted the motion by the plaintiff and the USFWS will be required to review its earlier decision to not list the species. In light of this court action, the Workgroup, going forward, should be mindful of the USFWS "Proposed Policy for Evaluating Conservation Efforts When Making Listing Decisions (PECE)." The PECE was not specifically addressed in the preparation of this plan. The policy identifies criteria USFWS will use in determining whether formal conservation efforts (such as this Plan) contribute to making the need to list a species are unnecessary. This policy is included as Appendix G.

The Work Group members recognize the need to continue to gather information and report on efforts to improve conditions for sage-grouse. Therefore, the working group will use a GIS database maintained and operated by CDOW to document habitat treatments designed to improve sage-grouse habitat in the area. The Work Group will also work with local counties to document land use changes in sage-grouse habitat. In addition, the Work Group will work with the Counties and local Land Conservation Organizations to document the number of acres of sage-grouse habitat protected through conservation easements, etc.

The primary population data that will be collected includes total number of active and inactive leks, average number of males per lek, and number of new leks located annually. The CDOW will provide an annual report of these population data to the Work Group and U.S. Fish and Wildlife Service (USFWS).

Annual meetings will be held to review and discuss the population data, to discuss and compile information on the habitat treatments completed, as well as to discuss any new information regarding sage-grouse and their habitats. Annual meetings with the Work Group will also serve as a forum to discuss and develop a yearly Annual Work Plan for the Parachute Piceance and Roan Creek drainages of Rio Blanco & Garfield Counties. The CDOW will provide the Annual

Work Plans as well as a yearly status report detailing management efforts relating to sage-grouse to the USFWS.

A. Conservation Actions Relating to Monitoring and Evaluation

Goal:	Objectives:	Actions:	Who:	When:
Continue to foster public/private partnerships to benefit sage-grouse, monitor and evaluate such actions, share information relating to sage-grouse, and provide pertinent information to the USFWS.	1. Continue to work within the sage-grouse Work Group context.	1a. Convene annual Work Group meetings.	CDOW	Beginning 2008
		1b. Develop yearly Annual Work Plan outlining planned efforts to benefit sage-grouse.	Work Group	Beginning 2008
	2. Use the concepts of Adaptive Management to maximize understanding and insure that efforts will benefit sage-grouse.	2a. Monitor the effects of treatments to benefit sage-grouse.	CDOW, BLM, Work Group	Ongoing
		2b. Integrate monitoring results to modify management actions as necessary.	CDOW, BLM, Work Group	Ongoing
	3. Document management actions completed to benefit sage-grouse.	3a. Communicate management actions and results to other members of the Work Group.	Work Group	Ongoing
		3b. Develop GIS database to document sagebrush habitat treatments in the area.	CDOW	Beginning 2008
		3c. Provide outreach to new and current landowners to increase awareness of the local Conservation Plan and best management practices.	CSU Extension, CDOW, NRCS, Work Group, Conservation Districts	Ongoing
	4. Document other impacts (positive and negative) to sage-grouse habitat as part of an overall habitat	4a. Work with Rio Blanco and Garfield Counties to be proactive in land-use planning (for the benefit of sage-grouse) and monitor land-use changes in the area.	CDOW, County Planners, Land Trusts	Ongoing

Goal:	Objectives:	Actions:	Who:	When:
	assessment. 5. Provide documentation of Work Group efforts to benefit sage-grouse and their habitat.	5a. Provide annual status report to the USFWS.	CDOW	Beginning 2008

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VI. APPENDICES

Appendix A: Available Funding Opportunities for GrSG Habitat Conservation

Table A-1. Specific funding opportunities identified for GrSG habitat conservation.

Colorado Division of Wildlife (CDOW)						
Grant / Program	**What land is eligible?**	**Length of Agreement**	**Easements**	**Cost Share**	**Applicant obligations**	**Contact Information**
Colorado Species Conservation Partnership Program (CSCP)	Any land where an easement or management plan are needed to benefit sage-grouse.	Variable	one-time, up-front payment	Variable	Develop a conservation plan and comply with the terms of the easement, or develop a plan and assist with the cost, establishment, and maintenance of conservation practices.	Ken Morgan (303)291-7404 http://wildlife.state.co.us/
Habitat Partnership Program (HPP)	All land is eligible where wildlife/human interactions occur.	Variable	N/A	Variable	Contact local District Wildlife Manager and develop proposal. Must be able to evaluate the success of project based on objectives.	Local District Wildlife Manager http://wildlife.state.co.us/
Cooperative Habitat Improvement Program (CHIP)	All private land for which the habitat improvement has been approved by the area habitat biologist	10 years	N/A	85%	Applicant must provide 15% of cost of habitat improvement and must ensure practice is maintained through the term of the contract.	CDOW (970)255-6185 http://wildlife.state.co.us/
Habitat Stamp Program	All land – primarily for deer/elk winter range and hunting and fishing opportunities	Variable	N/A	variable	N/A	Ken Morgan (303)291-7404 http://wildlife.state.co.us/

Table A-1 (con't). Specific funding opportunities identified for GrSG habitat conservation.

Natural Resources Conservation Service (NRCS)							
Grant / Program	**What land is eligible?**	**Length of Agreement**	**Rental Payments**	**Easements**	**Cost Share**	**Applicant obligations**	**Contact Information**
Conservation Security Program (CSP)	Private agriculture operation lands	5-10 years	Flat rates - based on Conservation work applied to land	N/A	50—65%	Record keeping of past and present conservation efforts	Local NRCS office www.nrcs.usda.gov
Conservation Reserve Program (CRP)	Highly erodible cropland. Marginal pastureland is also eligible.	10-15 years	Payment based on length of agreement and average rental rates for the county.	N/A	50%	Develop and follow a plan for the conversion of cropland to a less intensive use. Also, assist with the cost, establishment, and maintenance of conservation practices.	Local FSA or NRCS office. www.nrcs.usda.gov
Conservation Reserve Program Continuous Sign-up	Highly erodible cropland. Marginal pastureland is also eligible.	10-15 years	Payment based on length of agreement and average rental rates for the county	N/A	50% to 90%	Develop and follow a plan to implement riparian buffers, wildlife habitat buffers, wetland buffers, filter strips, grass waterways, shelterbelts, living snow fences, contour grass strips, salt tolerant vegetation, or shallow water areas for wildlife. Also, assist with the cost, establishment, and maintenance of conservation practices.	Local FSA or NRCS office www.nrcs.usda.gov
Environmental Quality Incentives Program (EQIP)	All private land in agricultural production is eligible; includes cropland, grassland, pastureland and non-industrial private forestland.	1-10 years	N/A	N/A	up to 75%	Develop and follow an EQIP plan that describes the conservation and environmental purposes to be achieved; assist with installation costs.	Local NRCS office www.nrcs.usda.gov
Farm and Ranchland Protection Program (FRPP)	Private land that contains prime farmland or other unique resources and is subject to a pending easement from an eligible entity.	Perpetual easement	N/A	one-time, up-front payment	N/A	Continue to use the land for agricultural purposes. Develop a conservation plan and comply with the terms of the easement.	Local NRCS office www.nrcs.usda.gov
Grassland Reserve Program (GRP)	Private land that includes grassland, forbs, or shrubs (including rangeland and pastureland); and land that historically was dominated by grasses, forbs, and shrubs and has significant value for plants and animals.	10-30 year agreement, or perpetual easement	annual payment based on length of agreement	one-time, up-front payment on perpetual	up to 100%	Develop and follow a plan for the restoration and maintenance of grasslands. If necessary, assist with the cost of restoration. Can maintain agricultural use with development of a conservation plan.	Local NRCS office www.nrcs.usda.gov

Table A-1 (con't). Specific funding opportunities identified for GrSG habitat conservation.

Natural Resources Conservation Service (NRCS)							
Grant / Program	**What land is eligible?**	**Length of Agreement**	**Rental Payments**	**Easements**	**Cost Share**	**Applicant obligations**	**Contact Information**
Wetlands Reserve Program (WRP)	Most private wetlands converted to agricultural use prior to 1985 are eligible. Wetland must be restorable and suitable for wildlife benefits.	10 years, 30 years, or perpetual easement	N/A	one-time, up-front payment	up to 100%	Develop and follow a plan for the restoration and maintenance of the wetland. If necessary, assist with the cost of restoration. Also, must give up agriculture production rights.	Local NRCS office www.nrcs.usda.gov
Wildlife Habitat Incentives Program (WHIP)	All private land is eligible, unless it is currently enrolled in CRP, WRP, or a similar program	5-15 years	N/A	N/A	up to 75%	Prepare and follow a wildlife habitat development plan; assist with installation costs.	Local NRCS office www.nrcs.usda.gov

Table A-1 (con't). Specific funding opportunities identified for GrSG habitat conservation.

U.S. Fish and Wildlife Service (USFWS)							
Grant / Program	**What land is eligible?**	**Length of Agreement**	**Rental Payments**	**Easements**	**Cost Share**	**Applicant obligations**	**Contact Information**
Landowner Incentive Program (LIP)	All private and tribal land	Variable	Yes	Short and long term	up to 75%	Personnel from state agency will need to submit application, USFWS will approve, and CDOW will administer grant in cooperation with the landowner.	Ken Morgan (303)291-7404 http://wildlife.state.co.us/
Intermountain West Joint Venture Partnership	Projects considered acceptable for funding include long-term protection, restoration, or enhancement of any bird habitat. Joint Venture emphasis is centered upon on-the ground conservation.	Up to 30 years	N/A	Yes	50%	N/A	David Klute – Colorado Representative (303)291-7320 www.iwjv.org
North American Wetland Conservation Act	State, private, Tribal, Federal?	Variable	No	Long-term	50%	Work with local USFWS office, but grant is administered through USFWS Migratory Bird Office	Local USFWS office or http://www.iwjv.org/

Table A-1 (con't). Specific funding opportunities identified for GrSG habitat conservation.

U.S. Fish and Wildlife Service (USFWS)							
Grant / Program	**What land is eligible?**	**Length of Agreement**	**Rental Payments**	**Easements**	**Cost Share**	**Applicant obligations**	**Contact Information**
North American Wetland Conservation Act, Small Grants	State, private, Tribal, Federal	Variable	No	Long-term	50%	Work with local USFWS office, but grant is administered through USFWS Migratory Bird Office (Up to $50K/grant)	Local USFWS office or http://www.iwjv.org/
Partners for Fish and Wildlife	All private land, wetland and riparian habitat has been a primary focus along with some treatment of sagebrush.	Variable, most projects delivered in 1-3 months	N/A	N/A	75-100%	Work with USFWS Biologist to develop project plan. Follow management actions for duration of wildlife extension agreement.	Bob Timberman (970) 723 4926 www.coloradopartners.fws.gov
Private Stewardship Grants Program	Private land	Variable	Yes	No	Variable	The contract and plan must provide quantifiable measures to evaluate the success of the project. The grant is administered through USFWS Ecological Services.	Local USFWS office http://grants.fws.gov/ (applications due 12/03 or 1/04)
Section 6 Conservation Grants	State, private, Tribal, Federal	Variable	N/A	N/A	up to 75%	Work with local USFWS office, but grant is administered through USFWS Ecological Services	Local USFWS office http://grants.fws.gov/
State Wildlife Grants	State, private, Tribal, Federal	Variable	Yes	Short term and long term	75% planning, 50% implementation	States, but not Tribes, must develop comprehensive wildlife management plans	Jim.Guthrie@co.state.us or local USFWS office http://grants.fws.gov/
Tribal Wildlife Grants	Tribal	Variable	N/A	N/A	100%	Up to $250,000 / tribe	Local USFWS office http://grants.fws.gov/

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Table A-1 (con't). Specific funding opportunities identified for GrSG habitat conservation.

Non-Governmental Organizations (NGOs)							
Agency / Organization	**Grant / Program**	**What land is eligible?**	**Length of Agreement**	**Easements**	**Cost Share**	**Applicant obligations**	**Contact Information**
Audubon Society	N/A	Stress bird habitat and ecosystem restoration	Variable	N/A	Variable	N/A	www.audubon.org
Pheasants Forever	N/A	Mostly private lands to acquire lands for public use.	Variable	N/A	Variable	N/A	www.pheasantsforever.org
Great Outdoors Colorado (GOCO)	Legacy Initiative/ Open Space/ Wildlife Grants	All private and public land where state agencies, non-profit conservation organizations, local governments, or private land owners are interested in conservation and land protection.	Variable	Possible	Variable, usually requires a minimum 25% match	Personnel from local governments, non-profit land conservation organizations, CDOW, and Colorado State Parks need to be submit proposal and manage contract.	www.goco.org (303)863-7522 info@goco.org
Mule Deer Foundation	N/A	All land that is critical to wildlife	Variable	Possible	Variable	Must go through USFS, BLM or one of their corporate partners	www.muledeer.org 1-888-375-3337
Quail Unlimited	N/A	All land that potentially provides habitat for quail and (sometimes) sage-grouse	Variable	Possible	Variable	Must go through USFS, BLM or one of their corporate partners	www.qu.org
Rocky Mountain Elk Foundation	N/A	All land that is critical to wildlife	Variable	Possible	Variable	Must go through USFS, BLM or one of their corporate partners	www.rmef.org
National Fish and Wildlife Foundation	N/A	Special grants for research on all land that potentially provides habitat for fish and wildlife.	Variable	Possible	Minimum 1:1	Non-federal partners, community-based organizations, tribes, educational institutions, and other non-profit organizations.	www.nfwf.org

Table A-1 (con't). Specific funding opportunities identified for GrSG habitat conservation.

Non-Governmental Organizations (NGOs)							
Agency / Organization	**Grant / Program**	**What land is eligible?**	**Length of Agreement**	**Easements**	**Cost Share**	**Applicant obligations**	**Contact Information**
National Forest Foundation	N/A	On or adjacent to National Forests or Grasslands	Variable	N/A	1:1 ratio with private	Non-federal partners, community-based organizations, tribes, educational institutions, and other non-profit organizations.	www.natlforests.org
North American Grouse Partnership	N/A	All land that provides habitat to sage or other grouse	Variable	N/A	Variable	Non-federal partners, community-based organizations, tribes, educational institutions, and other non-profit organizations.	www.grousepartners.org
The Nature Conservancy	N/A	All private and public land where agencies, non-profit conservation organizations, local governments, or private land owners are interested in conservation and land protection.	Variable	Possible	Variable	Federal and non-federal partners, community-based organizations, tribes, educational institutions, and other non-profit organizations.	www.nature.org
National Wildlife Turkey Federation	N/A	All private and public land where agencies, non-profit conservation organizations, local governments, or private land owners are interested in conservation and land protection.	Variable	Possible	Variable	Federal and non-federal partners, community-based organizations, tribes, educational institutions, and other non-profit organizations.	www.nwtf.org

Appendix B: Amendment 14 – Predator Control Changes

Amendment 14: Prohibited Methods of Taking Wildlife (1996)

Be it Enacted by the People of the State of Colorado:

Article XVIII of the Constitution of the State of Colorado is amended by the addition of a new Section 12, to read:

Section 12. Prohibited methods of taking wildlife.

(1) It shall be unlawful to take wildlife with any leghold trap, any instant kill body-gripping design trap, or by poison or snare in the state of Colorado.

(2) The provisions of subsection (1) of this section shall not prohibit:
(a) The taking of wildlife by use of the devices or methods described in subsection (1) of this section by federal, state, county, or municipal departments of health for the purpose of protecting human health or safety;
(b) The use of the devices or methods described in subsection (1) of this section for controlling:
(I) wild or domestic rodents, except for beaver or muskrat, as otherwise authorized by law; or
(II) wild or domestic birds as otherwise authorized by law;
(c) The use of non-lethal snares, traps specifically designed not to kill, or nets to take wildlife for scientific research projects, for falconry, for relocation, or for medical treatment pursuant to regulations established by the Colorado wildlife commission; or
(d) The use of traps, poisons or nets by the Colorado division of wildlife to take or manage fish or other non-mammalian aquatic wildlife.

(3) Notwithstanding the provisions of this section 12, the owner or lessee of private property primarily used for commercial livestock or crop production, or the employees of such owner or lessee, shall not be prohibited from using the devices or methods described in subsection (1) of this section on such private property so long as:
(a) such use does not exceed one thirty day period per year; and
(b) the owner or lessee can present on-site evidence to the division of wildlife that ongoing damage to livestock or crops has not been alleviated by the use of non-lethal or lethal control methods which are not prohibited.

(4) The provisions of this section 12 shall not apply to the taking of wildlife with firearms, fishing equipment, archery equipment, or other implements in hand as authorized by law.

Appendix C: Best Management Practices (BMP's)

BEST MANAGEMENT PRACTICES (BMP's)
Methods to Reduce Impacts to Greater Sage-grouse
Kim Kaal, CDOW & Parachute, Piceance Roan Creek Subcommittee developing the local Plan for Greater Sage-grouse Conservation, July 2007

Best management practices (BMP's) are recommendations to guide landowners, land users, and land managers to lessen the impact of oil and gas development activities on Greater Sage-grouse through mitigation, less disruptive drilling and production practices, and improved infrastructure development. They are a site-specific means to minimize negative effects on sage-grouse. These practices are intended to be used as components of, or in addition to, requirements of an APD or leasing agreement. They can be used alone as single actions or together in a comprehensive management program. The intent of this list is to provide action-oriented management practices based on the latest science and to encourage voluntary implementation of these practices.

This list was compiled to provide land managers, owners, and users, with tools that they can use; this document does not have regulatory authority to enforce their implementation. Only the leasing authority, when appropriate, can require any actions on the part of a leaseholder. It is, however, important to note, that the implementation of as many of these practices as feasible, will serve to minimize the impacts of oil & gas activity on sage-grouse and assist in the conservation of these birds. The BMP's listed here directly relate to many of the strategies created in the PPR plan. As such, it is important to use a comprehensive approach to the strategies and BMP's.

There are difficulties with providing a list of specific best management practices. Changing industry knowledge and practices, new scientific information, and the challenges of field verification and monitoring all present obstacles in the development and maintenance of such a list. The best known management practices must inherently evolve with the changing conditions in industry, wildlife management, and technology. These are not "one-size-fits-all" tasks that can be used for every situation, nor are they a cookbook to create a specific product. It must be understood, therefore, that close collaboration in the implementation of these guidelines is necessary between industry and wildlife personnel.

Siting and Construction

- Involve CDOW personnel early in the survey for wildlife issues prior to development. Plan around issues accordingly.
- In the project planning phases use Natural Diversity Information Source and any additional habitat/wildlife mapping available prior to development.
- Consult with CDOW on surface occupancy within 4 miles of any greater sage-grouse leks within suitable habitat.
- Within suitable sage-grouse habitat, avoid all surface disturbance within 0.6 mile of any Greater Sage-Grouse lek between March 15 and May 15, except when such activities would not disrupt breeding or nesting activities, as determined in consultation with CDOW (and BLM if on public land)..

- Within suitable sage-grouse habitat, avoid breeding/nesting season (March 15 – July 7) road construction, drilling, and well completion within 4 miles of any active or potentially active Greater Sage-Grouse leks except when such activities would not disrupt breeding or nesting activities, as determined in consultation with CDOW (and BLM if on public land).
- Within 4 miles of an active or potentially active sage-grouse lek, keep total surface disturbance within sage-grouse habitat to 1% or less. (After reclaimed lands re-grow sufficient native vegetation they would no longer be counted towards the calculated percentage.)
- Within suitable sage-grouse habitat, avoid breeding/nesting season (March 15 – July 7) travel on existing roads within view of potentially active sage-grouse leks to portions of the day between 9:00 am and 5:00 pm .
- Use state of the art technology to protect existing vegetation. Use of mats if possible for drilling operations to preserve topsoil and vegetative root stock.
- Wherever mats cannot be used, conserve soil horizons and segregate topsoil from subsoil. Manage topsoil to maintain soil microbe health and viability.
- Minimize habitat fragmentation by limiting surface disturbance by reducing the number of well pads per section.
- Control public access in suitable habitat (i.e. gate roads, etc.). Minimize the impact of newly developed or opened areas by consolidating facilities.
- Perform voluntary onsite (i.e. CDOW & BLM) on private lands to identify issues prior to ground disturbance.
- Consolidate pipeline corridors and economize gas transportation. Encourage cooperative gas carrying agreements.
- Place road and pipeline right-of-ways such that they avoid critical habitat and mitigate their effects wherever possible.
- Cluster wells on multiple well pads and place associated production to maximize interim reclamation of well pads.
- Consolidate oil and gas production facilities to reduce disturbance to wildlife and minimize long term impacts. Reduce the number of locations where water and oil would be hauled off by truck.
- Preplan and adequately size infrastructure and facilities to accommodate current and future gas production.

<u>Drilling Operations and Production</u>

- Simultaneously complete wells to facilitate faster drilling and development rates.
- Strive to centralize hydraulic fracturing operations to minimize surface impacts.
- During production phase restrict well site visitations in breeding season (Mar. 1 – May 15) within 0.6 miles of active and potentially active GrSG leks to portions of the day after 9:00 am and before 5:00 pm.
- Strive to economize visitation to wells by use of multi-function contractors.
- Use early and effective reclamation techniques, including interim reclamation, to speed return of disturbed areas to use by grouse. (May require multiple reclamation efforts and multiple soil amendments.)
- Reduce long-term footprint of facilities to the smallest practical space.

- Utilize reclamation seed mixes consisting of native bunchgrasses, forbs and appropriate subspecies of big sagebrush.
- Practice reclamation techniques that speed recovery of pre-existing vegetation. (e.g. brush-beating of sage brush for site clearance, retention of topsoil with native seed)
- Avoid aggressive, non-native grasses (e.g. intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, smooth brome, etc) in reclamation seed mixes.
- Make every effort to aggressively control noxious and invasive weed species based on weed management plan that strives to minimize the impact to non-target plant species.
- Recycle and reuse water on site where possible to reduce truck traffic. (i.e. closed loop).
- Educate employees and contractors on best management practices, environmental regulations, and raise awareness on sage-grouse needs.
- Encourage industry participation in CDOW's Operation Game Thief program and immediately report all potential poaching incidents. Educate industry and their contractors on the importance of poaching and wildlife harassment mitigation.
- Create development plans to phase development to maintain sage-grouse habitat.
- Install automated systems, including high tank alarms, emergency shut down and facilitate remote monitoring.
- Expeditiously skim and eliminate oil from produced water ponds and reserve pits, and exclude wildlife and sage-grouse with fencing and or netting.
- Protect wetlands, drainages, and riparian areas from erosion, sedimentation and spills. Map wetlands prior to development to identify and properly permit these sensitive areas. Restore to functional condition & reclaim areas of erosion.
- Consider wetland banking if feasible.
- Facilitate increased communication and cooperation between stakeholders, companies and agencies.

<u>Transportation</u>

- Manage travel and prohibit off road travel. Manage development of road networks through transportation planning, and reduce habitat fragmentation.
- Restrict and monitor vehicular speed to reduce wildlife collision potential, increase safety, and minimize dust generation.
- Encourage carpooling, transportation coordination or provide mass transport options for workers to work sites. Consider advantages of man camps.

<u>Environmental</u>

- Restore functional wetlands.
- Spread quick germinating site adapted native seed or sterile non-native for interim reclamation on cut and fill slopes of well pads and roads. Right-of-way are final reclamation not interim.
- Develop site specific reclamation plans and consult with CDOW on seed mixes, apply seed most effectively during the late fall and early winter. Assess reclamation success at least annually through photo documentation, vegetation plots, documentation of invasive weeds and erosion. Evaluate reclamation in different areas that represent different elevations, vegetative communities, slope aspects, water proximity.

- Cooperate with CDOW on wildlife management issues. Provide opportunities for hunter outreach, education and conservation on private lands. Consider hunting leases on private lands or land exchanges.
- Compile maps containing wildlife information including mule deer, elk, sheep, sage-grouse, raptor, wildlife usage etc.
- Track wildlife habitat improvements or changes on maps, photographs, and other documentation.
- Monitor and map wildlife presence or usage areas. Document using photographs, maps and annual reports as to deer and elk usage. Identify locations of native fish (Cutthroat trout) and consider stream habitat improvements. Compile information on maps to track changes and document occurrences.
- With the exception of exclusionary fencing install high tensile or post and rail fences and or remove all fencing that is a hazardous to SG.
- Install raptor perch deterrents on fences in sage-grouse habitat.
- Encourage retrofitting of existing powerlines and other overhead structures to deter raptor perching where utility corridors impact Greater Sage-grouse seasonal habitats.
- Construct grazing management plans and annually access grazing regiment to meet SG habitat requirements. (check grazing strategy for more detail needed)
- Engage in or fund CDOW and private research to develop methods for impact reduction or habitat improvement.
- Reduce noise effects using special mufflers, equipment housing, installation of sound barriers, earthen berms, etc. in particularly sensitive SG areas.
- Apply certified weed free mulch to reclaimed areas to preserve seed and maintain soil moisture.
- Allow no pets on site and report feral animals to County Animal Control Officers.
- Fence livestock out of newly reclaimed areas where appropriate or practical until reclamation becomes established. Once fences are no longer needed removing fencing material and dispose of properly.
- Consult with CDOW/BLM/USFS on wildlife habitat enhancement projects, reclamation planning, noxious weed control, riparian habitat restoration, grazing management, geographic area specific seed mixes.
- Consider putting lands under conservation easement.
- Maintain voluntary compliance on private lands with all state and federal environmental regulations.

<u>Adaptive Management & Monitoring</u>

- <u>The PPR LWG encourages creative solutions to allow for both energy development and the persistence sage-grouse in the Piceance Basin. Exceptions to timing limitations and limitations on surface disturbance acres may be granted in order to allow implementation of other strategies designed to minimize impacts to sage-grouse (e.g. temporally clustered development). Alternate strategies must be based on the best available science and agreed to by the Colorado Division of Wildlife.</u>
- <u>All strategies implemented to minimize impacts to sage-grouse during energy development must be continually evaluated for effectiveness. If the three-year running</u>

average high male lek count continually declines for three years, consider changing strategy.

REFERENCES:

- COGCC Rules and Regulations http://oil-gas.state.co.us/
- BLM and Forest Service "Gold Book" Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development http://www.blm.gov/bmp/goldbook.htm
- Low-Volume Roads Engineering Best Management Practices Field Guide http://ntl.bts.gov/lib/24000/24600/24650/Index_BMP_Field_Guide.htmBLM
- Western Governors Association Coal Bed Methane Best Management Practices Handbook (http://www.westgov.org/wga_reports.htm)
- EPA's National Menu of Stormwater Best Management Practices http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm
- EPA's Storm Water Pollution Prevention Plans for Construction Activities http://cfpub.epa.gov/npdes/stormwater/swppp.cfm
- Weed control guidance http://www.blm.gov/weeds/PullingTogether/PullingTogether.pdf.
- CDOW Strategic Plan http://wildlife.state.co.us/About/StrategicPlan/
- Colorado Weed Management Association http://www.cwma.org/
- CDOW fencing standards guidance
- COGCC wildlife policy
- CDOW main (303) 297-1192
- COGCC main (303) 894-210

Appendix D: Explanation of the 1976 Lek Counts and Numbers Used

Explanation of the 1976 Lek Counts and the Numbers Used
John Toolen, December 2007

The most extensive and complete lek count information for the Piceance Creek area prior to the turn of the century is contained in the report "Survey of sage grouse strutting ground complexes and seasonal use areas within the Piceance Basin Wildlife Habitat Area, Progress Report, 12/20/1977, Colorado Division of Wildlife," widely known within the CDOW as "the Krager Sikes Act report."

The report's lek count information, while more extensive and complete than most data prior to 2000, has its own set of gaps and peculiarities, and I wanted to document the various constraints and limitations of this information as well as explain how I dealt with these issues in coming up with the numbers reported for the year 1976 used and cited in the conservation Plan. I wanted to use this information as a historical reference point, if only for the purpose of being able to state whether or not we think that we are counting more or fewer grouse in the area today than we did in the past.

Peculiarities of 1975-1977 data:

- Actual number of birds counted was not reported; rather, the number of birds counted at each lek was reported as being within a "range." The ranges were set at 1-2, 3-5, 6-15, and 15+ (which more logically could be called 16+). This presents difficulties in comparing data from these years to other years when actual counts were reported. One can take the mid-point of each range and report it, but how do you deal with "15+"? The text in the report does state that all leks were small, "less than 25 birds."
- The report does specifically state that the counts were of males or all birds present, though it does report that cock attendance at 84 Mesa decreased from 5 in 1971 to 1 in 1974.
- Counts were not conducted at the 28 leks reported in each year; rather, 3 leks were counted in 1975, 20 in 1976, and 5 in 1977.
- There was no overlap of counts among years, with the possible exception of 84 Mesa, which was reported as "last sighting, 1974."
- It is not stated or noted definitively when the 84 Mesa lek was visited during the 3-year period, or whether or not it was visited in all of the 3 years.
- No lek other than 84 Mesa was reported as having "zero" birds during 1975-1977. We do not know if that means that other leks were visited and not recorded if birds were absent, or if no other leks were visited.
- Other data was available for other leks not counted by Krager's crew.

What I Did With the Data and Why

- I assumed the numbers reported were males, based on reference to 84 Mesa in text of report and statement quoted in next bullet point.
- I used 24 birds as the maximum number of males seen at a lek, based on the statement in the text that "the leks discovered were small (less than 25 strutting cocks)…" The highest whole number less than 25 is, of course, 24.
- I set up a spreadsheet with three columns for each year: minimum, middle and maximum. I put in numbers the following way: **Range 1-2**: 1, 2, 2. **Range 3-5**: 3, 4, 5. **Range 6-15**: 6, 11, and 15. **Range 15+ (16-24)**: 16, 20, 24.
- I also included data from other count sources as available from eight other leks. Three of these leks overlapped in non-count years with 3 of the 28 leks in the Krager report. I included available data from other areas in order to make the closest comparison with current numbers which cover leks not included in the Krager report. These numbers are reported in the spreadsheet as the same number for each category of "minimum, middle, and maximum" (e.g., 4,4,4).

Results

- I disregarded the numbers from 1975 and 1977. Full counts were not done in those years by Krager's crew (3 leks in '75 and 5 in '77); unfortunately, leks counted in those years were not counted in 1976. One could conceivably lump those counts with the 1976 counts, but year-to-year variability can be high, and I decided no to do this.
- The minimum, middle, and maximum numbers reported for 1976 are 204, 284, and 350 males, respectively. What this means is that the only "real" number that can be stated as fact is 204. We know that there were at least 204 males on observed leks in the area because they were actually seen. The numbers for middle and maximum are more speculative. The high number of 350 could conceivably be higher; there is no way to know if all the birds present were actually seen. On the other hand, the way the data were presented, we can't really assume that the maximum numbers of birds in each range were seen, although it is "possible," if improbable, that 350 birds were seen and additional birds went undetected.

We can say for certain that 204 birds were seen on 28 different leks in the spring of 1976. This number is probably lower than the number of birds actually there, but because of the peculiarities of the number reports, we will never know for sure. So I decided to add, somewhat conservatively and arbitrarily, to add 30 males to the count by Krager. This number (234) is carried forward into the conservation Plan as the "official" number of males reported in 1976.

Appendix E: CDOW Lek Definitions and PPR Lek Location Map

Abstract

This dataset was created by the Colorado Division of Wildlife for the Colorado Greater Sage Grouse Conservation Plan (CCP). The dataset was created by merging individual population lek data received from various CDOW Wildlife Conservation and Terrestrial biologists.

The following defines the CCP Status field:

- Active lek: A display area that has been attended by >=2 male sage-grouse in >= 2 of the previous 5 years.

- Inactive lek: A display area that has not been utilized (no male sage-grouse) for display or breeding in the last 5 years.

- Historic lek: A display area that has not been utilized for display or breeding in the last 10 years.

- Potentially active lek: A lek for which there is insufficient information to accurately categorize into active, inactive, or historic. Additionally, leks with male sage-grouse displaying or breeding in the last 5 years but does not meet activity status (>=2 birds for >=2 years of the last 5 years) are considered "potentially active". This definition is similar to the "unknown" category used in the Colorado Conservation Plan (CCP) and CDOW Species Activity Maps. The name has been changed for this Plan to make a distinction between leks in this population, for which we are gathering information annually, versus leks in other areas (particularly the larger populations in Moffat and Jackson counties) where many lek sites are not always annually due to the number of leks and the time it would take to get to all of them each spring.

All data is the best available. Inconsistencies and errors may be present. Some leks where not mapped because of wrong or missing location information. This data shall not be redistributed without the consent of the Colorado Division of Wildlife.

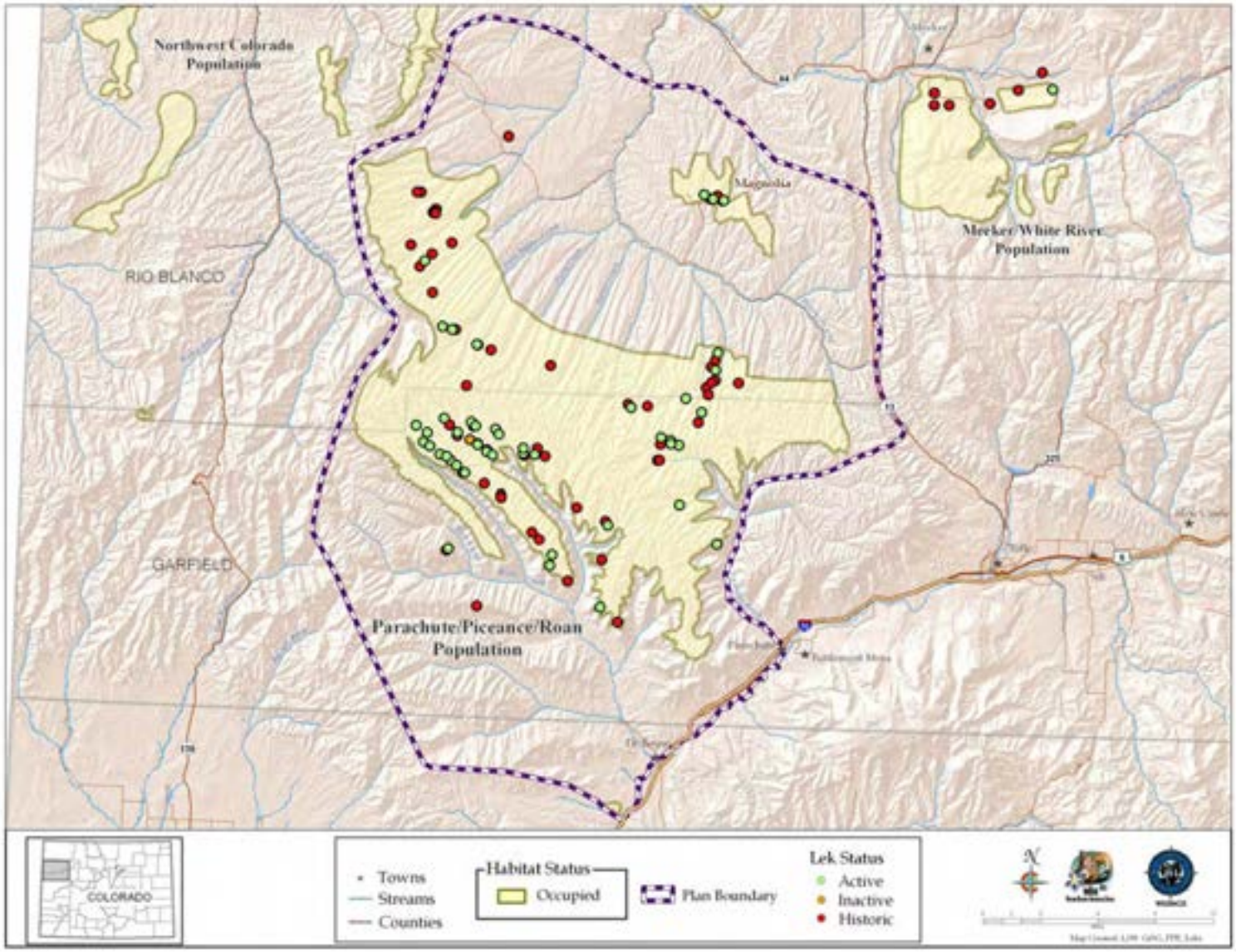

Figure F-1. PPR Lek Locations as of 2007

Appendix F: PPR Greater Sage-Grouse Habitat Mapping Summary

PPR Greater Sage-Grouse Habitat Mapping Summary

By: Heather Sauls, Wildlife Biologist
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Meeker, CO 81641
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Purpose and Need

In order to develop landscape-scale conservation strategies specific to the PPR, the BLM (White River Field Office) initiated a 3 year, landscape-level greater sage-grouse habitat inventory for the Piceance Basin in the summer of 2006. The PPR population is unique because the available habitat is naturally fragmented due to topography and because sagebrush parks are often interspersed with mountain shrubs. The habitat inventory is being conducted on both public and private land and will provide critical local information on the quantity and quality of available sage-grouse habitat in the PPR at a scale not possible from state or national mapping efforts. Specifically, the habitat inventory will provide: 1) a biologically-based estimate for the number of acres of sage-grouse habitat in the Piceance Basin, 2) the spatial arrangement of suitable habitat and unsuitable habitat, and 3) the quality of available habitat (i.e. herbaceous understory, encroachment from pinyon/juniper, etc).

The primary objective of the Piceance Basin sage-grouse habitat inventory is to create a relatively simple landscape-scale map of the different vegetation types found within potential sage-grouse habitat. Since the map is GIS-based, it can easily be shared, updated, and overlaid with other landscape features such as leks, roads, well pads, etc. We plan to use the habitat inventory map as a means to: 1) determine the suitability of specific areas as potential sage-grouse habitat, 2) prioritize areas in need of habitat restoration, and 3) evaluate land uses that may impact either suitable habitat or restoration efforts.

Computer Model of Potential Habitat

We began by developing a computer model of potential sage-grouse habitat within the overall range established by the CDOW for the PPR population. We identified potential sage-grouse habitat using a GIS (geographic information system) model based on slope and vegetation type. We used the Colorado Vegetation Classification Project (CVCP) data and included 19 vegetation classes that included grasses, forbs, sagebrush (*Artemisia tridentata)*, rabbitbrush (*Chrysothamnus* spp.), and mountain shrubs. We did not include drainages and used a 75m buffer around drainages to remove them from the model. Slope was generated from a DEM (digital elevation model) and was originally limited to 15% or less. Not including the Magnolia area, the computer model estimated 38,613 acres of potential sage-grouse habitat (including both public lands and private property) for the PPR population.

While the computer model is soundly based on habitat requirements, we have always considered it a work in progress and we have been updating our estimate of potential habitat as we gain more local information. In some areas, the model overestimates habitat by including habitat types that are not suitable sage-grouse habitat such as aspen, oak/serviceberry, and pinyon/juniper. In other areas, the model underestimates habitat by not including the basins at the

tops of drainages. In response to the observation of sage-grouse using areas outside of the modeled habitat, we ran the model again using a 20% slope cut-off instead of the original 15% slope cut-off. Using the 20% slope model, we estimated 55,170 acres of potential sage-grouse habitat (Figure F-1).

Habitat Inventory Map

The next step was to ground-truth the vegetation types within the computer model. We went to areas identified by the computer model as potential habitat and classified them into general habitat categories based on the vegetation type present at the site: oak/serviceberry (OS), aspen (AS), pinyon/juniper (PJ), grass (GR), rabbitbrush (RB), mountain shrub (MT), and sagebrush (SG). We designated mountain shrub sites as those sites where ≥25% of the shrub cover (excluding rabbitbrush) at the site was composed of bitterbrush, serviceberry, and/or snowberry. At representative sites, we used 30m line transects to measure vegetation. Shrub cover was estimated using the line intercept method, forb and grass cover was estimated using the Daubenmire method, and visual obstruction was estimated using a Robel pole.

Approximately 9,885 acres and 29, 205 acres were mapped during the 2006 and 2007 field seasons, respectively (Figure F-2). In addition to the 204 vegetation transects, there are an additional 177 photo points. Herbaceous understory and shrub composition information was collected at representative rabbitbrush sites (n=3), mountain shrub sites (n=111), and sagebrush sites (n=90). There was no significant difference in herbaceous cover between mountain shrub and sagebrush sites. The most obvious difference between the two types of sites is simply the composition of shrubs at the site. Research from the Colorado Division of Wildlife on habitat use by radio-collared PPR birds will help resolve whether or not mountain shrub is important sage-grouse habitat. Since we record shrub cover by species, we will be able to go back and look at this data again as research progresses and will be able to identify sites that are an equal mixture of several shrub species (e.g. bitterbrush, snowberry, serviceberry, rabbitbrush, sagebrush, serviceberry) or sites that are dominated by only a few species (e.g. sagebrush and serviceberry).

One of the primary products of the sage-grouse habitat inventory is the habitat type map. The map is GIS-based and can be overlaid with other shapefiles to see the spatial arrangement of habitat types in relation to other landscape features such as leks, roads, etc. Since it covers such a large area, it is difficult to show habitat types for the entire inventoried area on a small map. Figure G-3 shows a portion of the habitat inventory map for an area west of the Sprague Gulch Road and Divide Road junction. While the map shows mountain shrub sites and sagebrush sites as discrete units, it is important to remember that in reality there is a gradient between them. In some areas, the habitat inventory closely follows the modeled habitat but in other areas we have mapped acreage outside of the model. The map shows the spatial arrangement of the habitat types but it does not show areas in need of habitat restoration. We found it difficult to map encroachment and habitat quality and instead use the site photos and transect data to convey that information.

A Work in Progress

It can not be overemphasized that our estimate of potential habitat is only an initial estimate and that it is subject to revision as we gain more local knowledge. We are trying to use our habitat inventory together with the computer models to estimate potential habitat. It is critical that we also consider how well those methods match the areas that the birds are actually using. We plan to work closely with CDOW to determine how well our model of potential habitat and

the habitat inventory map matches their location data from radio-collared birds and to make adjustments as necessary.

While this data is preliminary and incomplete, it is already proving valuable. We are using this information to improve our estimate of the acreage of sage-grouse habitat. We have also used this information to identify several potential areas for habitat restoration work based on dense shrub cover, low understory cover, tall serviceberry shrubs, or the encroachment of pinyon/juniper. Our goal over the 2008 summer field seasons is to complete the PPR habitat inventory for all sage-grouse habitat within the White River Resource Area. To do so, it is critical that we continue our existing partnerships with private landowners and establish new partnerships.

Partners

As mentioned above, the habitat inventory is being conducted on both public and private land. We are grateful to the following landowners for allowing us permission to use their land to access public land and/or to conduct the habitat inventory on their land: Jim Brennan, ConocoPhillips, J. Lynn Dougan, EnCana, ExxonMobil, Torrence Hughes, Dan Johnson, Pat Johnson, Tim Mantle, Jerry Oldland, Orion Energy Partners, Shell, and Tim Uphoff.

We would also like to thank EnCana for providing $34,000 to help fund this project in 2006 and 2007. In 2007, CDOW provided one technician and also provided housing for another technician at the Little Hills bunkhouse.

We hope to continue these partnerships in the future and to develop new partnerships with other landowners in the Piceance Basin.

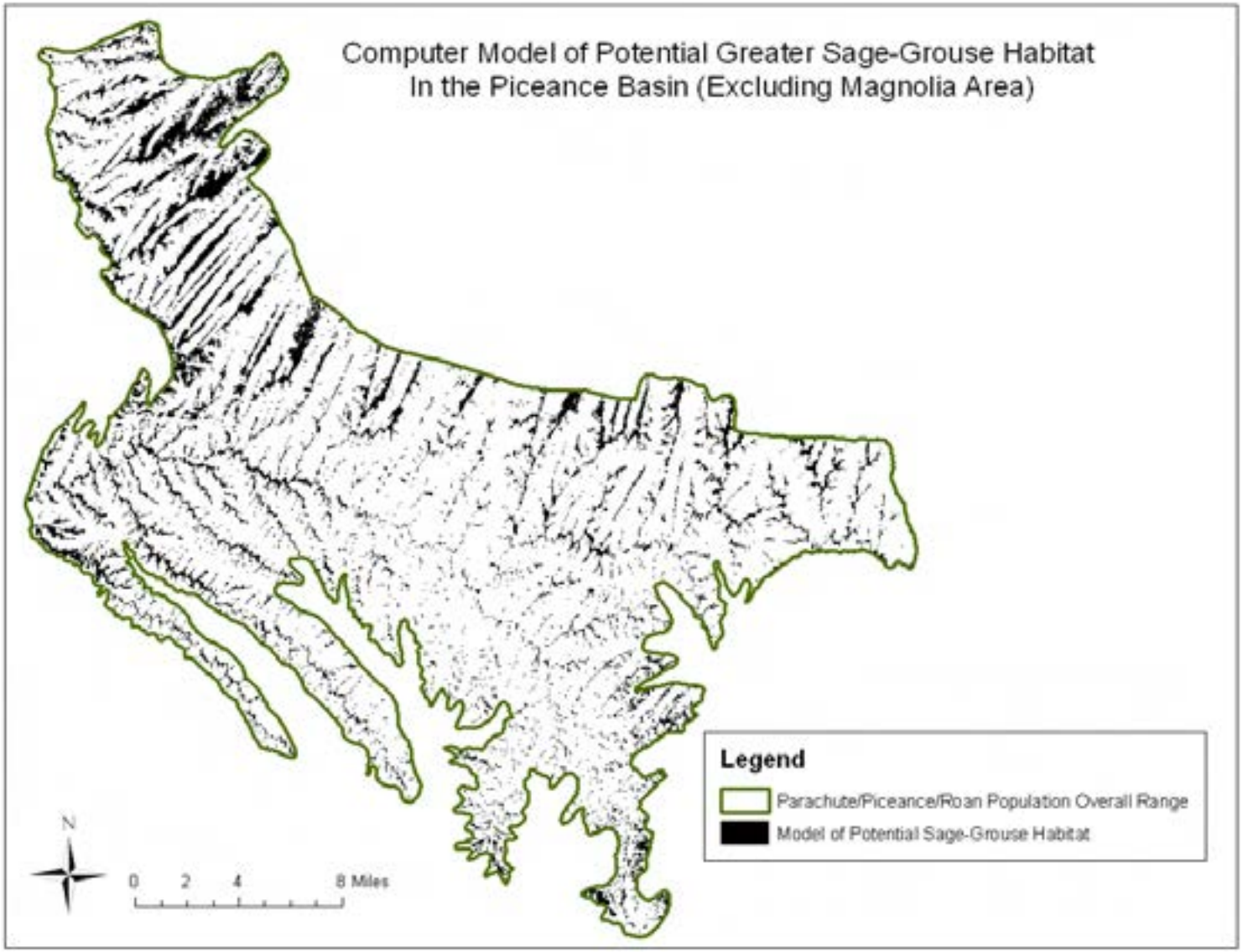

Figure F-1. Computer Model of Potential Greater Sage-Grouse Habitat in the Piceance Basin (Excluding the Magnolia Area)

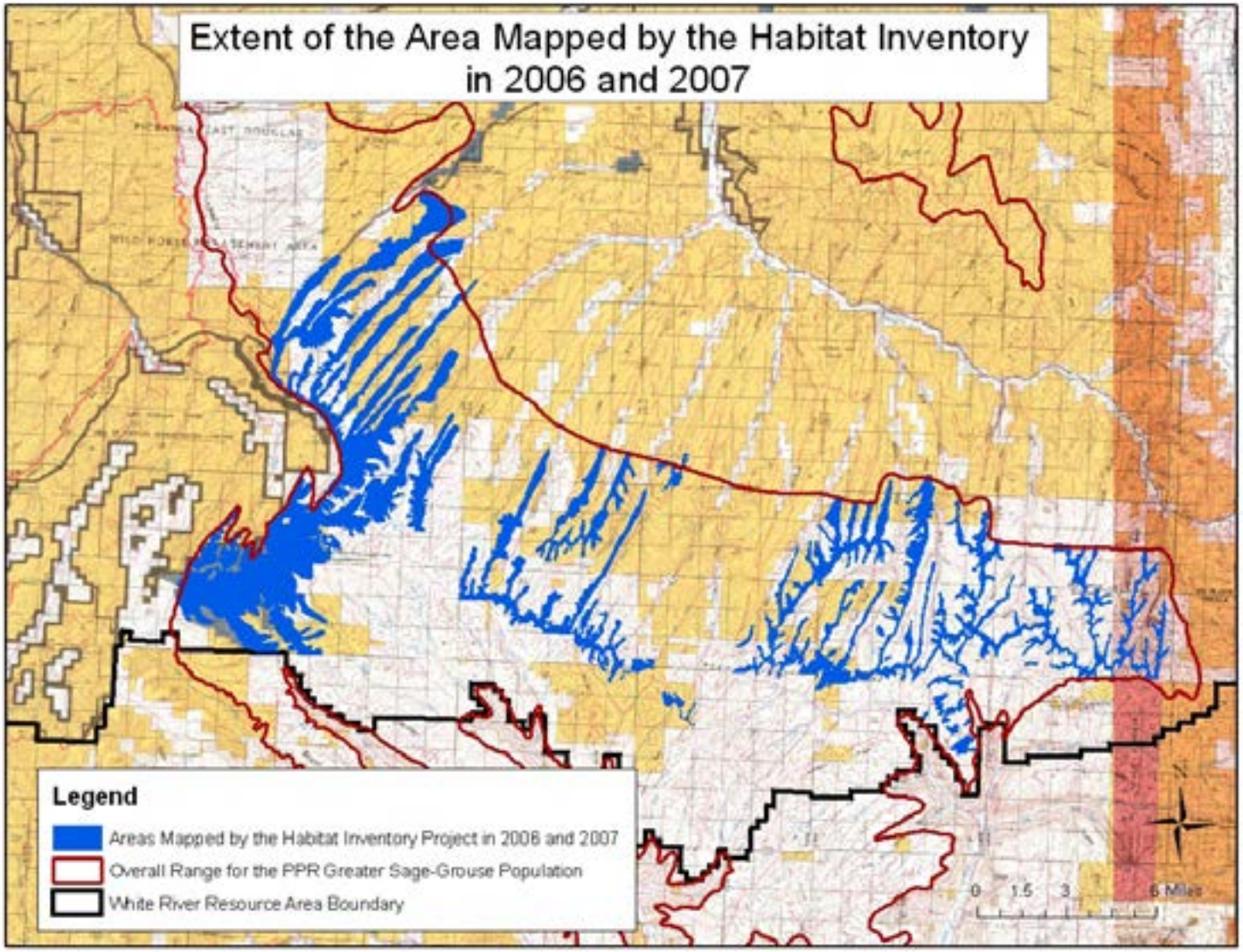

Figure F-2. Areas mapped for sage-grouse habitat inventory during the 2006 and 2007 field seasons.

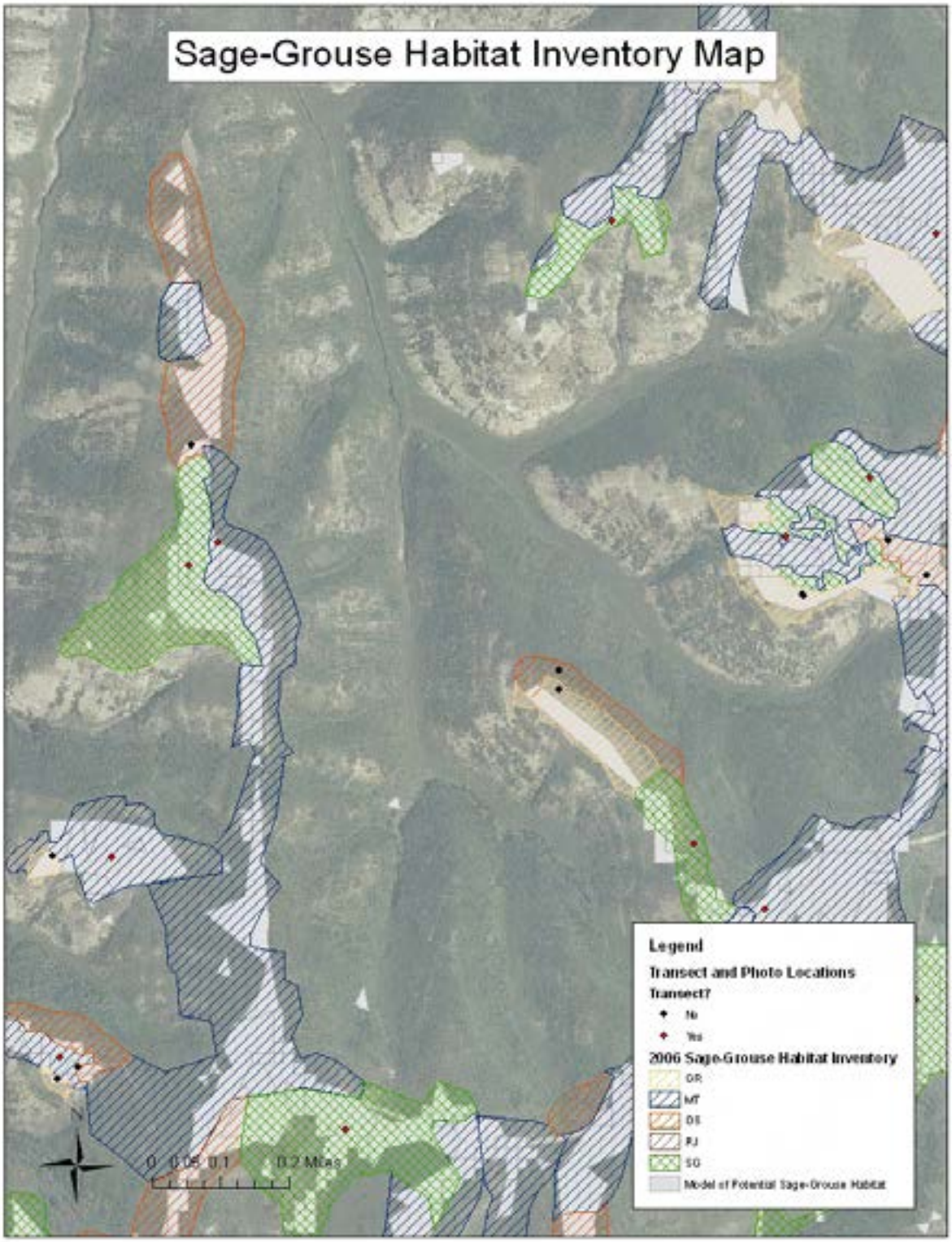

Figure F-3. An example of the sage-grouse habitat inventory map for an area west of the Sprague Gulch Road and Divide Road junction. (GR=grass, MT=mountain shrub, OS=oak/serviceberry, PJ =pinyon/juniper, SG=sagebrush)

Appendix G: USFWS "Proposed Policy for Evaluating Conservation Efforts When Making Listing Decisions

U.S. Fish & Wildlife Service / National Oceanic & Atmospheric Administration

Proposed Policy for of Conservation Efforts When Making Listing Decisions

On June 13, 2000, the Fish and Wildlife Service and the National Marine Fisheries Service (Services), published a draft policy for the evaluation of conservation efforts when making listing decisions under the Endangered Species (Act). While the Act requires us to consider all conservation efforts being made to protect a species, the policy identifies criteria we will use in determining whether formalized conservation efforts contribute to making listing a species as threatened or endangered unnecessary. The policy applies to conservation efforts identified in conservation agreements, conservation plans, management plans or similar documents developed by Federal agencies, State and local governments, Tribal governments, foreign governments, businesses, organizations, and individuals.

What is the purpose of this policy?
We have proposed this policy in order to ensure consistent and adequate evaluation of formalized conservation efforts (conservation efforts identified in conservation agreements, conservation plans, management plans, and similar documents) when making listing decisions. We have also proposed this policy to facilitate the development of conservation efforts that sufficiently improve a species' status so as to make listing the species as threatened or endangered unnecessary.

Does the policy specify the level of conservation, or types of conservation, needed to make listing unnecessary?
No, the policy does not provide guidance for determining the level of conservation or the types of conservation efforts needed to make listing unnecessary. Also, the policy does not provide guidance for determining when parties should enter into agreements or when a conservation effort should be included in an agreement or plan. *The policy provides guidance only for evaluating the certainty of implementation and effectiveness of formalized conservation efforts.*

What authority does the Service have to implement this policy?
Section 4(a)(1) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1533(a)(1)) states that we must determine whether a species is threatened or endangered because of any of the following five factors:

(A) the present or threatened destruction, modification, or curtailment of its habitat or range;

(B) overutilization for commercial, recreational, scientific, or educational purposes;

(C) disease or predation;

(D) the inadequacy of existing regulatory mechanisms; and

(E) other natural or manmade factors affecting its continued existence.

Although this language focuses on impacts negatively affecting a species, section 4(b)(1)(A) requires us also to "tak[e] into account those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation, to protect such species, whether by predator control, protection of habitat and food supply, or other conservation practices, within any area under its jurisdiction, or on the high seas." Read together, sections 4(a)(1) and 4(b)(1)(A) and our regulations at 50 C.F.R. section 424.11(f) require us to consider any State, local, or foreign laws, regulations, ordinances, programs, or other specific conservation measures that either positively or negatively affect a species' status. The manner in which the section 4(a)(1) factors are framed supports this conclusion. Factor (D) for example— "the inadequacy of existing regulatory mechanisms"—indicates that we might find existing regulatory mechanisms adequate to justify a determination not to list a species.

In addition, we construe the analysis required under section 4(a)(1), in conjunction with the directive in section 4(b)(1)(A), to authorize and require us to consider whether the actions of any other entity, in addition to actions of State or foreign government, create, exacerbate, reduce, or remove threats to the species. Factor (E) in particular—any "manmade factors affecting [the species'] continued existence"—requires us to consider the pertinent laws, regulations, programs, and other specific actions of any entity that either positively or negatively affect the species. Thus, the analysis outlined in section 4 requires us to consider any conservation efforts by State or local governments, foreign governments, Tribal governments, Federal agencies, businesses, organizations, or individuals that positively affect the species' status.

What are the criteria that a conservation effort must meet in order for the Service to determine that it might contribute to making listing unnecessary?
Conservation agreements, conservation plans, management plans, and similar documents generally identify numerous conservation efforts (i.e., actions, activities, or programs) to benefit the species. In determining whether a formalized conservation effort contributes to making listing a species as threatened or endangered unnecessary or contributes to forming a basis for listing as threatened rather than endangered, we must evaluate whether the conservation effort affects the status of the species.

Two factors are key in that evaluation: (1) For those efforts yet to be implemented, the certainty that the conservation effort will be *implemented* and (2) the certainty that the conservation effort will be *effective*. In order for us to determine that a formalized conservation effort contributes to making listing a species unnecessary or contributes to forming a basis for listing a species as threatened rather than endangered, the conservation effort must meet the following criteria:

A. The certainty that the conservation effort will be implemented:

- The conservation effort; the party(ies) to the agreement or plan that will implement the effort; and the staffing, funding level, funding source, and other resources necessary to implement the effort are identified.
- The authority of the party(ies) to the agreement or plan to implement the conservation effort, and the legal procedural requirements necessary to implement the effort, are described.

- Authorizations (e.g., permits, landowner permission) necessary to implement the conservation effort are identified, and a high level of certainty that the party(ies) to the agreement or plan that will implement the effort will obtain these authorizations is provided.
- The level of voluntary participation (e.g., by private landowners) necessary to implement the conservation effort is identified, and a high level of certainty that the party(ies) to the agreement or plan that will implement the conservation effort will obtain that level of voluntary participation is provided (e.g., an explanation of why incentives to be provided are expected to result in the necessary level of voluntary participation).
- All regulatory mechanisms (e.g., laws, regulations, ordinanaces) necessary to implement the conservation effort are in place.
- A high level of certainty that the party(ies) to the agreement or plan that will implement the conservation effort will obtain the necessary funding is provided.
- An implementation schedule (including completion dates) for the conservation effort is provided.
- The conservation agreement or plan that includes the conservation effort is approved by all parties to the agreement or plan.

B. The certainty that the conservation effort will be effective:

- The nature and extent of threats being addressed by the conservation effort are described.
- Explicit objectives for the conservation effort and dates for achieving them are stated.
- The steps necessary to implement the conservation effort are identified.
- Quantifiable, scientifically valid parameters that will demonstrate achievement of objectives, and standards for these parameters by which progress will be measured, are identified.
- Provisions for monitoring and reporting progress in implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided.
- Principles of adaptive management are incorporated.

Based on input received during the public comment period, these criteria may be revised in the final policy.

Whom should I contact about this policy?
To obtain further information on the proposed policy, contact our Headquarters Office at the address below. More information and office addresses can also be found by visiting the Fish & Wildlife Service website: (http://www.fws.gov).

U.S. Fish and Wildlife Service
Endangered Species Program
4401 N. Fairfax Drive, Room 420
Arlington, VA 22203
703/358 2105

National Marine Fisheries Service
Office of Protected Resources
Room 13658
1315 East West Highway
Silver Spring, MD 20910
301/713 1401

September 2001

Appendix H: List of PPR Workgroup Members

First Name	Last Name	Affiliation
Fran	Amendola	Norwest Corporation
Vic	Beckler	
Drew	Bennett	Mesa Land Trust
Paul	Betzer	ConocoPhillips Co.
Geoff	Blakeslee	The Nature Conservancy
Clait	Braun	Grouse Inc.
Bill & Nancy	Brennan	Landowner
John	Bridges	Western Area Power Administration
Indra	Briedis	
Nicole	Brynes	Encana
Rep. Bernie	Buescher	Colorado House of Reps.
Chris	Canfield	COGCC
Dave	Cesark	Williams Production RMT
Chris	Clark	Plains Exploration and Production Co.
Creed	Clayton	USFWS
Ray	Clifton	Colorado Rural Electric Assoc.
Bob	Coleman	Marathon
Fred	Cummings	NRCS
Dennis	Davidson	NRCS
Eileen	Dey	Conoco-Phillips
Steve	Don	Grand Valley Rural Power Lines Inc.
Scot	Donato	Bill Barrett Corp
Stephanie	Duckett	Colorado Division of Wildlife
Bill	Ekstrom	CSU Cooperative Ext.
Darby	Finley	Colorado Division of Wildlife
Maurice	Foye	HRL Compliance
Chris	Freeman	Berry Petroleum
Kathy	Friesen	EnCana
John	Gardner	Rifle Citizen-Telegram
Paul T.	Gayer	Kinder Morgan
Terry	Gosney	EnCana
John	Gray	Westwater Engineering
Carrie	Gudorf	Cordillean
Joe	Gumber	Westwater Engineering
Adell	Heneghan	Marathon Oil Company
Geoff	Hier	CO Rural Elect. Assoc.
Ed	Hollowed	BLM
Joel	Hurmance	EDM Consultants
Terry	Ireland	USFWS
Tyson	Johnston	PDC - Petro Development Corp.
Kim	Kaal	CO Div. of Wildlife

Andy	Keep	NRCS
Tom	Knowles	CDOW
Elissa	Knox	CO Div. of Wildlife
Pete	Kolbenschlag	Colorado Environmental Coalition
Nicole	Korbe	Tri-State Generation & Transmission Assoc.
Frank	Krugh	Marathon Oil
Mike	Lopez	Land Manager
Justin	Lovato	Conoco Phillips
Jeff	Madison	Rio Blanco County
Noe	Marymor	CDOW / NRCS
Dan	Mathews	CO Div. Reclamation Mining & Safety
Pat	McCarty	CSU Cooperative Ext.
Larry	McCown	Garfield County Commissioner
Dave	McDonald	Landowner
Mike	McKibbin	Grand Junction Daily Sentinel
Mike	McKibbin	Rifle Citzen Telegram
Brandon	Miller	CDOW
Cathy	Neelan	North American Mediation Associates
Forrest	Nelson	Rio Blanco County Commissioner
David	Neslin	Colorado Oil & Gas Commission
Joe	Neuhof	Colorado Environmental Coalition
Lori	Nielsen	EDM Consultants
Big Eddie	Nielson	NRCS
Sean	Norris	Chevron
Jerry & Stephanie	Oldland	Landowner
John	O'Rourke	Earth Tech.
Lee	Parker	Chevron Shale Oil Co.
Brad	Petch	Colorado Division of Wildlife
Al	Pfister	W. Colorado Field Office, USFWS
Evan	Phillips	CDOW
Heidi	Plank	Bureau of Land Management
Kent	Rider	Williams
Larry	Robinson	Landowner
Albert	Romero	Colorado Division of Wildlife
Pam	Roth	Williams Energy
Heather	Sauls	BLM
John	Savage	Landowner
Terri	Schulz	The Nature Conservancy
Clee	Sealing	North American Grouse Partnership
Steve	Shuey	CDRMS
Steve	Smith	The Wilderness Society
Brett	Smithers	Bureau of Land Management
Ron	Spencer	White River Electric Assn.
Ken	Strom	Audubon Colorado
Mike	Swaro	CDOW
Jim	Thate	Colorado Rural Electric Assoc.

Dan	Thompson	NRCS
Bob	Timberman	USFWS
John	Toolen	Colorado Division of Wildlife
Tim & Chris	Uphoff	Landowner
Boone	Vaughn	Landowner
Deanna	Walker	Conoco-Phillips
Kent	Walter	Bureau of Land Management
Chuck	Whiteman	Shell Oil

VII. SIGNATURES OF PARTICIPANTS

The following pages include signatures and/or letters of support from the following:

Federal Agencies
State Agencies
County or Municipal Governments
Private Sector and Individual Signature (includes companies, organizations, etc.)
Letters of Support

CONSERVATION AGREEMENT

The U.S. Fish and Wildlife Service-Western Colorado Ecological Services Field Office hereby states it intent to assist with and participate in the implementation of the Parachute-Piceance-Roan Conservation Plan (Plan) as prepared by the Working Group. By signing this Conservation Agreement (Agreement) the Service shows support for the purpose, guiding principals, and conservation actions as stated in the Plan. Authority for the Service to enter into this Agreement and participate in implementation of the Plan comes from the Endangered Species Act of 1973, as amended; the Fish and Wildlife Act of 1956, and the Fish and Wildlife Coordination Act, as amended. Signing of this Agreement does not constitute a review under the Policy for Evaluating Conservation Efforts When Making Listing Decisions (PECE), nor an evaluation of the real or absolute extinction risk for the greater sage-grouse. The Service's endorsement of the Plan is not an indication that it will determine, under PECE, that the Plan should be considered when the Services makes a listing determination for the greater sage-grouse, nor does the existence of the Plan necessarily result in the Service determining that listing is not warranted. Specific commitments are as follows:

1. To pursue funding opportunities through available grants or funding sources for implementation of the Plan.

2. To attempt to provide a representative to Working Group meetings.

3. To use our authorities to review Federal projects and recommend measures to avoid or minimize impacts to the greater sage-grouse and its habitat.

4. To provide technical assistance for proposed projects as needed and requested.

5. To provide recommendations to address issues of concern during future Plan revisions, including but not limited to inclusion of habitat disturbance guidelines for project related impacts.

Performance of all activities described above is contingent on adequate funds and staff being made available and allocated to the Fish and Wildlife Service (Service). All projects or management actions implemented in accordance with the Plan will be subject to all laws, regulations, policies and procedures in effect at the time the action is implemented. This agreement is neither a fiscal nor a funds obligating document. This Agreement shall not prohibit the Service from engaging in management actions regarding greater sage-grouse conservation beyond those described in this Agreement and in the Plan. However, such management actions should be coordinated with the Working Group.

This Agreement is effective as of the date of signing and shall remain in effect until the Service chooses to amend or terminate the agreement. If the habitat disturbance guideline issue is not resolved within six months, the Service's support of this plan may be terminated.

Allan R. Pfister

Allan R. Pfister, Western Colorado Field Supervisor
U.S. Fish and Wildlife Service-Ecological Services

4/29/08
Date

Conservation Agreement

The U.S. Bureau of Land Management (White River Field Office) hereby states its intent and commitment to assist with and participate in the implementation of the Parachute-Piceance-Roan (PPR) Greater Sage-grouse Conservation Plan. This plan was prepared by a work group of affected stakeholders and is designed to conserve and enhance populations and habitats of Greater Sage-grouse (GRSG), a BLM sensitive species. This plan is in no way meant to be construed as a Resource Management Plan Decision. All projects or management actions implemented through these guidelines will be subject to site specific environmental analysis required under the National Environmental Policy Act. Specific commitments made hereby are as follows:

1. All proposed projects or actions funded, implemented or authorized by the BLM will be analyzed with respect to impacts on Greater Sage-grouse and their habitats in accordance with the guidelines set forth in this plan.

2. To implement the guidelines, conservation actions, and intent set forth in this plan within the constraints of existing laws, policies, regulations and management plans, and while considering the needs or implications to other species and multiple uses.

3. To work with private landowners, companies, organizations and other state or federal agencies to implement necessary conservation actions to maintain or enhance Greater Sage-grouse habitat as outlined in this plan.

4. To exercise authorities for maintenance, conservation and management of Greater Sage-grouse populations and suitable habitat pursuant to provisions in the BLM Sensitive Species Policy Manual and the Federal Land Policy and Management Act (FLPMA).

Performance of all activities described above is contingent on adequate staff and funding being allocated to the signatory agency. This agreement shall not prohibit the signatory agency from engaging in management actions regarding Greater Sage-grouse conservation beyond those described in the agreement and in the Conservation Plan. Such management actions should be coordinated with the PPR Work Group.

This agreement shall become effective on the date of signature by the participating agency and shall remain in effect until the signatory party chooses to terminate the agreement, or the agreement is terminated by consent of the PPR Work Group. The agreement may be terminated by providing 90 days written notice to the PPR Work Group.

Kent C. Walter — April 29, 2008

Kent Walter, White River Field Office Manager — Date
Bureau of Land Management, USDI

Conservation Agreement

The U.S. Bureau of Land Management (Grand Junction Field Office) hereby states its intent and commitment to assist with and participate in the implementation of the Parachute-Piceance-Roan (PPR) Greater Sage-grouse Conservation Plan. This plan was prepared by a work group of affected stakeholders and is designed to conserve and enhance populations and habitats of Greater Sage-grouse (GRSG), a BLM sensitive species. This plan is in no way meant to be construed as a Resource Management Plan Decision. All projects or management actions implemented through these guidelines will be subject to site specific environmental analysis required under the National Environmental Policy Act. Specific commitments made hereby are as follows:

1. All proposed projects or actions funded, implemented or authorized by the BLM will be analyzed with respect to impacts on Greater Sage-grouse and their habitats in accordance with the guidelines set forth in this plan.

2. To implement the guidelines, conservation actions, and intent set forth in this plan within the constraints of existing laws, policies, regulations and management plans, and while considering the needs or implications to other species and multiple uses.

3. To work with private landowners, companies, organizations and other state or federal agencies to implement necessary conservation actions to maintain or enhance Greater Sage-grouse habitat as outlined in this plan.

4. To exercise authorities for maintenance, conservation and management of Greater Sage-grouse populations and suitable habitat pursuant to provisions in the BLM Sensitive Species Policy Manual and the Federal Land Policy and Management Act (FLPMA).

Performance of all activities described above is contingent on adequate staff and funding being allocated to the signatory agency. This agreement shall not prohibit the signatory agency from engaging in management actions regarding Greater Sage-grouse conservation beyond those described in the agreement and in the Conservation Plan. Such management actions should be coordinated with the PPR Work Group.

This agreement shall become effective on the date of signature by the participating agency and shall remain in effect until the signatory party chooses to terminate the agreement, or the agreement is terminated by consent of the PPR Work Group. The agreement may be terminated by providing 90 days written notice to the PPR Work Group.

Catherine Robertson — May 27, 2008

Catherine Robertson, Grand Junction Field Office Manager — Date
Bureau of Land Management, USDI

Monday, June 09, 2008.max

Conservation Agreement

The U.S. Bureau of Land Management (White River Field Office) hereby states its intent and commitment to assist with and participate in the implementation of the Parachute-Piceance-Roan (PPR) Greater Sage-grouse Conservation Plan. This plan was prepared by a work group of affected stakeholders and is designed to conserve and enhance populations and habitats of Greater Sage-grouse (GRSG), a BLM sensitive species. This plan is in no way meant to be construed as a Resource Management Plan Decision. All projects or management actions implemented through these guidelines will be subject to site specific environmental analysis required under the National Environmental Policy Act. Specific commitments made hereby are as follows:

1. All proposed projects or actions funded, implemented or authorized by the BLM will be analyzed with respect to impacts on Greater Sage-grouse and their habitats in accordance with the guidelines set forth in this plan.

2. To implement the guidelines, conservation actions, and intent set forth in this plan within the constraints of existing laws, policies, regulations and management plans, and while considering the needs or implications to other species and multiple uses.

3. To work with private landowners, companies, organizations and other state or federal agencies to implement necessary conservation actions to maintain or enhance Greater Sage-grouse habitat as outlined in this plan.

4. To exercise authorities for maintenance, conservation and management of Greater Sage-grouse populations and suitable habitat pursuant to provisions in the BLM Sensitive Species Policy Manual and the Federal Land Policy and Management Act (FLPMA).

Performance of all activities described above is contingent on adequate staff and funding being allocated to the signatory agency. This agreement shall not prohibit the signatory agency from engaging in management actions regarding Greater Sage-grouse conservation beyond those described in the agreement and in the Conservation Plan. Such management actions should be coordinated with the PPR Work Group.

This agreement shall become effective on the date of signature by the participating agency and shall remain in effect until the signatory party chooses to terminate the agreement, or the agreement is terminated by consent of the PPR Work Group. The agreement may be terminated by providing 90 days written notice to the PPR Work Group.

Jamie E. Connell — 6-10-2008

Jamie Connell, Glenwood Springs Field Office
Bureau of Land Management, USDI

Date

CONSERVATION AGREEMENT

The USDA / Natural Resources Conservation Service hereby states its intent to assist with and participate in the implementation of the Parachute, Piceance & Roan Creek Greater Sage-grouse Conservation Plan, as prepared by the Parachute, Piceance & Roan Creek Greater Sage-grouse Work Group.

Performance of all activities described in the Plan pertaining to the NRCS is contingent on adequate funds and staff being made available and allocated to the agency. This agreement shall become effective on the date of signature by the participating parties, and shall remain in effect until the parties choose to terminate the agreement, or the agreement is terminated by consent with the Parachute, Piceance & Roan Creek Greater Sage-grouse Work Group.

Dennis Davidson
District Conservationist, USDA-NRCS
Garfield County

4/29/08
Date

Andy Keep
District Conservationist, USDA-NRCS
Rio Blanco County

4/29/08
Date

Jim Currier
District Conservationist, USDA-NRCS
Mesa County

4/29/08
Date

Conservation Agreement

The **Colorado Division of Wildlife** hereby states its intent and commitment to assist with and participate in the implementation of the ***Parachute-Piceance-Roan Greater Sage-Grouse Conservation Plan*** as prepared by the Parachute-Piceance-Roan (PPR) Greater Sage-Grouse Working Group. Specific commitments made hereby are as follows:

To provide one staff person to coordinate the implementation of this plan and represent the Division on the Parachute-Piceance-Roan Working Group, which consists of representatives from state and federal agencies, local government, conservation organizations, landowners, private industry, and interested members of the local community.

2. To assume lead responsibility for the inventory and monitoring of Greater Sage-Grouse in the Parachute-Piceance-Roan area, and to annually compile and report inventory and monitoring information.

3. To assume lead responsibility for the reintroduction of Greater Sage-Grouse into formerly occupied habitats in Colorado.

4. To implement and enforce specific State statutes and Wildlife Commission Regulations (Colorado Revised Statutes, Title 33, Articles 3 and 6, and Colorado Wildlife Commission Regulations Chapter 3) that control the taking and possession of Greater Sage-Grouse in Colorado.

To make recommendations to, and cooperate with, other state and federal agencies, local governments, private landowners, and land developers to avoid, minimize, or mitigate negative impacts of development and other land uses on Greater Sage-Grouse populations and their habitats in the Parachute-Piceance-Roan area

6. To make recommendations to, provide some funding for, and cooperate with other state and federal agencies, local governments, private landowners, and conservation organizations to conserve and enhance Greater Sage-Grouse habitats in the Parachute-Piceance-Roan area.

7. To continue to support and conduct research on the population dynamics and habitat relationships of Greater Sage-Grouse in Colorado.

Performance of the commitments described above is contingent on adequate funding being made available and allocated to the signatory agency. This agreement shall not prohibit the signatory agency from engaging in management actions regarding Greater Sage-Grouse beyond those described in this agreement and in the Conservation Plan. This agreement shall become effective on the date of signing by the participating party and shall remain in effect until the signatory party chooses to terminate the agreement. The agreement may be terminated by providing 90 days written notice to the Parachute-Piceance-Roan Working Group.

Thomas E. Remington

Thomas E. Remington
Director, Colorado Division of Wildlife

5/10/08
Date

BOARD OF COMMISSIONERS
RIO BLANCO COUNTY
P.O. BOX 1
MEEKER, CO 81641

RIO BLANCO COUNTY SIGNATURE PAGE

Rio Blanco County has participated in the development of the Parachute-Piceance-Roan Greater Sage Grouse Conservation Plan and concurs with the findings. The Rio Blanco County Board of County Commissioners support the mission of the Plan to conserve and enhance Greater Sage-grouse population and habitats in Rio Blanco and Garfield Counties in ways that are compatible with existing and future land uses thereby insuring the opportunity for people to enjoy this wildlife resource in perpetuity. Any actions undertaken by the County are strictly voluntary. Signing this plan shows the County's support, but shall in no way bind the County to any particular action.

COUNTY OF RIO BLANCO,
STATE OF COLORADO, By
and Through Its BOARD OF
COUNTY COMMISSIONERS

ATTEST:

Nancy R. Amick
Clerk & Recorder
Rio Blanco County

Forrest F. Nelson, Chairman

Joe F. Collins, Commissioner

Kenneth C. Parsons, Commissioner

Forrest F. Nelson, Chairman *Joe F. Collins* *Kenneth C. Parsons*
County Administration (970) 878-9430 *Fax (970) 878-5442* *bocc@co.rio-blanco.co.us*
Rio Blanco County Administration Building, 317 E. Market Street, Meeker, CO 81641

VII. SIGNATURES OF PARTICIPANTS

Private Sector and Individual Signature Page

"Signatories to this Plan have participated and concur with the Plan development. They support the mission of the Plan to conserve and enhance the Greater Sage-Grouse populations and habitats in Garfield, Mesa, and Rio Blanco Counties in ways that are compatible with existing and future land uses, thereby insuring the opportunity for people to enjoy this wildlife resource in perpetuity. Any actions undertaken by the signatories are strictly voluntary. Signing this Plan shall in no way be construed to reduce or deprive the signatories of any rights, privileges they enjoy. Any party to this agreement can terminate with a written notice to the Workgroup via the Colorado Division of Wildlife offices in Grand Junction or Meeker, CO. If the species is listed under the Endangered Species Act it is the signatories' option to withdraw from this agreement at anytime."

Name	Affiliation
Ryan Callaway	CO-DNR-DRMS
Chris Canfield	Colo. Oil & Gas Conservation Commission
Andrea Christie	
Steve Smith	SHE-WILDERNESS SOCIETY
[illegible]	White River Electric Assn Inc.
[illegible]	CO DOW
[illegible]	
[illegible]	CO DOW
[illegible]	West Water Engineering Co.
[illegible]	Colorado DRMS.

Private Sector and Individual Signature Page

Signatories to this plan have participated and concur with the plan development. They support the mission of the Plan to conserve and enhance the Greater Sage-Grouse population and habitats in Parachute, Piceance and Roan Creek *areas of* Colorado in ways that are compatible with existing and future land uses, thereby insuring the opportunity for people to enjoy this wildlife resource in perpetuity. Any actions undertaken by the signatories are strictly voluntary. Signing this plan shall in no way be construed to reduce or deprive the signatories of any rights or privileges they enjoy. Any party to this agreement can terminate with a written notice to the Workgroup via the Colorado Division of Wildlife Office in Grand Junction CO. If the species is listed, it is the signatories' option to withdraw from this agreement at anytime.

Name	Affiliation
[illegible]	Williams Production RMT
[illegible]	HRL COMPLIANCE SOLUTIONS INC.
[illegible]	ConocoPhillips Company
Eileen Day	ConocoPhillips Company
Joe Dunbar	WESTWATER ENGINEERING
Bill Bumgarner	Rancher
Chris Kohl	Rancher
Tim [illegible]	Rancher
[illegible] Chris Clark	Plains Exploration & Production
Sam Morris	Chevron U.S.A. Inc. CO
Nicole M. Byrne	Working Group Member

Colorado Rural Electric Association
5400 North Washington Street
Denver, Colorado 80216
(303) 455-2700
FAX: (303) 455-2807

To: Greater Sage-grouse Steering Committee
CC: Cathy Neelan, North American Mediation Associates, LLC
John Toolen Bureau of Land Management
Lori Nielsen EDM International, Inc.
Brad Petch Colorado Division of Wildlife

Re: Comments regarding the review of listing status decisions prior to the April 29th signing of the local Parachute, Piceance and Roan Creek (PPR) Conservation Plan

The Colorado electric utilities do work in close cooperation with the Bureau of Land Management (BLM) and Colorado Division of Wildlife (CDOW) when planning and permitting is conducted to locate new utility corridors outside documented Greater Sage-grouse leks. We would like to continue working with the BLM and CDOW to preserve all potentially sensitive species including sage-grouse. We appreciate that over the past years the BLM and CDOW have allowed the electric utilities to comment on conservation actions.

In regard to the Parachute, Piceance and Roan Creek (PPR) Working Plan and the Greater Sage-grouse Statewide Conservation Plan as they relate to Electrical Structures, Rights-of-Way, and Power Lines, the Colorado Rural Electric Association would like to take this opportunity to comment on the PPR Plan, particularly as it relates to the Statewide GrSG Plan. The electric cooperatives have a valid concern that the "recommended 4-mile buffer zone", can be calculated as an 8-mile diameter potential exclusion area for suitable habitat as described in Appendix B of the GRSG Conservation Plan and can be easily misinterpreted as a recommended practice by permit applicants and land management agencies.

We are currently reviewing the Statewide Plan independently, as it pertains to power lines and electric utilities. Overall, we believe that the correlation and cross referencing of the PPR Plan with the Statewide Plan should be more consistent. A recent insertion into the Greater Sage-grouse PPR plan appendices refers to a Best Management Practice proposing that CDOW be consulted prior to surface occupancy within 4 miles of a lek.

Although we understand that 1) the PPR Plan is strictly voluntary, 2) the 4-mile radial distance buffer targets specific areas in the Piceance Basin, 3) the 4-mile buffer is not a "No Surface Occupancy" (NSO) area, and 4) the Statewide plan mentioned "it [the 4-mile buffer] is an area of consideration where the disturbance guidelines should be applied when, and if, possible" we are still concerned over the associated language. The language regarding the buffer zone refers to a request for consultation with the CDOW, which is an unknown. However, our major concern is that the land management agencies, such as the BLM may incorporate a 4-mile buffer into their permitting policy for power line right-of-way, particularly in the Piceance Basin based on how the PPR Plan is worded. If this became policy for permitting right-of-way, we feel this measure would be excessive and is beyond what was previously agreed upon by the PPR working group. Both documents should have clearer outlines of what is proposed.

The electric cooperatives have a valid concern that the "recommended 4-mile buffer zone", can be calculated as an 8-mile diameter potential exclusion area for suitable habitat as described in Appendix B of the GRSG Conservation Plan and can be easily misinterpreted as a recommended practice by permit applicants and land management agencies.

Your Touchstone Energy® Partner
The power of human connections

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When power lines are within the area of a Greater Sage-grouse lek we agree that electrical structures can be retrofitted with modern perching deterrents to dissuade birds of prey from using the electrical structure as an unfair advantage. However; this should also be evaluated on a case-by-case basis.

The concept of burying the high-voltage power lines should be evaluated on a project specific basis. An electrical pole has a very small footprint, and the equipment used to place the pole and string the overhead conductor do very little damage to the environment as compared to burying lines and the associated linear disturbance. A trench to bury the same power line will disturb an area at least 10 feet wide and for the entire length of the right-of-way. Trenching eliminates the existing and desired vegetation, while disturbed soil encourages unwanted vegetation, requires continual maintenance in seeding and weed prevention, and of course a buried power line is much more expensive to install than overhead lines.

As stated on Pages 83-84 of the Final PPR Plan, paragraph 3a verbiage such as, "Actions for power lines in order to reposition new power lines and install raptor deterrents when applicable and feasible" and the term "Conservation Actions" allow too much room for interpretation and could easily be construed to propose a variety of actions. It is our concern that plans containing "Conservation Actions" and "Best Management Practices" can more easily transcend into rules and laws than if the plans would plainly state that the CDOW and the BLM will work with all affected parties when sage-grouse leks are a viable concern.

To reiterate previous communications, the electric cooperatives are not-for-profit and we have to pass all increases in construction and operation costs on to the consumers.

CREA, with all intents and purposes will try to comply with the PPR Plan. However; CREA does not have the authority to sign and bind on the content of this plan on behalf of the cooperative members that may directly or indirectly be affected by the plan.

Thank you for the opportunity to comment.
If you have any questions or concerns please feel free to contact the Colorado Rural Electric Association.

Ray Clifton
Executive Director
Colorado Rural Electric Association
rclifton@coloradorea.org
303-455-2700 ext. 104

Jim Thate
Director of Safety Training and Loss Control
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ENCANA™

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www.encana.com

EnCana Oil &Gas (USA) Inc. Signature Page

EnCana Oil & Gas (USA) Inc. participated in the development of the Parachute-Piceance-Roan Greater Sage Grouse Conservation Plan. We support the mission of the local working group to conserve and enhance this Greater Sage Grouse population and associated habitats through cooperative multi-party efforts, adaptive management, and private land stewardship, in ways that are compatible with our existing and future activities in the geologic Piceance Basin. EnCana may assist with and participate in the implementation of the Plan. Any actions undertaken by EnCana are strictly voluntary. This signature letter shall in no way be construed to reduce or deprive EnCana of rights or privileges. Signing this Plan shows EnCana's support but does not commit us to any particular action.

Byron R. Gale, North Piceance Team Lead

July 24, 2008
Date

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UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240
http://www.blm.gov/
December 27, 2011

In Reply Refer To:
1110 (230/300) P
EMS TRANSMISSION 12/27/2011
Instruction Memorandum No. 2012-044
Expires: 09/30/2013

To: All Field Officials
From: Director
Subject: BLM National Greater Sage-Grouse Land Use Planning Strategy
Program Areas: All Programs.

Purpose: This Instruction Memorandum (IM) provides direction to the Bureau of Land Management (BLM) for considering Greater Sage-Grouse conservation measures identified in the Sage-Grouse National Technical Team's - *A Report on National Greater Sage-Grouse Conservation Measures* (Attachment 1) during the land use planning process that is now underway in accordance with the 2011 *National Greater Sage-Grouse Planning Strategy* (Attachment 2).

This IM supplements direction for Greater Sage-Grouse contained in WO IM No. 2010-071 (*Gunnison and Greater Sage-Grouse Management Guidelines for Energy Development*), the BLM's 2004 *National Sage-Grouse Habitat Conservation Strategy* and is a component of the 2011 *National Greater Sage-Grouse Planning Strategy* (Attachment 2). It is also consistent with WO IM No. 2011-138 (*Sage-Grouse Conservation Related to Wildland Fire and Fuels Management*).

In March 2010, the U.S. Fish and Wildlife Service (FWS) published its decision on the petition to list the Greater Sage-Grouse as "Warranted but Precluded." 75 Fed. Reg. 13910 (March 23, 2010). Over 50 percent of the Greater Sage-Grouse habitat is located on BLM-managed lands. In its "warranted but precluded" listing decision, FWS concluded that existing regulatory mechanisms, defined as 'specific direction regarding sage-grouse habitat, conservation, or management' in the BLM's Land Use Plans (LUPs), were inadequate to protect the species. The FWS is scheduled to make a new listing decision in Fiscal Year (FY) 2015.

The BLM has 68 land use planning units which contain Greater Sage-Grouse habitat. Based on the identified threats to the Greater Sage-Grouse and the FWS timeline for making a listing decision on this species, the BLM needs to incorporate explicit objectives and desired habitat conditions, management actions, and area-wide use restrictions into LUPs by the end of FY 2014. The BLM's objective is to conserve sage-grouse and its habitat and potentially avoid an ESA listing.

In August 2011, the BLM convened the Sage-Grouse National Technical Team (NTT), which brought together resource specialists and scientists from the BLM, State Fish and Wildlife Agencies, the FWS, the Natural Resources Conservation Service (NRCS), and the U.S. Geological Survey (USGS). The NTT met in Denver, Colorado in August and September 2011, and in Phoenix, Arizona in December 2011, and developed a series of science-based conservation measures to be considered and analyzed through the land use planning process. This IM provides direction to the BLM on how to consider these conservation measures in the land use planning process.

In order to be effective in our ability to conserve Greater Sage-Grouse and their habitat, the BLM will continue to work with its partners including: the Western Association of Fish and Wildlife Agencies (WAFWA), FWS, USGS, NRCS, U.S. Forest Service (USFS), and Farm Services Agency (FSA) within the framework of the Sagebrush Memorandum of Understanding (2008) and the *Greater Sage-Grouse Comprehensive Conservation Strategy* (2006).

Policy/Action: The BLM must consider all applicable conservation measures when revising or amending its RMPs in Greater Sage Grouse habitat. The conservation measures developed by the NTT and contained in Attachment 1 must be considered and analyzed, as appropriate, through the land use planning process by all BLM State and Field Offices that contain occupied Greater Sage-Grouse habitat. While these conservation measures are range-wide in scale, it is expected that at the regional and sub-regional planning scales there may be some adjustments of these conservation measures in order to address local ecological site variability. Regardless, these conservation measures must be subjected to a hard look analysis as part of the planning and NEPA processes.

This means that a reasonable range of conservation measures must be considered in the land use planning alternatives. As appropriate, the conservation measures must be considered and incorporated into at least one alternative in the land use planning process. Records of Decision (ROD) are expected to be completed for all such plans by the end of FY 2014. This is necessary to ensure the BLM has adequate regulatory mechanisms in its land use plans for consideration by FWS as part of its anticipated 2015 listing decision.

When considering the conservation measures in Attachment 1 through the land use planning process, BLM offices should ensure that implementation of any of the measures is consistent with applicable statute and regulation. Where inconsistencies arise, BLM offices should consider the conservation measure(s) to the fullest extent consistent with such statute and regulation.

The NTT-developed conservation measures were derived from goals and objectives developed by the NTT and included in Attachment 1. These goals and objectives are a guiding philosophy that should inform the goals and objectives developed for individual land use plans. However, it is anticipated that individual plans may develop goals and objectives that differ and are specific to individual planning areas.

Through the land use planning process, the BLM will refine Preliminary Priority Habitat and Preliminary General Habitat data (defined below) to: (1) identify Priority Habitat and analyze actions within Priority Habitat Areas to conserve Greater Sage-Grouse habitat functionality, or where possible, improve habitat functionality, and (2) identify General Habitat Areas and analyze actions within General Habitat Areas that provide for major life history function (e.g., breeding, migration, or winter survival) in order to maintain genetic diversity needed for sustainable Greater Sage-Grouse populations. Any adjustments to the NTT recommended conservation measures at the local level are still expected to meet the criteria for Priority and General Habitat Areas.

Preliminary Priority Habitat (PPH): Areas that have been identified as having the highest conservation value to maintaining sustainable Greater Sage-Grouse populations. These areas would include breeding, late brood-rearing, and winter concentration areas. These areas have been/are being identified by the BLM in coordination with respective state wildlife agencies.

Preliminary General Habitat (PGH): Areas of occupied seasonal or year-round habitat outside of priority habitat. These areas have been/are being identified by the BLM in coordination with respective state wildlife agencies.

PPH and PGH data and maps have been/are being developed by the BLM through a collaborative effort between the BLM and the respective state wildlife agency, and are stored at the National Operations Center (NOC). These science-based maps were developed using the best available data and may change as new information becomes available. Such changes would be science-based and coordinated with the state wildlife agencies so that the resulting delimitation of PPH and PGH provides for sustainable populations. In those instances where the BLM State Offices have not completed this delineation, the Breeding Bird Density maps developed by Doherty 2010[1] As LUPs are amended or revised, the BLM State Offices will be responsible for coordinating with the NOC to use the newest delineation of PPH and PGH. To access the PPH and PGH data, please use the following link: \\blm\dfs\loc\EGIS\OC\Wildlife\Transfers\GREATER_SAGE_GROUSE_GIS_DATA. will be used. The NOC will establish the process for updating files to include the latest PPH and PGH delineations for each state. This information will assist in applying the conservation measures identified in Attachment 1 below.

Timeframe: This IM is effective immediately and will remain in effect until LUPs are revised or amended by the end of FY 2014.

Budget Impact: This IM will result in additional costs for coordination, NEPA review, planning, implementation, and monitoring.

Background: Following a full status review in 2005, the FWS determined that the Greater Sage Grouse was "not warranted" for protection. Decision documents in support of that determination noted the need to continue and/or expand all efforts to conserve sage-grouse and their habitats. As a result of litigation challenging the 2005 determination, the FWS revisited the determination and concluded in March

2010 that the listing of the Greater Sage-Grouse is warranted but precluded by higher priority listing actions.

In November 2004, the BLM published the *National Sage-Grouse Habitat Conservation Strategy*. The BLM National Strategy emphasizes partnerships in conserving Greater Sage-Grouse habitat through consultation, cooperation, and communication with WAFWA, FWS, NRCS, USFS, USGS, state fish and wildlife agencies, local sage-grouse working groups, and various other public and private partners. In addition, the *Strategy* set goals and objectives, assembled guidance and resource materials, and provided comprehensive management direction for the BLM's contributions to the ongoing multi-state sage-grouse conservation effort.

In July 2011, the BLM announced its *National Greater Sage-Grouse Planning Strategy* (Attachment 2). The goal of the *Strategy* and this IM is to review existing regulatory mechanisms and to implement new or revised regulatory mechanisms through the land use planning process to conserve and restore the Greater Sage-Grouse and their habitat. The Gunnison Sage-Grouse, bi-state population in California and Nevada and the Washington State distinct population segments of the Greater Sage-Grouse will be addressed through other policies and planning efforts.

Manual/Handbook Sections Affected: None.

Coordination: This IM was coordinated with the office of National Landscape Conservation System and Community Partnership (WO-170), Assistant Director, Renewable Resources and Planning, (WO-200), Minerals and Realty Management (WO-300), Fire and Aviation (WO-400), BLM State Offices, FWS and state fish and wildlife agencies.

Contact: State Directors may direct questions or concerns to Edwin Roberson, Assistant Director, Renewable Resources and Planning (WO-200) at 202-208-4896 or edwin_roberson@blm.gov; and Michael D. Nedd, Assistant Director, Minerals and Realty Management (WO-300) at 202-208-4201 or mike_nedd@blm.gov.

Signed by: Authenticated by:
Mike Pool Ambyr Fowler
Acting, Director Division of IRM Governance, WO-560

Garfield County

February 14, 2012

Erin Dreyfuss, NEPA Coordinator
Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

RE: Garfield County participation in the preparation of the BLM Environmental Impact Statement for the Greater Sage-Grouse and its habitat

Dear Ms. Dreyfuss:

We are in receipt of the letter sent by BLM District Manager James Cagney received in January, 2012 inviting Garfield County to participate as a Cooperating Agency in the preparation of the Environmental Impact Statement for the Greater Sage-Grouse and its habitat. As you are aware, several Garfield County staff members and Commissioner Mike Samson attended the open house hosted by the BLM in the Colorado River Valley Field Office on February 2nd. The Board of County Commissioners met on February 6, 2012 and has requested to participate with the BLM as a Cooperating Agency in this effort. As such, we anticipate providing you scoping comments on or before March 23rd, 2012.

Additionally, Garfield County participated considerably with the Parachute - Piceance – Road Work Group in the creation of the ***Parachute - Piceance – Roan Greater Sage-Grouse Conservation Plan (Plan)*** which was finalized by the Colorado Division of Wildlife on April 29, 2008. This plan provides conservation strategies on habitat change, grazing, predation, energy industry and mineral development, recreation, and water project development and water management. Additionally, this Plan proposes monitoring and evaluation of conservation planning efforts. Along with Garfield County and many other public and private agencies, at least four members of the BLM staff participated in this Plan.

Based on this recently conducted significant work effort, Garfield County also requests, to the degree permitted by process, to be considered as a Coordinating Agency in the EIS scoping and review of the BLM Greater Sage-Grouse planning effort.

We look forward to receiving the updated maps from the Colorado Department and Wildlife (CPAW) as soon as they become available. Additionally, we look forward to participating in the first Cooperating Agency Meeting when that is scheduled.

Again, we appreciate the ability to work with the BLM and are available should you have any questions or comments.

Sincerely,

John Martin, Chairman
Board of County Commissioners

Cc *County Commissioner Mike Samson*
County Commissioner Tom Jankovsky
Andrew Gorgey, Garfield County Attorney & Acting County Manager
Fred A. Jarman, AICP, Director, Building & Planning Department

Garfield County

March 20, 2012

Erin Dreyfuss, NEPA Coordinator
Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

RE: Garfield County participation in the preparation of the BLM Environmental Impact Statement for the Greater Sage-Grouse and its habitat

Dear Ms. Dreyfuss:

Garfield County appreciates being provided an opportunity to participate as a Cooperating Agency in the preparation of the BLM Environmental Impact Statement (EIS) for the Greater Sage-Grouse (GSG) and its habitat. In doing so, we have carefully reviewed the U.S. Fish and Wildlife Service's ***12-Month Findings for Petitions to List the Greater Sage-Grouse*** (USFWS 2010), ***Instruction Memorandum No. 2012-044, The Report on National Greater Sage-Grouse Conservation Measures*** dated 12/21/11 (the "GSGCM" report), and ***The BLM National Greater Sage-Grouse Planning Strategy*** dated 08/22/11. In addition and in support of our comments, we have also reviewed relevant portions of the ***Parachute-Piceance-Roan Greater Sage-Grouse Conservation Plan*** prepared by the Colorado Parks and Wildlife (CPW) on April 29, 2008, as well as the referenced scientific literature presented in these reports- particularly the articles referenced in the GSGCM report. We have also enlisted the assistance of Rocky Mountain Ecological Services, Inc. and BBC Research in the preparation of our comments.

As a general and introductory comment, Garfield County (the County) agrees with and appreciates the desire by the BLM to ensure the continued persistence of greater sage-grouse and aid in the recovery of the species; however, the County cannot support the approach the BLM is suggesting in the GSGCM report, and further questions the purpose and need for another lengthy NEPA process, when there are already regulatory mechanisms and extensive sage-grouse protection and management plans in place for the appropriate management and

assurances for persistence and recovery of the species. After reviewing the GSGCM report and supporting literature, we believe that the GSGCM report's recommended conservation measures exclude a balancing of resources and preempts existing permitted activities by state or local government(s), and would have significant undue hardships on private landowners and other key stakeholders including energy companies, which are vital for our local economies. While we understand the goals of protecting and restoring sage-grouse habitats, the Conservation Measures would be an extreme hardship on our constituents, and appears to exclude other viable alternatives to habitat management and goes beyond what the cited scientific literature has indicated as necessary for the continued existence of a health population of this species.

Further, with existing NEPA requirements for any action on federal lands or for projects with a federal nexus, there are already guidance documents and required review by the US Fish and Wildlife Service, as well as Colorado Parks and Wildlife for projects which may impact sage-grouse. Introducing additional lengthy planning and uncertainty to our constituents at this time is unfair and will cause negative impacts to industry, our economies, and our ability to utilize the public and private resources within Garfield County and northwestern Colorado.

Ultimately, Garfield County is concerned with the very restrictive approach suggested in the GSGCM Report because it seems to ignore the multiple use principles required in the BLMs' own Mission Statement restated here:

> ***It is the mission of the BLM, an agency of the department of the Interior, to manage BLM-administered lands and resources in a manner that best serves the needs of the American people. Management is based upon the principles of multiple use and sustained yield taking into account the long-term needs of future generations for renewable and nonrenewable resources.***

Primary and General Sage-Grouse Habitat in Garfield County

In reviewing CPW mapped preliminary priority greater sage-grouse habitat within Garfield County, habitats are limited to a combination of public (BLM) and private lands on mesa tops of the western Roan Plateau, and southern end of the Piceance Basin. As the BLM is aware, this area also contains vitally important natural gas and shale reserves, important enough for much of this area to once be part of the Naval Oil Shale Reserve. The total 148,858 acres of CPW mapped Preliminary Priority Habitat in Garfield County includes 24,821 acres of BLM managed lands and 123,718 acres of private lands, which ends up being a total of 8% of the land base within the County. Approximately 63% of the County is already under the management of the public trust (including the State of Colorado, US Forest Service, and the BLM), and the 123,718

acres of preliminary primary habitats on private lands ends up being a very significant 18% of all private lands within the County (see **Table 1** below, and **Figures** at end of the document). When including mapped General Habitat, there could be additional impacts to 23% of all private lands in the County for sage-grouse management.

Table 1: Sage Grouse Habitats in Garfield County

Land Status Impacts	County Total		Priority Habitat		General Habitat		Total Habitat	
	Acres	*%*	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*
Private Lands	699,255.4	36.9%	123,718.2	18%	35,563.0	5%	**159,281.4**	**23%**
Federal Public Lands	1,179,108.7	62.3%	24,821.3	2%	36,548.4	3%	**61,369.7**	**5%**
State Lands	15,100.4	0.8%	318.0	2%		0%	**318.0**	**2%**
Total	**1,893,464.5**		**148,857.5**	8%	**72,111.4**	4%	**220,969.1**	**12%**

The BLM's GSGCW report would, where a federal nexus is involved, place further limitations and conditions on the management of these public and a significant portion of private lands within the County. While the acres of Preliminary Primary Habitat occurring within Garfield County are significant at the County level, at the scale of greater sage-grouse habitats, it comprises a very small percentage of all occupied sage-grouse habitats. The USFWS currently estimates that approximately 1.6 million acres is currently occupied by greater sage-grouse in the U.S. (USFWS 2010), and while this is only 56% of estimated historically occupied habitat, the contribution of habitats in Garfield County to this species, which occurs at the extreme southern end of this species range, should also be considered when accounting for the potential significant impact to private and public land base in the County.

Review of Literature from GSGCM Report

Upon reviewing the GSGCM report, we reviewed literature cited by the report as the basis for the conservation measures. The GSGCM report suggests that only a 3% disturbance of a section be allowed in very limited circumstances at any one time, and on page 21 regarding energy development, the GSGCM report's Conservation Measures present that the exclusion of mineral development and other disturbances from priority habitats is needed where possible and that agencies should limit them as much as possible in other areas (including private lands). The same section also states that *a 4-mile NSO* [no surface occupancy] *likely would not be practical given most leases are not large enough to accommodate a buffer of this size, and lek spacing within priority habitats is such that lek-based buffers may overlap and preclude all development* (emphasis added).

It further states that 4-mile buffers around leks are needed to ensure the continued persistence of the greater sage-grouse. The 3% surface disturbance conservation measure equates to only 19.2 acres of disturbance in a 640-acre section, based on "professional judgment from Holloran

2005, Walker et al. 2007, Doherty et al. 2008, Doherty et al. 2011, and Naugle et al. 2011a, b" (see pg. 8 of GSGCM report). Further, the GSGCM report states that if there is already 3% surface disturbance within sage-grouse habitat, then no other uses should be allowed. The GSGCM report also indicates that if there is already more than 3% surface disturbance in sage-grouse habitats, then significant reclamation activities and mitigations should take place. However, upon reviewing the scientific literature cited by the GSGCM report, we do not see where these articles support a maximum limitation of 3% surface impacts within sage grouse habitats as needed for the continued persistence of the species. We believe that while the cited scientific articles do present solid science that sage grouse are sensitive to loss of sagebrush habitats and indirect impacts from road traffic, noise, etc., the GSGCM report takes a very extreme stance that is not supported in the cited articles that effectively halting any further realistic land-use activities within sage-grouse habitat is needed to protect the species.

Also a fact that is not accounted for or disclosed in the GSGCM report, is that the literature cited to support the Conservation Measures are from studies which all took place in highly developed natural gas and CBM fields in Wyoming, where in many cases the density of well pads was often near 15 pads per section (40 acre spacing), and that the studies took place in areas that also had other significant surface impacts (e.g., water evaporation ponds, roads, pipelines, compressor stations and gas plants, as well as infill projects; e.g., Jonah Field (I & II), Pinedale Anticline, Powder River Basin, Continental Divide-Crestone project, etc.). We feel that while these studies may be applicable for sage-grouse direct and indirect impacts adjacent to high density gas field development in Wyoming, it is not accurate or appropriate to reference the types of impacts seen in some of the highest density gas fields in the U.S. and apply conservation measures arbitrarily and equally to all habitats in all States and Counties.

We interpreted the results presented in these articles as indicating that within 0.25 to 1.5 miles of very intensive natural gas/CBM field development there are significant decreases in sage-grouse habitat utilization, and that the further habitats are from intensive land use activities, the less impact there is. But we again contend that the results of these studies do not indicate that 4 mile buffers are warranted for the protection of the species, and that the GSGCM report, while referencing these studies as its scientific basis, does not accurately reflect the facts presented in the studies, and if anything presents a biased interpretation of the results. The GSGCM report's Conservation Measures appear to only consider the needs sage-grouse in remaining habitats in Wyoming, and does not accurately account for or respect the ongoing uses, needs, of other permitted uses of public, and more importantly, of private lands. While the long-term protection of greater sage-grouse is also important to the County, we believe that more balance and a more realistic land use management process is needed and should be incorporated into any management planning efforts.

The County further questions the viability of restricting access to leased or unleased federal fluid mineral estate by helicopter-portable drilling methods in priority habitat areas without the ability to transport the gas to market. This is especially challenging when there may already be seasonal timing restrictions are already in place. "Alternative B" on Page 22 of the National SGS Report appears to be more reasonable as it provides an opportunity for energy development to occur so long appropriate mitigation measures are also being pursued. The County recommends that the EIS contain an alternative that is consistent with this approach rather than a complete NSO alternative with very limited (3%) disturbance rules.

Table 2: Impacts to Leased Acreages in Garfield County

Lease Impacts	County Total		Priority Habitat		General Habitat		Total Habitat	
	Acres	*%*	*Acres*	*%*	*Acres*	*%*	*Acres*	*%*
Authorized	212,946.0	35.8%	22,017.1	10%	8,235.9	4%	**30,253.0**	**14%**
Authorized/Held by Production	327,176.5	55.1%	17,932.6	5%	16,861.7	5%	**34,794.4**	**11%**
Pending Authorization	54,156.5	9.1%		0%	29,170.2	54%	**29,170.2**	**54%**
Total	**594,279.0**		**39,949.7**	7%	**54,267.8**	9%	**94,217.6**	**16%**

Historic Context Regarding Predation and Other Population Factors

In preparing the EIS, the County recommends the BLM examine the historic and current impact of predation and natural low recruitment on the overall numbers of the sage-grouse as these impacts and how management can help these other factors is lacking in the GSGCM report. It has been suggested that as the United States federal policy changed over time from the early 1970's, certain tools were eliminated that were used to control certain predator populations such as coyotes, and habitat improvement project are now under-funded. It has also been suggested that because of these policy changes the SGS population numbers in the United States significantly decreased (as documented in research conducted by John W. Connelly, recognized sage-grouse biologist with the Idaho Department of Fish and Game, Blackfoot, ID) because the predators were no longer heavily controlled and other factors have negatively impacted habitats. This research suggests that the high population numbers reported in the late 1960s (showing approximately 350% of the 2003 population according to Connelly) were the result of significant predator control and that the normal population numbers were likely much less. In other words, the EIS should carefully review and present research that examines the rise and fall of the GSG populations with the rise and fall of predator control policy and habitat improvement/management to place realistic population numbers and other population control factors into context, and not solely place the burden of protecting sage-grouse on the energy industry.

Range Management / Grazing

Range Management or Grazing (domestic livestock and wild ungulate) is a very important component of Garfield County's traditional ranching heritage and wildlife herd management which requires working together with our public lands. In preparation of the EIS, Garfield County recommends the BLM work closely with the Cattleman's Association and the Wool Growers Association for both Colorado and other states which are also affected by the EIS to gain their valuable input into this process.

Appropriately, the GSGCM report does not apply, nor does Garfield County suggest, the 4-mile 'no surface occupancy' and a maximum 3% disturbance approaches that would effectively prohibit existing grazing on established allotments. Garfield County supports the approach provided in the ***Parachute-Piceance-Roan Greater Sage-Grouse Conservation Plan*** for the appropriate management of domestic livestock and wild ungulates. In doing so, the EIS should carefully consider and potentially implement the following goals:

1) Continue to foster a sustainable and economically viable ranching community while also providing high-quality sage-grouse habitat; and

2) In conjunction with sustainable livestock interests and sport hunting industries, ensure that grazing by other ungulates is not adversely affecting sage-grouse habitats.

In drafting the alternatives for the EIS, the BLM should also work closely with the Colorado Parks and Wildlife to understand and not conflict with their management approach that currently allows a limited annual harvest of the GSG in specific hunting units in northwest Colorado with the purchase of a small game license.

Socio-economic Impact

It is understood the National SGS Report is not intended to address the socio-economic impact of the prohibitions / conservation measures it suggests such as the 4-mile NSO buffer and 3% disturbance limit. The County strongly recommends the BLM carefully consider the structure of the EIS such that it contains a section devoted to a credible analysis of current and likely future conditions in the region's energy extraction industry. More to the point, Garfield County challenges the apparent approach the BLM is taking in the GSGCM report to increase its regulatory controls over the oil and gas industry and other development which will have the adverse effect of reducing employment and further eroding the County's economic base; to the contrary, Garfield County believes the BLM should be a leader in encouraging responsible multiple use and resource development opportunities to stimulate economic growth which is vital to our economy and that of northwest Colorado.

This EIS should document and consider the dramatic economic changes that have transformed the region's economy in recent years. Garfield County has experienced a pronounced downturn in economic activity, which has significantly altered the economic relationships between activities on public lands and the local economy. These changes, evident now for more than three years, must be more accurately characterized and more reasonably considered in all of the proposed management alternatives that are to be presented in the EIS. In recent years, the economics of natural gas permitting, production and compliance have changed, dramatically leaving Garfield County producers competitively disadvantaged and very sensitive to cost of production changes. The EIS needs to include a contemporary and accurate socio-economic analysis that acknowledges this industry reality.

Garfield County's concerns, more simply put, are that BLM's potential implementation of Conservation Measures from the GSGCM report are not warranted in Colorado, and such an approach would result in a virtual moratorium on energy development severely impacting the economy of the County and northwest Colorado, further exacerbating an already economically depressed and challenged area.

Table 3: Impacts to Lease Sections in Garfield County

Section Impacts	Priority Habitat		General Habitat		Total Habitat	
	Count	*Acres*	*Count*	*Acres*	*Count*	*Acres*
Section - Unoccupied by Well	199	86,072.1	114	48,448.4	**313**	**134,520.5**
Section - Occupied by Well	164	77,914.3	33	8,534.0	**197**	**86,448.3**
Total	**363**	**163,986.4**	**147**	**56,982.4**	**510**	**220,968.8**

Table 4: Impacts to Leased Aliquots in Garfield County

Aliquot Impacts	Priority Habitat		General Habitat		Total Habitat	
	Count	*Acres*	*Count*	*Acres*	*Count*	*Acres*
Aliquot - Unoccupied by Well	5,007	144,845.7	1,978	62,454.2	**6,985**	**207,299.9**
Aliquot - Occupied by Well	289	11,268.0	76	2,401.0	**365**	**13,669.0**
Total	**5,296**	**156,113.7**	**2,054**	**64,855.2**	**7,350**	**220,968.9**

The Parachute-Piceance-Roan Greater Sage-Grouse Conservation Plan

The BLM, Garfield County and approximately 40 - 50 other stakeholders, including federal, state and local agencies / governments, private land owners, environmental interest groups, and energy companies, participated for nearly three years (2005 to 2008) in an intensive workgroup facilitated by the CPW to write the ***Parachute-Piceance–Roan Greater Sage-Grouse Conservation Plan*** prepared by Colorado Parks and Wildlife (CPW) on April 29, 2008 ***(the CPW Conservation Plan)*** with the following purpose:

This diverse workgroup produced comprehensive conservation strategies that include Goals, Objectives and Actions as well provided a framework as to which agencies were responsible for them and when they would occur. These strategies focused on key areas including data availability, habitat change, grazing, predation, energy industry and mineral development, recreation, and water project development and water management. The BLM as a key and active participant, among other partners, was tasked with a variety of actions in all of these conservation strategies. The County finds these strategies to be a more realistic in managing sage-grouse in the Parachute Creek, Piceance Creek, and Roan Creek areas than the approach taken in the GSGCM report and suggests the BLM use this as the basis for their approach, or at least assesses this plan as a viable Alternative in any NEPA process. Garfield County contends that it is not necessary, prudent, or financially responsible to insert a new study or plan from Wyoming for what has already recently been completed for a specific area.

To establish a process and framework that will guide management efforts directed at improving GSG habitat and increasing numbers of GSG in the Parachute Creek / Piceance Creek / Roan Creek area.(Map to the right.)

Figure 1. Location Map, Parachute-Piceance-Roan Area

The County recommends the BLM to continue supporting the primary goal it has already agreed to implement in the CPW Conservation Plan which is to ***"Maintain a viable population for GSG while developing energy & mineral resources"*** which is to be implemented by actions such as

"Investigate opportunities and provide incentives to promote cluster development in key GSG habitats. Cluster the development of roads, pipelines, electric lines, and other facilities, and use existing, combined corridors where possible." (See page 87 to 93 in the CPW Conservation Plan for the comprehensive set of goals, objectives, and actions relating to the energy industry and mineral development.)

A very common concern from industry and private land owners in northwest Colorado is not the need or requirement to protect the environment, but is the repeated changes in regulatory guidance and unknown potential impacts from long, drawn-out environmental planning processes. Because of this, Garfield County has seen many operators and private markets/investors hold off or postpone projects and investments in capital and hiring of employees given the length of time and uncertainties given NEPA processes and almost inevitable litigation. Additionally, during our review of the greater sage-grouse issue for this scoping effort, we were quite surprised at the amount of literature and planning documents all recently completed for this species, and we again raise the concern over repetitive planning processes which introduce uncertainty to our constituents and industry. To briefly review the guidance documents which are all designed to provide a "management plan" for the public and industry to plan around, we have observed and reviewed the following:

1. A Report on National Greater Sage-Grouse Conservation Measures (BLM 2011)
2. Colorado greater sage-grouse conservation plan (CPW, 2008)
3. Conservation assessment of greater sage-grouse and sagebrush habitats (Western Association of Fish and Wildlife Agencies, 2004).
4. Conservation of Greater Sage-Grouse on Public Lands in the Western U.S. Implications of Recovery and Management Policies (Policy Analysis Center for Western Public Lands, 2002)
5. Greater sage-grouse comprehensive strategy (WAFWA, 2006)
6. Greater Sage-Grouse Conservation Plan: Parachute-Piceance-Roan (BLM, CPW and others 2008)
7. Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats (2011)
8. Guidelines to manage sage-grouse populations and their habitats (Connelly et al. 2000)
9. National Sage-Grouse Habitat Conservation Strategy (BLM 2004)
10. US Fish and Wildlife Service 12 Month Findings for Petitions to List the Greater Sage-Grouse (2010)

These reports are in addition to the volumes of scientific articles on sage-grouse ecology, indeed sage-grouse is likely one of the more studied species, and there is a large amount of

scientific literature available. Garfield County contends that there are already existing and approved plans for greater sage-grouse within northwest Colorado, and having the public, industry and cooperating agencies enter into yet again another "planning effort" immediately on the heels of recently completed planning efforts is an undue burden on already taxed public resources, and will again provide another reason for industry and private enterprise to seek other areas for doing business.

We sincerely appreciate the ability to work with the BLM in their scoping process for the EIS. In addition to our comments, Garfield County, as a Cooperating Agency, requests additional 60 days be granted by the BLM to compose any further comments since the mapping of the Priority and General Habitat by the Colorado Parks and Wildlife was not made available to us for review until March 13, 2012 which is only 11 days prior to the deadline for comments. Please do not hesitate to contact us should you have any questions or comments.

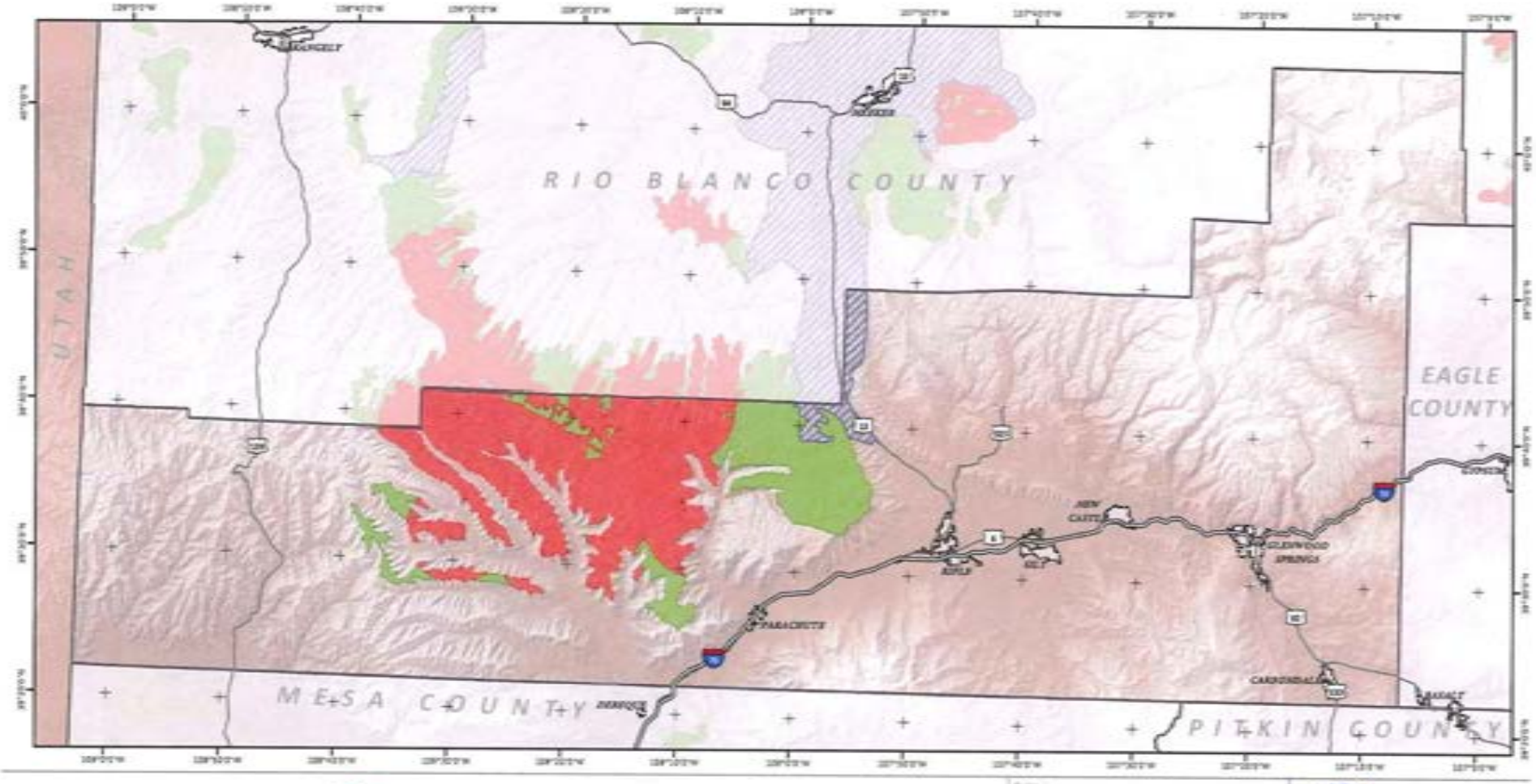
Sincerely,

John Martin, Chairman
Board of County Commissioners

Mike Samson, Commissioner
Board of County Commissioners

Tom Jankovsky, Commissioner
Board of County Commissioners

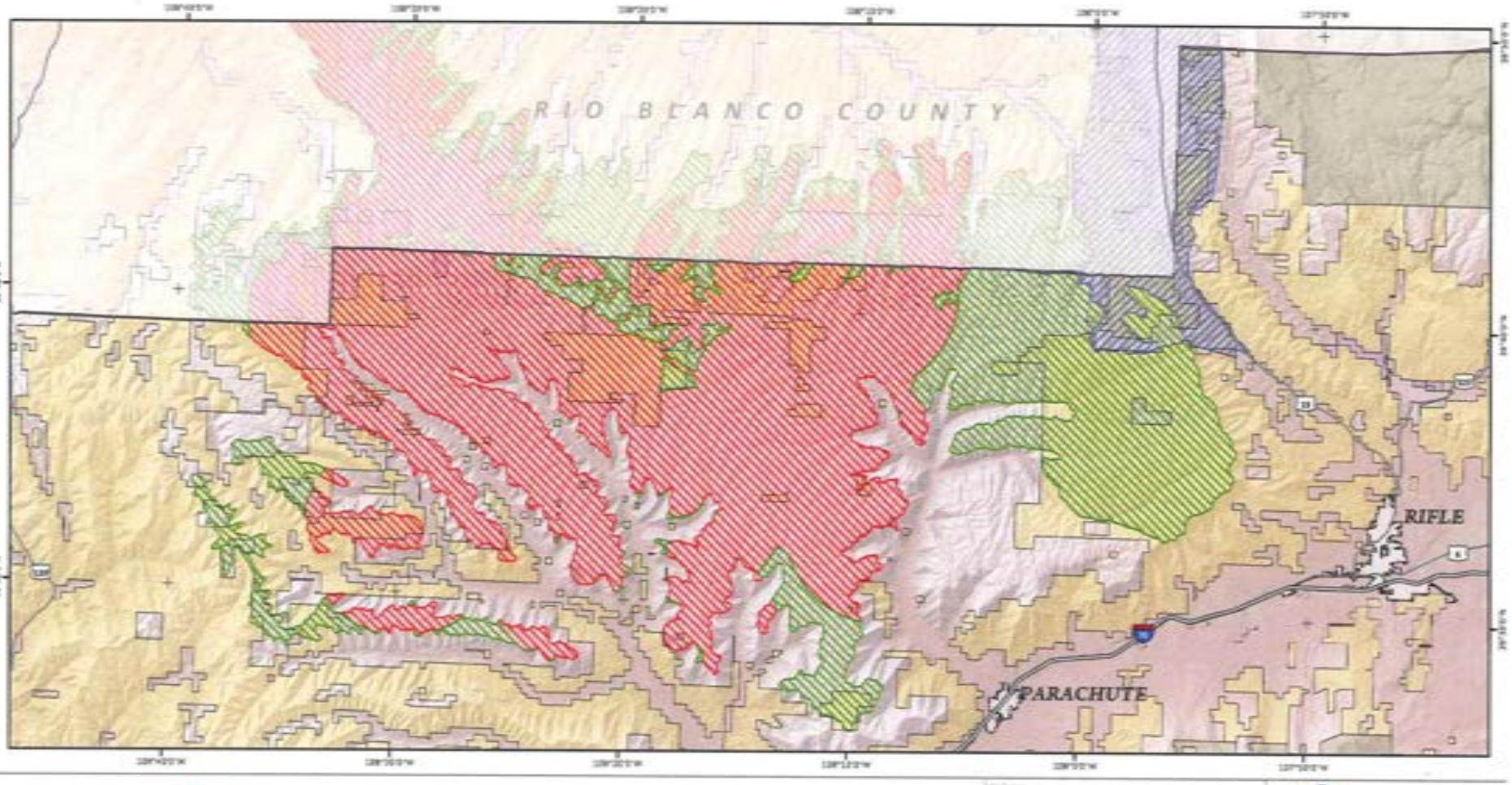
CC: Andrew Gorgey, Garfield County Attorney & Acting County Manager
Fred A. Jarman, AICP, Director, Building & Planning Department



Garfield County

Figure X

Preliminary Habitats for Greater Sage Grouse



Preliminary Priority Habitat
Preliminary General Habitat
Linkage Area

Private Lands
BLM Lands
USFS Lands

Municipal Boundary
County Boundary
Interstate
State Highway

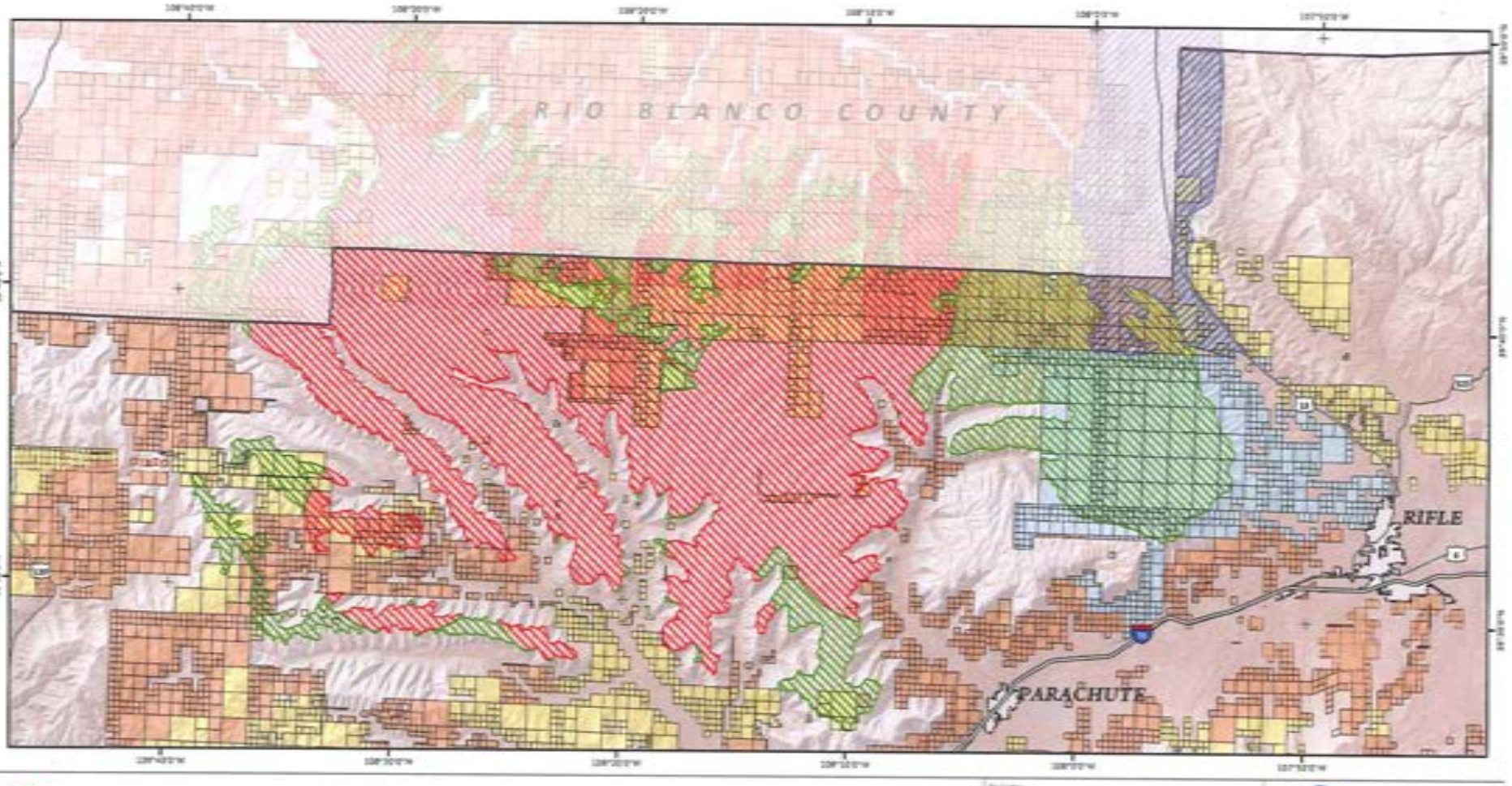
PENDO Solutions

Garfield County

Figure X

Preliminary Habitats for Greater Sage Grouse

Affected Landownership



Preliminary Priority Habitat
Preliminary General Habitat
Linkage Area
Authorized Lease, Held by Production
Authorized Lease
Pending Lease
Municipal Boundary
County Boundary
Interstate
State Highway

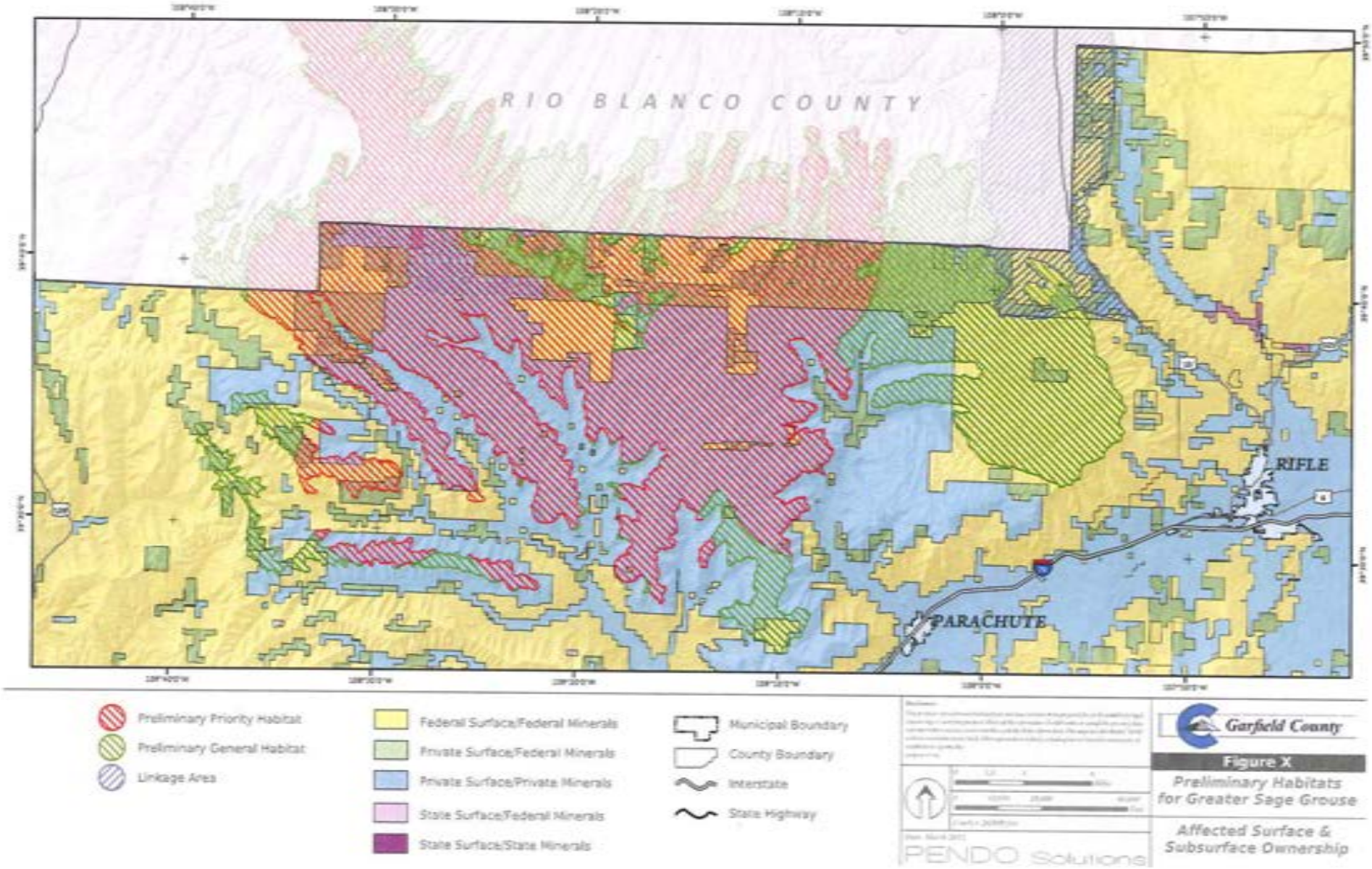
PENDO Solutions

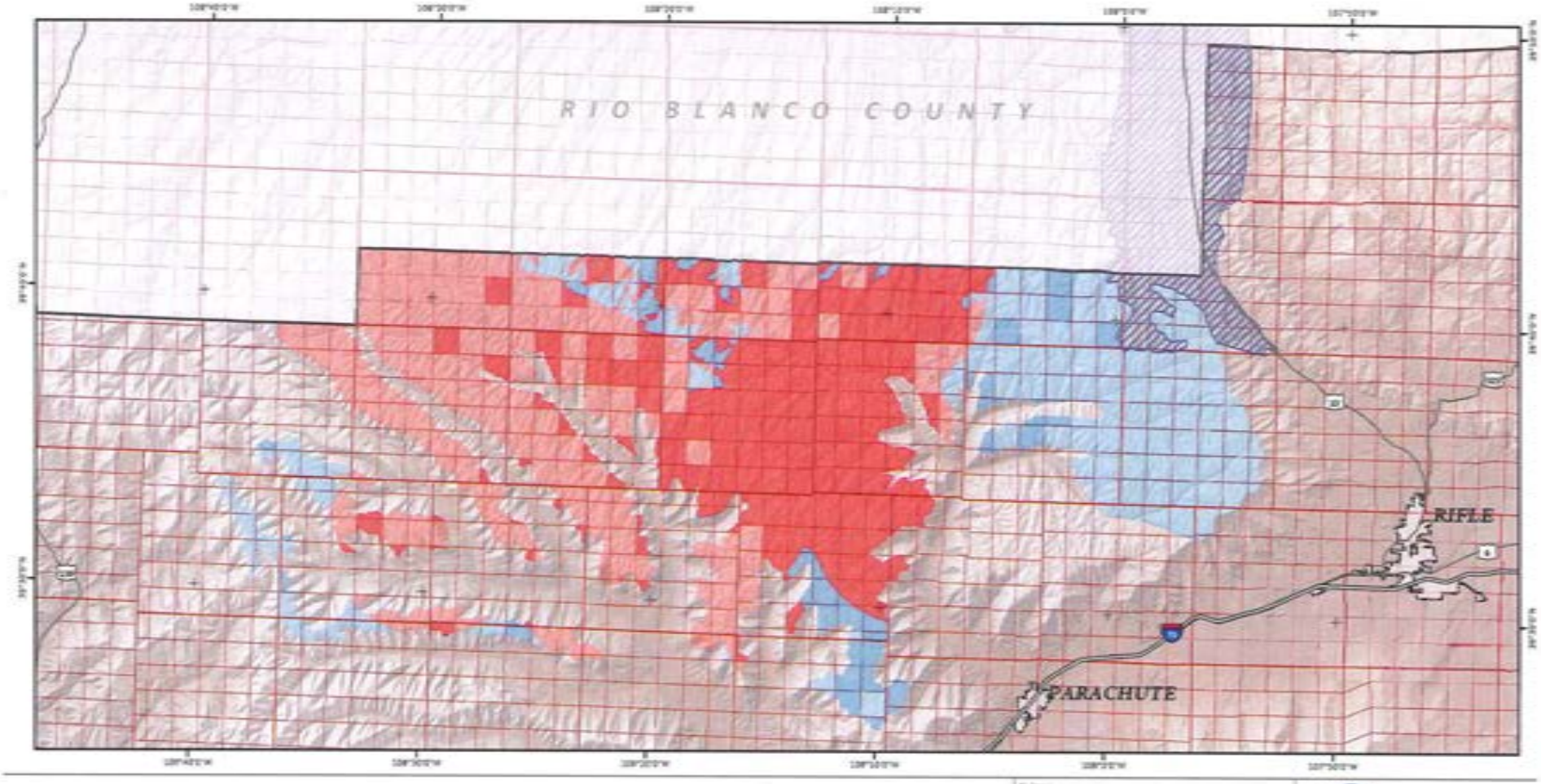
Garfield County

Figure X

Preliminary Habitats for Greater Sage Grouse

Affected Natural Gas Leases


RIO BLANCO COUNTY
RIFLE
PARACHUTE
Preliminary Priority Habitat
Preliminary General Habitat
Linkage Area
Federal Surface/Federal Minerals
Private Surface/Federal Minerals
Private Surface/Private Minerals
State Surface/Federal Minerals
State Surface/State Minerals
Municipal Boundary
County Boundary
Interstate
State Highway
PENDO Solutions
Garfield County
Figure X
Preliminary Habitats for Greater Sage Grouse
Affected Surface & Subsurface Ownership



Section Impacted by PPH

Section Impacted by PPH, Occupied by Gas Well

Section Impacted by PGH

Section Impacted by PGH, Occupied by Gas Well

Municipal Boundary

County Boundary

Interstate

State Highway

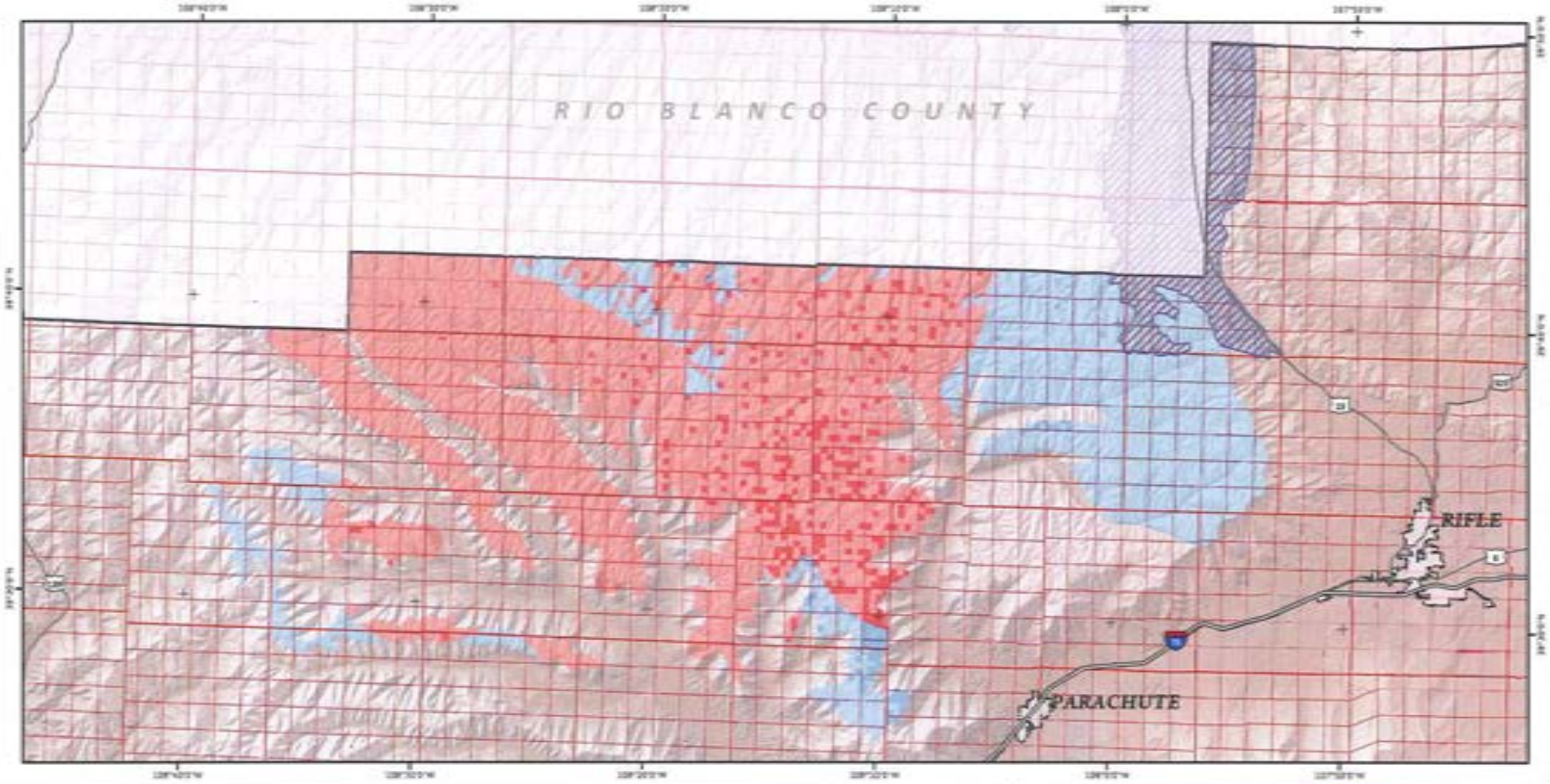
PENDO Solutions

Garfield County

Figure X

Preliminary Habitats for Greater Sage Grouse

Affected Sections



Aliquot Impacted by PPH

Aliquot Impacted by PPH, Occupied by Gas Well

Aliquot Impacted by PGH

Aliquot Impacted by PGH, Occupied by Gas Well

Municipal Boundary

County Boundary

Interstate

State Highway

PENDO Solutions

Garfield County

Figure X

Preliminary Habitats for Greater Sage Grouse

Affected Aliquots

Reception#: 820277
06/20/2012 02:33:50 PM Jean Alberico
1 of 4 Rec Fee:$0.00 Doc Fee:0.00 GARFIELD COUNTY CO

STATE OF COLORADO)
)ss.
COUNTY OF GARFIELD)

At a regular meeting of the Board of County Commissioners for Garfield County, Colorado, held at the County Administration Building in Glenwood Springs on Monday, the 18th day of June, 2012, there were present:

Tom Jankovsky ___, Commissioner
Mike Samson ___, Commissioner
John Martin ___, Commissioner Chairman
Andrew Gorgey ___, County Manager
Carey Gagnon ___, Acting County Attorney
Jean Alberico ___, Clerk to the Board

when the following proceedings, among others were had and done, to-wit:

RESOLUTION NO. 12- 51

RESOLUTION ASSERTING COORDINATION REGARDING THE GREATER SAGE GROUSE WITH ALL FEDERAL AND STATE AGENCIES MAINTAINING JURISDICTION OVER LANDS AND/OR RESOURCES LOCATED WITHIN GARFIELD COUNTY, COLORADO

WHEREAS, Garfield County, Colorado is the legal and political subdivision of the state of Colorado for which the Board of County Commissioners is authorized to act; and

WHEREAS, the Board of County Commissioners of Garfield County (BOCC) is charged with establishing comprehensive land use plans outlining present and future authorized uses for all lands and resources situated within the County; and

WHEREAS, the Colorado legislature has stated that "[e]ach local government within its respective jurisdiction has the authority to plan for and regulate the use of land by . . . protecting lands from activities which would cause immediate or foreseeable material danger to significant wildlife habitat and would endanger a wildlife species…regulating the use of land on the basis of the impact thereof on the community or surrounding areas . . . (and) planning for and regulating the use of land so as to provide planned and orderly use of land and protection of the environment in a manner consistent with constitutional rights." C.R.S. § 29-20-104(1)(b), (g) and (h); and

WHEREAS, the BOCC is engaged in the land use planning process for future land uses to serve the welfare of all the citizens of Garfield County; and

WHEREAS, approximately 60% of the land in Garfield County is federally owned, with the Bureau of Land Management comprising the largest holding of 608,486 acres; and

WHEREAS, the citizens of Garfield County historically earn their livelihood from activities reliant upon the land and natural resources within the county making such activities critical to the economy of the County; and

ok

4

WHEREAS, the economic base and stability of Garfield County is largely dependent upon energy development, tourism, ranching and farming, activities that depend on the continued multiple use of the federal lands as mandated and provided for by Congress at 43 U.S. § 1701(a)(7) and (12); and

WHEREAS, Garfield County will be irreparably harmed if federal and state agencies fail to: 1) inform the BOCC of all pending or proposed actions affecting local communities and citizens within Garfield County and; 2) coordinate with the BOCC in the planning and implementation of those actions; and

WHEREAS, coordination of planning and management actions is mandated by federal laws governing land management, including the Federal Land Policy and Management Act (FLPMA), 43 U.S.C. § 1701 *et seq.* Specifically at 43 U.S.C. § 1712, regarding coordination with a county engaging in the land use planning process, FLPMA requires that the "Secretary of the Interior shall . . . . coordinate the land use inventory, planning, and management activities . . . with the land use planning, and management programs of other federal departments and agencies and of the state and local governments within which the lands are located;" and

WHEREAS, the coordination requirements of Section 1712 of FLPMA provide for special involvement by government officials who are engaged in the land use planning process; and

WHEREAS, FLPMA, at section 1712, also provides that the "Secretary shall ...assist in resolving, to the extent practical, inconsistencies between federal and non-federal government plans" and gives preference to those counties which are engaging in the planning process over the general public, special interest groups of citizens, and even counties not engaging in a land use planning program; and

WHEREAS, the requirement that the Secretary "coordinate" land use inventory, planning, and management activities with local governments, and resolve inconsistencies implies that the resolution process take place at the beginning of the planning cycle and during the planning cycle instead of at the end of the planning cycle when the draft federal plan or proposed action is released for public review; and

WHEREAS, the Bureau of Land Management regulations provide that "in addition to the public involvement" the BLM must assure "coordination" with local government and sets forth the specific elements of coordination (*see* 43 C.F.R. § 1610.3-1); and

WHEREAS, the National Environmental Policy Act of 1969 ("NEPA"), 42 U.S.C. § 4321 *et seq.* mandates the "coordination" process with Garfield County. 42 U.S.C. § 4331 provides that the "continuing policy of Federal government" is to enter into "cooperation with State and local governments." Congress provides that in carrying out this national policy of "cooperation" the agencies shall "coordinate" with state and local governments: "it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources;" and

WHEREAS, NEPA also requires that the federal agency study, develop and describe appropriate alternatives for any proposal which involves unresolved conflicts concerning alternative uses of available resources (42 U.S.C. § 4332(E)); and

WHEREAS, the Council on Environmental Quality (CEQ) regulations (40 C.F.R. § 1501(c)) implementing NEPA require federal agencies to discuss any inconsistency of a proposed action with state and local plans or policies and, where an inconsistency exists, describe how the agency will reconcile its position with the state or local plan's position; and

WHEREAS, the Endangered Species Act (ESA) requires that the Secretary of Interior shall not make any determinations until "after taking into account those efforts, if any, being made by … any political subdivision of a State … to protect such species, whether by predator control, protection of habitat and food supply, or other conservation practices, within any area under its jurisdiction" (16 U.S.C. § 1531(c)(2)); and

WHEREAS, Garfield County is a signatory to, and has been actively involved in developing the Parachute-Piceance-Roan Greater Sage-Grouse Plan.

NOW, THEREFORE, BE IT RESOLVED by the Board of County Commissioners of Garfield County, State of Colorado, as follows:

1. That the Garfield County Board of County Commissioners does hereby assert legal standing to coordinate regarding the Greater Sage Grouse with all federal and state agencies maintaining jurisdiction of lands and/or resources located within Garfield County, Colorado.

DATED this 18th day of June, 2012.

ATTEST:

GARFIELD COUNTY SEAL COLORADO

BOARD OF COUNTY COMMISSIONERS OF GARFIELD COUNTY, STATE OF COLORADO

Jean M Alberico
Clerk to the Board

By: _____
Chairperson

Upon motion duly made and seconded the foregoing Resolution was adopted by the following vote:

Tom Jankovsky - Aye
Mike Samson - Aye
John Martin - Aye
Commissioners

Reception#: 820277
06/29/2012 02:33:50 PM Jean Alberico
4 of 4 Rec Fee $0.00 Doc Fee:0.00 GARFIELD COUNTY CO

STATE OF COLORADO)
) ss.
COUNTY OF GARFIELD)

I, Jean Alberico, County Clerk and ex-officio Clerk of the Board of County Commissioners in and for the County and State aforesaid do hereby certify that the annexed and foregoing Resolution is truly copied from the Records of the Proceedings of the Board of County Commissioners for said Garfield County, now in my office.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said County, at Glenwood Springs, this ___ day of ___ ____, A.D. 20__.

County Clerk and ex-officio Clerk of
the Board of County Commissioners

Garfield County

June 18, 2012

Helen Hankins
Colorado State Director
Bureau of Land Management
2850 Youngfield Street
Lakewood, Colorado 80215-7093

Re: BLM's Greater Sage-Grouse Environmental Impact Statement

Dear Director Hankins,

The continued viability of the greater sage-grouse in Garfield County is of critical concern to our county as is reflected in our policies. I'm certain you are aware we have been actively involved in developing the Parachute – Piceance - Roan Plan administered by the Colorado Department of Wildlife and continue to support this approach. It has proven to be an effective conservation plan that appropriately balances mitigation, additional study, and monitoring to gage results and adjust conservation measures for the benefit of the greater sage-grouse.

Most importantly, the plan was developed from a local perspective. Each solution is based on the uniqueness of our local climate, ecology, geology, habitat characteristics, productive uses and species diversity. Your agency is a participant in the plan and has committed to support these conservation measures.

The Bureau of Land Management (BLM) holds 615,973 acres of land in our county making every management decision made by the BLM important to our future and that of the greater sage-grouse. We were pleased by your agency's announcement in the Federal Register on December 9, 2011 (FR Vol. 76, No. 237) that the BLM would be preparing an Environmental Impact Study to officially incorporate greater sage-grouse conservation measures into your land use and management plans.

Such a step by your agency is a necessary one to ensure and enhance the sage grouse habitat in ways that are compatible with existing and future land uses. We were also pleased that this same notice affirmed that you would be preparing this plan in coordination with Garfield County:

> *"The BLM and FS will coordinate and communicate with State, local, and tribal governments to insure that the BLM and FS consider provisions of pertinent plans, seek to resolve inconsistencies between State, local and tribal plans, and provide ample opportunities for state, local and tribal governments to comment on the development of amendments or revisions." (FR page 77011)*

Coordination between your agency and our county's planning efforts can result, and should result, in an effective approach that incorporates management of the federal lands with conservation goals of private, county and state landowners for the benefit of the sage-grouse. Coordination will also provide the opportunity for us to be meaningfully involved in the process to point out any inconsistencies between our positions early in the process so that potential conflicts can be avoided.

As you may recall, Garfield County requested the ability to participate in a coordination process in our letter to the BLM on February 14, 2012; the request is excerpted here from that letter (attached):

> **Based on this recently conducted significant work effort, Garfield County also requests, to the degree permitted by process, to be considered as a Coordinating Agency in the EIS scoping and review of the BLM Greater Sage-Grouse planning effort.**

In addition to our role as a Cooperating Agency, we have adopted the coordination resolution (attached) requiring the BLM to coordinate with Garfield County regarding the Sage Grouse NEPA study to ensure that our local plans and policies of Garfield County (such as the ***Parachute – Piceance - Roan Plan***) are being carefully considered to resolve local impacts while maintaining the ultimate goal of avoiding a listing of the species.

We have reviewed the coordination requirement set forth by Congress at 42 USC 1712 and agree that the process outlined in the statute in addition to your Agency's regulations is an appropriate path for us to move forward so that a localized solution is developed in your environmental study.

Accordingly, we request our first coordination meeting to take place prior to your scoping period closing. We have set aside the morning of July 17, 2012 for this meeting.

We look forward to this meeting and the opportunity to coordinate our plans. Please contact Commissioner Tom Jankovsky by email at tjankovsky@garfield-county.com or by telephone at

970-945-5004 to confirm the suggested meeting date above, or to arrange for an alternative date if conflicts with other priorities.

Very truly yours,

John Martin, Chairman
Board of County Commissioners

Tom Jankovsky, Commissioner
Board of County Commissioners

Mike Samson, Commissioner
Board of County Commissioners

Enclosure(s): *Garfield County Coordination Resolution*
February 14, 2012 letter to BLM

Cc: *Jim Cagney*
Andrew Gorgey, Garfield County Manager
Carey Gagnon, Acting Garfield County Attorney
Fred A. Jarman, AICP, Garfield County Building & Planning Department

AUDIOTAPED BOARD OF COUNTY COMMISSIONERS
OF GARFIELD COUNTY
WORK SESSION MEETING
108 8th Street, Room 100
Glenwood Springs, Colorado

July 17, 2012
2 p.m.

Re: BLM SAGE GROUSE MEETING

1 APPEARANCES:

2 Commissioner Tom Jankowsky

3 Commissioner John Martin - Chairman

4 Commissioner Mike Samson

5

6 David Boyd, Public Affairs

7 Jim Cagney, District Manager

8 Drew Gorgey, Garfield County Manager

9 Fred Jarman, Planning Director

10 Margaret Byfield, Admin Consultant

11 Eric Patterson, Wildlife Biologist

12 Dan Byfield, American Stewards

13 Jeff Comstock, Natural Resources Director

14 Sean Bolton, Rio Blanco Commissioner

15 Mary Russell, resident, Glenwood Springs

16 Andy Teilelman, Glenwood Springs

17 John Stroud, press

18

19

20

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22

23

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1 CHAIRMAN MARTIN: All right. We're on
2 the air. Let's go ahead and call our work session
3 together, or is it a special meeting, Tom.
4 COMMISSIONER JANKOVSKY: No, this is a
5 work session. Well, no, this is a special meeting.
6 CHAIRMAN MARTIN: So it is a special
7 meeting, so it was noticed. We'll do roll call
8 then. We will follow the same procedure.
9 Marian, can you call roll for us, please,
10 for the record.
11 (Roll was called.)
12 CHAIRMAN MARTIN: And, also, in our
13 regular sessions, we recite the pledge of
14 allegiance, so would you please rise and
15 participate.
16 (Pledge of Allegiance was recited.)
17 (Invocation.)
18 CHAIRMAN MARTIN: We want to thank you
19 very much.
20 Now, this is a special meeting. However,
21 I don't believe any decisions are going to be asked
22 today.
23 COMMISSIONER JANKOVSKY: No, this is
24 actually -- it's a government-to-government
25 meeting, is what it is. That's why we're all at

1 the table. So we do have the coordination process
2 regarding the Greater Sage Grouse as our first
3 item.
4 I'd like to introduce everyone at the
5 head table here, I guess. So let's start.
6 MR. BOYD: I'm David Boyd. I'm public
7 affairs with BLM in northwestern Colorado.
8 MR. CAGNEY: And I am Jim Cagney. I am
9 the district manager for the Bureau of Land
10 Management that has the distinction of overseeing
11 the five field offices that have Greater Sage
12 Grouse habitat. And so I'm in charge of this
13 project.
14 CHAIRMAN MARTIN: And Drew.
15 MR. GORGEY: I'm Drew Gorgey. I'm the
16 Garfield County manager.
17 MR. JARMAN: Thank you. Fred Jarman,
18 planning director for Garfield County.
19 MS. BYFIELD: Margaret Byfield, American
20 Stewards of Liberty consultant to the Board.
21 MR. PETTERSON: My name is Eric
22 Patterson, wildlife biologist, Rocky Mountain
23 Ecological Service, and I'm a consultant to the
24 County.
25 CHAIRMAN MARTIN: Thank you. Way out in

1 the audience. I want everybody to be identified.
2 MR. BYFIELD: I'm Dan Byfield with
3 American Stewards.
4 CHAIRMAN MARTIN: Thank you, Dan.
5 MR. COMSTOCK: Jeff Comstock, natural
6 resources director for Moffat County.
7 CHAIRMAN MARTIN: Thanks for coming down,
8 too.
9 Sean?
10 MR. BOLTON: Sean Bolton, Rio Blanco
11 County Commissioner.
12 CHAIRMAN MARTIN: Thanks.
13 You folks wish to be on the record?
14 MS. RUSSELL: Sure. Mary Russell,
15 resident of Glenwood Springs.
16 CHAIRMAN MARTIN: Well, welcome.
17 MR. TEILEMAN: Andy Teilelman, resident
18 of Glenwood Springs.
19 CHAIRMAN MARTIN: And, of course, we all
20 know John. He's the press. And we have our County
21 attorney. We have our information officer and our
22 administrative assistant.
23 So, Tom, I'd like to turn it over to you.
24 I got a little jet-lagged. I left Pittsburgh this
25 morning, a little after 3 this morning, so I

1 finally got here. And that's Eastern Standard
2 Time. So take it away.
3 COMMISSIONER JANKOVSKY: Thank you,
4 Commissioner. I think the first thing -- first of
5 all, this is a government-to-government meeting.
6 It's to talk about the coordination process. I
7 believe the meeting has been published, but we are
8 not taking any public comment at this time. So
9 that's my understanding of that.
10 And I just wanted to go a little bit
11 through the coordination process, and this is what
12 you guys have given us from the BLM handbook guide
13 on cooperating agencies and also the coordinating
14 process.
15 And the first thing that came to my
16 attention, I actually received this when I was --
17 from the Colorado River District office when we
18 were looking at their EIS for their RMP, Resource
19 Management Plan. But there is a letter in here
20 from Mr. Abby, director of the Bureau of Land
21 Management, and in about the second paragraph he
22 says: Coordination is a key part of our day-to-day
23 operation to work with, communicate with and
24 partner with state, local and tribal governments as
25 we carry out our management responsibilities on

1 public land.
2 And then if you go back to page 31 in the
3 handbook, there is a -- and it's real nice because
4 it's laid out with questions, so I'm going to read
5 those questions, just maybe highlight what the
6 coordination process is.
7 The first question is: What is the scope
8 of the BLM's coordination responsibilities in
9 developing and revising RMPs and EISs? And the BLM
10 has responsibility to coordinate with other
11 government units to the extent practical. The BLM
12 will seek to maximize consistency with the plans
13 and policies of other government entities.
14 And so, you know, we're here today to
15 talk about Sage Grouse because we do have a plan,
16 which you're aware of Jim, the PPR plan, which is
17 the Parachute Piceance Roan Plan, which takes into
18 consideration the lands in Garfield County that are
19 under potential listing for Sage Grouse or where we
20 have Sage Grouse habitat.
21 And then it goes on to state that to the
22 extent consistent with laws governing and
23 administration -- and this is FLPMA 43.USC -- to
24 the extent consistent with the laws governing the
25 administration of public lands, coordinate the land

1 use inventory planning and management activities
2 for such lands with the land use planning and
3 management programs of other federal departments
4 and agencies and to the state's local governments
5 within which such lands are located.
6 Then there's just a quick little blurb in
7 here which also falls under FLPMA, but also falls
8 under a CRF for coordination, CRF for the BLM. And
9 that is the secretary shall keep apprised of state,
10 local and tribal land use plans, which we talked
11 about earlier, assure that consideration is given
12 to those plans, assist in resolving inconsistencies
13 between the federal and non-federal government
14 plans, provide meaningful involvement of local
15 governments, including early public notice, and
16 then make federal plans consistent with local
17 plans.
18 Then there's just a question in here: Is
19 there a coordinating agency status designation?
20 And it states in here: No, there is no such
21 designation as coordinating agency. It's
22 coordinating process.
23 And it also says: Is an MOU, memorandum
24 of understanding, required between a local
25 government and the BLM to define coordination? And

1 the answer to that is no.
2 Can the BLM meet its coordination
3 responsibilities through a cooperating agency
4 relationship? The BLM has a duty to coordinate
5 even if a formal CA relationship is not
6 established. And then, again, that's in
7 conjunction with FLPMA. And there are CRFs down
8 below this.
9 Does coordination under FLPMA require the
10 BLM to share pre-decisional documents? I think
11 this is very important because you are in a
12 pre-decisional stage right now and I think there
13 will be times, Jim, when you may say: I don't want
14 to discuss that because it's pre-decisional
15 possibly, but the answer to that is no.
16 To what extent is the BLM obligated to
17 follow local plans and policies? By regulation the
18 BLM has an obligation to keep apprised of non-BLM
19 plans, assure consideration is given to those plans
20 that are germane to the development of the BLM,
21 BLM's plans, assist in resolving, to the extent
22 practicable, inconsistencies between the federal
23 and non-federal plans, provide for meaningful
24 public involvement of other federal agencies,
25 state, local and tribal officials.

1 It goes on to say: When
2 inconsistencies between -- and I think this is an
3 important one for us. This is: When
4 inconsistencies between a proposed action and a
5 local plan or policy cannot be resolved, should
6 there be acknowledgement in the EIS? And the CEQ
7 regulations require that inconsistencies between
8 the proposed action and other federal, state, local
9 or tribal lands use plans and policies to be
10 documented. And those plans and policies are to be
11 documented in EIS.
12 And that's one of our reasons we're here
13 to have this meeting is because we do have a plan,
14 and we feel very strongly that we would like to
15 have that in the EIS. And then if a state or local
16 plan is inconsistent with federal law or policy, in
17 such cases the BLM does not have an obligation to
18 seek consistency.
19 And that's pretty much it from your
20 handbook, but I just wanted to kind of get those
21 things on the table.
22 CHAIRMAN MARTIN: That's the 2000 --
23 COMMISSIONER JANKOVSKY: And that is the
24 2012 handbook and it's revised and the title is
25 Desk Guide to Cooperating Agency Relationships and

1 Coordination with Intergovernmental Partners.
2 MR. GORGEY: Commissioner, I believe in
3 one point you spoke that the Bureau does not have a
4 duty to make them consistent. I believe you meant
5 to to say does have a duty to make them consistent.
6 COMMISSIONER JANKOVSKY: I can go back to
7 that, but it is -- it talks about the
8 inconsistencies. And it says: When consistencies
9 between a proposed action and a local plan or
10 policy cannot be resolved, should they be
11 acknowledged in the EIS? And the answer is: Yes,
12 the CEQ regulations require that inconsistencies
13 between the proposed action and other federal,
14 state, local or tribal land use plans and policies
15 be documented in the EIS.
16 Does that answer your question? I can
17 also go back to FLPMA, which states that: Assist
18 in resolving inconsistencies between federal and
19 non-federal government plans, or in the BLM CRF it
20 has pretty much the same wording, a system
21 resolving to the extent practical, inconsistencies
22 between federal and non-federal government plans.
23 So those are both in FLPMA and in the BLM's CRF.
24 MR. GORGEY: Thank you.
25 CHAIRMAN MARTIN: And young Mr. Boyd, you

1 know that we've done this numerous times on several
2 different items in reference to coordination and
3 cooperation. And I believe we have obtained a
4 cooperative status, is that correct, on the
5 Sage Grouse on this, Jim?
6 MR. CAGNEY: Yes.
7 CHAIRMAN MARTIN: (Inaudible). So does
8 Moffat County, Rio Blanco County. Did Jackson,
9 Grand, do you know?
10 MR. CAGNEY: Yes.
11 CHAIRMAN MARTIN: All of it. And you've
12 talked a lot about the different stages that you're
13 in now on the Sage Grouse and the different plans.
14 You brought that up in the meeting, so that's part
15 of your record on cooperating agencies in
16 reference to the different plans that are out
17 there, because I know that we have more than one in
18 the state, so...
19 MR. CAGNEY: Right, there's five. I
20 should talk about that in some detail here.
21 CHAIRMAN MARTIN: Thanks, Jim. Go ahead.
22 COMMISSIONER JANKOVSKY: I just have a
23 couple of things to finish up. You know, I want to
24 turn it over to Eric, but let Jim talk about that.
25 You know, and again, we passed a resolution as a

1 Board of County Commissioners just stating that we
2 want to go through the coordination process. And
3 Garfield County is a signatory to and has been
4 actively involved in developing the PPR, Greater
5 Sage Grouse Plan.
6 Now, therefore, be it resolved the Board
7 of County Commissioners of Garfield County,
8 Colorado as follows does hereby a certain legal
9 standing to coordinating regarding the Greater Sage
10 Grouse with all federal and state agencies. And
11 then we'd sent off a letter with this resolution to
12 Director Hankins, which you probably have seen that
13 letter.
14 And so we just we're here really to talk
15 about our plan and why we feel strongly about the
16 local plans. You know, we stated in here in our
17 letter to Director Hankins that each solution is
18 based on the uniqueness of our local client,
19 ecology, geology, habitat characteristics,
20 productive uses and species diversity. And so we
21 feel for that reason that it's important to talk
22 about our local plan.
23 You know, and to be quite honest, we feel
24 by doing this that we make the -- we help the BLM
25 with the defensibility of the EIS and the

1 obligation to accommodate local plans. And, again,
2 this is a government-to-government meeting, you
3 know, and I think there's definitely some big
4 differences between our governments because federal
5 agencies -- the authority of federal agencies is to
6 execute federal law, but it's to be balanced with
7 the duties and responsibilities of local
8 governments to protect the health, safety and
9 welfare.
10 And so it's our responsibility to protect
11 the health safety and welfare of our constituents,
12 and your responsibility is to uphold the federal
13 laws of the United States of America. But I think
14 by working together government to government, we
15 can kind of resolve some of these issues and move
16 forward. And I don't know if there are issues, but
17 I think I'd like to maybe let you speak and --
18 CHAIRMAN MARTIN: And going through this
19 process again, there are certain things that have
20 been discussed, I'm sure at the different meetings
21 you've had as Cooperating Agencies.
22 And there's a process that certain
23 information is to be absorbed, and with working
24 document, et cetera, and drafts are being done or
25 discussion or solutions being resolved that haven't

1 been resolved yet with the cooperating agency
2 status. So we don't need to bring all of those up
3 because I think the process is to work those out in
4 the meetings.
5 COMMISSIONER JANKOVSKY: That is a
6 different venue and I believe it is a different --
7 CHAIRMAN MARTIN: Okay. So we don't want
8 to get into that.
9 COMMISSIONER JANKOVSKY: That is correct.
10 That is correct. I think Jim will keep us very --
11 I would think keep our feet to the fire on that.
12 CHAIRMAN MARTIN: We wouldn't violate
13 that agreement that we have in place either, Jim.
14 MR. CAGNEY: I have to apologize. I'm
15 not sure I understood what you just said.
16 CHAIRMAN MARTIN: In other words, there
17 are certain work products that are not to be
18 divulged yet to the general public, based upon
19 science, based upon draft, based upon a work
20 product itself. That's a non-complete product. I
21 think that's still within that MOU that there are
22 certain documents that need to be finalized before
23 released.
24 MR. CAGNEY: Right.
25 CHAIRMAN MARTIN: And I just didn't want

1 to get into those, if they're not finalized. So
2 you guys steer us clear. Because we're not -- Mike
3 and I and the rest of us -- well, Tom's there,
4 biologist is there, Jeff is there, Sean's there,
5 Fred's been attending. So I just didn't want to
6 get into kind of that gray area, so keep us out of
7 that, will you?
8 MR. CAGNEY: It's easier said than done,
9 but --
10 CHAIRMAN MARTIN: Do you wish to respond
11 to anything that Tom said?
12 MR. CAGNEY: Yeah, and I don't know if
13 this is so much a response as it is to just -- I'd
14 really would appreciate the opportunity to make a
15 couple points here.
16 First of all, thank you very much for
17 putting this together. And if I have one point I'd
18 like to make it's -- I mean I'm not focused in any
19 way on what my obligations are with regard to
20 coordination with counties. I mean I would hope
21 that through the ebb and flow of that we exceed my
22 obligations and that's, you know, a nonissue.
23 And I really appreciate the work that
24 Garfield County has done to get these kinds of
25 discussions going because I can assure you that the

1 absolute last thing I want to do is try to figure
2 this out by myself. I mean I promise you that's
3 the case.
4 I would refer to the cooperating agency
5 status. And I think the core issue there, it's
6 a -- you know, it came up last time because, you
7 know, we had some press at the cooperating agency
8 meeting. And in those meetings we're empowered by,
9 you know, the Federal Land Policy and Management
10 Act to talk about what's called pre-decisional
11 information, and that's the specifics of what's in
12 the alternatives and that type of thing.
13 And that little window right there is my
14 opportunity to talk to cooperating agencies and do
15 something other than build this thing, you know, in
16 a vacuum. And, you know, the BLM, you know, we
17 have interdisciplinary teams and we think we cover
18 the bases. But, you know, any organization, you
19 know, up to and including us will just drift, you
20 know, without even knowing it, if we're just kind
21 of working by ourselves, so this is our opportunity
22 to not do that.
23 So what we do is we get a cooperating
24 agency status and that gives us a pass to divulge
25 that information. And the issue there is that

1 every has to have to same opportunity to comment,
2 whether you live in Florida or, you know, across
3 the nation.
4 And, you know, if we start chatting about
5 some things and some group says: Wait a minute,
6 you guys ran this show in such and such a manner
7 that different people had different opportunities
8 to the information earlier and then more time to
9 prepare their comments, et cetera, et cetera, then
10 they can -- you know, they can deal me some
11 heavy-handed you know bad stuff and I have to
12 prevent that.
13 So that's where we stand on that. But we
14 have to talk about this stuff so we can-- there's
15 plenty of things we can talk about without getting
16 into that.
17 CHAIRMAN MARTIN: Very good. I just
18 didn't want to follow that --
19 MR. CAGNEY: No, we're okay.
20 CHAIRMAN MARTIN: Tom?
21 COMMISSIONER JANKOVSKY: I think at this
22 point -- and i just really want to go back to
23 the -- you know, we do want to see our plan in the
24 EIS, so that's the reason we've -- you know, we've
25 asked you here. And I'll just kind of I turn it

1 over to maybe Eric, and let Eric talk a little bit
2 about the PPR plan.
3 CHAIRMAN MARTIN: Okay. I want to make
4 sure that we identify that it is an approved plan.
5 The signatures were, again, the US Fish and
6 Wildlife, BLM, Division of Wildlife, the Colorado
7 Department of Natural Resources, Rio Blanco,
8 Garfield County -- you had your own, Moffat had
9 their own -- landowners which are the private
10 landowners. There were some larger landowners,
11 smaller landowners. We had environmental groups.
12 COMMISSIONER JANKOVSKY: A number of
13 environmental groups.
14 CHAIRMAN MARTIN: I'm trying to think how
15 many other groups. Do you remember Dave, at all
16 how many were on that plan that was held down in
17 Parachute and a few other places? Can you read
18 those off because it was adopted.
19 COMMISSIONER JANKOVSKY: You want me to
20 read all of them off, because it's a long list, but
21 I'd be happy to.
22 CHAIRMAN MARTIN: And also Division of
23 Wildlife adopted it as a working plan, too, for the
24 State of Colorado on the birds. So just if you can
25 do like at least a dozen of them so we can get a

1 foundation of who was there on this working plan.
2 Then is that working plan physically available for
3 anybody that wish us to read it? Okay, we do have
4 a copy. Thank you.
5 COMMISSIONER SAMSON: What's the date on
6 that, Tom?
7 COMMISSIONER JANKOVSKY: This is a 2008
8 plan and I think Eric will discuss that.
9 CHAIRMAN MARTIN: Name a couple of those,
10 Tom, so we can get a foundation.
11 COMMISSIONER JANKOVSKY: I will give
12 maybe the first 15 or so that are on here.
13 Northwest Corporation, Mesa Land Trust, Conoco
14 Phillips, the Nature Conservancy, Grouse, Inc.,
15 Western Area Power Administration, EnCana, Bernie
16 Buescher, Colorado House of Representatives,
17 Colorado Oil and Gas Conservation, US Fish and
18 Wildlife, Rifle Citizen Telegram.
19 You know, this is working group members,
20 is who it is. They're not necessarily all -- I
21 don't know that they're all signatures. This is
22 working group members. Wilderness Society, Audubon
23 Colorado, Colorado Rural Electric Association,
24 Bureau of Land Management, so...
25 CHAIRMAN MARTIN: And it's also in the

1 index and glossary of what took place and who did
2 what.
3 COMMISSIONER JANKOVSKY: Yeah, it's work
4 group members. And then there was signature -- the
5 signature's back here, but it becomes more
6 difficult off the signature pages.
7 CHAIRMAN MARTIN: Thank you. I just
8 wanted to make sure that everybody is working off a
9 true plan that has gone through the process, what
10 we talked about before, Jim, in reference to the
11 process. And it is not an overnight process. I
12 think this was several years that we worked on this
13 plan.
14 So I'll give it to the biologist now.
15 CHAIRMAN MARTIN: Thank you for the
16 foundation.
17 MR. PETTERSEN: Well, thanks a bunch for
18 coming up here. And I think one of the things that
19 we did want to get out on the table is that from
20 what I've heard from Garfield County is that they
21 realize and understand that the most important
22 thing is to conserve Sage Grouse and Sage Grouse
23 habitat on the landscape.
24 And so in reading through the NTT report
25 and looking at the PPR plan, I think we all

1 recognize that the most important thing is to
2 maintain what habitat is left out there. That's
3 the only thing that's really going to conserve the
4 species long term.
5 In order to make sure that if the County
6 moves forward with this process of coordinating
7 with the BLM, they also want to make sure that the
8 PPR plan is going to be consistent enough with the
9 NTT report and that it's going to still meet
10 purpose and need.
11 And to that end, we just had a couple
12 questions that maybe -- I don't know if BLM can
13 answer this, this second, maybe not -- but one of
14 the things that came up is that a lot of the
15 impacts that are now facing Sage Grouse and
16 Sage Grouse habitat in Wyoming, Colorado is energy
17 development, wind power, oil and gas development.
18 And a lot of the studies in the NTT
19 report are pretty much from the Pinedale area,
20 Pinedale area, Pinedale, Pinedale Anticline, Powder
21 River Basin where -- there's a lot of development
22 up in that country. And we recognize that the NTT
23 report -- this is the best available science there
24 is in looking at what are the impacts of these kind
25 of developments on Sage Grouse and their use of

1 habitats. But we also recognize when looking at
2 that, well, hey, all these studies are coming from
3 areas that have seen a lot of development.
4 And we just wanted to make sure that we
5 understand that everyone's on the same page; that
6 is there a venue or how are we going to move
7 forward with using studies from these really highly
8 developed areas and then crosswalk that into areas
9 like Garfield County where that isn't that level of
10 development, where we're not talking, you know 16
11 pads a square mile and compressors and all that in
12 the areas where Sage Grouse occurs in Garfield
13 County.
14 So that was a concern that -- in our
15 discussions is that how are we going to make sure
16 that the -- whatever is brought forth that's going
17 to be implemented in Garfield County works with
18 Garfield County local conditions and the situations
19 that are down here.
20 And the other thing that came up, too,
21 was, you know, no more than 3 percent surface use,
22 surface occupancy in these Sage Grouse habitats.
23 We were wondering if the BLM or working with the
24 NTT team can get some feedback to the County, well,
25 where exactly did the 3 percent come from.

1 When we looked at the studies that say:
2 Well, here's the five or six studies, you know,
3 that were the basis for the 3 percent or the basis
4 for the 4-mile buffer around leks, we were
5 wondering if we can get a little bit more
6 information on how those studies were interpreted
7 to come up with the 3 percent -- you know, surface
8 use on 3 percent and the 4-mile buffer on leks.
9 And you don't have to --
10 CHAIRMAN MARTIN: That's kind of getting
11 on where I was talking about earlier. And, Jim,
12 you're going to have to steer us away if that
13 happens to be part of the working group discussion
14 that they're trying to work out. We want to make
15 sure that we don't violate our trust in that, but
16 we give our concerns.
17 UNIDENTIFIED SPEAKER: Right.
18 CHAIRMAN MARTIN: And we're not forcing
19 him to make an answer at this time, if he's
20 uncomfortable.
21 MR. PETTERSON: Right. And I think the
22 other thing, too, is that, well, you know if
23 Garfield County wants to use the PPR plan, we
24 realize that, you know, hey, there's probably going
25 to have to be some tweaks to the PPR plan, so...

1 MR. CAGNEY: Mr. Chairman, that 3
2 percent, it's in this publicly released document.
3 CHAIRMAN MARTIN: Okay.
4 MR. CAGNEY: So we're are very, very safe
5 here.
6 CHAIRMAN MARTIN: And continue.
7 MR. PETTERSON: Well, you know, that's
8 pretty much the meat of where we wanted to cut, as
9 far as the science goes, to make sure that whatever
10 Garfield County comes up with in looking at and
11 making sure that the PPR plan is going to meet that
12 purpose and need that we understand, you know,
13 fully the science behind the 3 percent and the
14 4-mile buffer because those are the real key
15 kickers in the NTT report, so...
16 CHAIRMAN MARTIN: And the identification
17 of those buffers I think has been in discussion.
18 (Inaudible). That happens to be what the slopes
19 and the different elevations, et cetera, it's not
20 all flat ground. It looks like it is on a map.
21 But you've had discussions about how the
22 slopes are there, different escarpments and
23 everything else are within those. So there's other
24 activities that take place at the base of those
25 that would not interfere with the lek.

1 I imagine that's one of those highly
2 discussed items on identification of 4-mile
3 buffers, et cetera. Am I correct?
4 MR. CAGNEY: Well, absolutely, and then
5 you can get into some additional kinds of issues
6 there that if -- when they made the priority
7 habitat map, you have to scale that in a certain
8 manner.
9 So when you complete that analysis and
10 make that map, well, there's stands of Pinion
11 Juniper, you know, that's Grouse habitat in
12 priority habitat.
13 CHAIRMAN MARTIN: Right.
14 MR. CAGNEY: So how are we going to
15 handle that when in terms of the disturbance. And
16 I've got some ideas. I don't know if they're any
17 good or not, but I've got some things I'd like to
18 chat about.
19 MR. PETTERSEN: I think we just feel
20 that, you know, with a proposal such as this with
21 the EIS, the to devil's going to be in the details.
22 And I think that we just want to make sure that
23 we've got a good understanding of where some of
24 those -- like the 3 percent 4-mile buffer is coming
25 from so that we just make sure we're doing the

1 right thing, too, so...
2 COMMISSIONER JANKOVSKY: I guess, you
3 know, if I can, maybe some of the differences in --
4 this is Appendix C in the PPR plan, which is best
5 management practices and just some of the
6 differences in this with NTT are that says consult
7 and -- and it's DOW now, which is Division of Parks
8 and Wildlife on surface occupancy within 4 miles of
9 any Greater Sage Grouse lek within suitable
10 habitat. So it's a consultation with as opposed to
11 no a no-surface occupancy.
12 And then it says: Within suitable
13 Sage Grouse habitat, avoid all surface within 6/10
14 of a mile of any Greater Sage Grouse lek between
15 March 15 and May 15. And so I mean those are just
16 fairly big differences difference between the
17 plans.
18 CHAIRMAN MARTIN: And that takes into the
19 consideration in reference to the growing season
20 for leasing, grazing and what have you and that
21 could or could not be within those particular areas
22 and that contract would be written as such. No
23 surface occupation or use during that certain
24 times. Isn't that the way it works, Dave?
25 COMMISSIONER JANKOVSKY: I think it just

1 gives us a little bit of flexibility for those
2 situations where we've seen in front of us as the
3 Board of County Commissioners where there's -- in
4 this case it was a communication tower and it was 2
5 miles from a lek, but the lek was on the top of the
6 plateau and the communication tower was 2000 feet
7 below.
8 And, you know, in that situation it's
9 probably not disturbance of that lek. And so those
10 are some of the questions we have, I guess.
11 CHAIRMAN MARTIN: And those are some of
12 the details that have to be discussed I think at
13 that meeting and then also given to the different
14 land managers and their specialties and how that
15 should apply if that 4-mile buffer is laid open
16 there. Each one of those kind of be an individual
17 issue, should we say.
18 MR. CAGNEY: I've got to smile when you
19 say "that meeting." It will be more than one
20 meeting, sir.
21 CHAIRMAN MARTIN: Oh, I know. I figure
22 the next one is going to be a discussion about
23 habitat one way or another. I know that's a
24 biggie.
25 MR. CAGNEY: So let me speak to a concern

1 that I've got because I -- you know, this is a hard
2 thing to do, you know, and I've waffled a couple
3 times pretty notably. Actually, more than you'll
4 ever know.
5 So I started out and then the original
6 instruction memorandum that I got from the Bureau
7 of Land Management was to do an environmental
8 impact statement and analyze this. That was the
9 original instruction, okay.
10 That mandate got expanded a little bit at
11 the scoping. We put that nationally, we did
12 scoping and we got more issues beyond this that
13 we're pretty much locked into having to analyze.
14 We've got lots of scoping comments and
15 that's a public document, the scoping report that
16 said: This is not enough, we need more than that.
17 Okay.
18 But before I got that news, I had set out
19 to structure this thing, saying that we would take
20 all our existing RMPs because they're pretty new
21 and the Glenwood Springs one's new, the Moffat
22 County one is new.
23 The combination of the stuff in Rio
24 Blanco County is really good stuff on Sage Grouse.
25 I mean the stuff that's already been done.

1 And the beauty of that system was that I
2 thought that, you know, that those kind of
3 documents were already captured in those existing
4 documents. And we put a lot of time into that
5 approach. There's a few BLMers that would like to
6 just to kill me because I'm just counter marching
7 them.
8 But, you know, if you took the National
9 Technical Team as one alternative and then did a
10 cross match of each of the five resource management
11 plans that we have to match it up with, if you
12 looked at any one of them, you know, it was
13 reasonable.
14 I mean there's some mismatched issues
15 there because resource management plans tend to
16 discuss site-specific locations, et cetera,
17 et cetera. But it was okay. But if you took all
18 five of them and put them together, then you ended
19 up with an inch of indecipherable complexity.
20 And I had people saying: Jim, you've got
21 to give this up. I mean this is not going to be
22 defensible. The judge is going to look at that and
23 he's going to say: I don't know what this says,
24 take it away, you know. And I had to give into
25 that.

1 So, you know, just getting close to the
2 edge of the alternative. So we've got the NTT and
3 no action, everybody's got a no action, and then
4 we've got a scoping requirement to do something
5 which, you know, you can call that -- that's a
6 citizen's alternative.
7 And certainly if we've not learned
8 anything from that Roan decision, it's that if
9 you've got citizen's alternatives like that in your
10 scoping, you have to pick them up and deal with
11 them, okay.
12 So now it's a question of that we have to
13 have another alternative. And it's been a little
14 confusing because it took me a lot of process steps
15 to get to that, you know, but, you know, I knew
16 that I was in deep trouble -- and I'll credit Fred
17 Jarman for this. At that second cooperating agency
18 meeting for saying: Jim, it is really unclear why
19 we're here, you know.
20 And so I thought that I could just take
21 the alternative that was kind of on the development
22 end of the scale and include that, and that didn't
23 work at all.
24 You know, when you look at those resource
25 management plans, those alternatives are not

1 standalone at all. They are designed to be
2 compared to each other.
3 So when you just took that one
4 alternative and looked at it, that was blatantly
5 not going to work.
6 Okay. So now what we need to do is we
7 need to make that alternative and we need to do
8 that in consultation with the cooperating agencies
9 and we need to get those kinds of issues in there.
10 That's what needs to be done and that needs to be
11 done as soon as we can do it.
12 And because of my little change of my
13 mind -- which I had to do it, I guess I don't feel
14 that bad about it I anymore, I did at the time --
15 but I mean I had to cancel that meeting on the 13th
16 and try to reschedule it for a Thursday.
17 And the result of that was there's a lot
18 of people had that Thursday set aside -- you know,
19 the 13th set aside from a long time ago.
20 So looking at fewer people that can make
21 that meeting, you know, Thursday, which is
22 unfortunate, but we're got going to get this done
23 in one meeting anyway.
24 So, hopefully, we'll get to the show on
25 the road in dealing with what you said. Because

1 when I shifted over this program and decided that
2 no, we need to have far more generic alternatives,
3 that using the existing material with all the
4 reference to individual landmarks is not going to
5 work, I lost some links to County plans. And I've
6 got to get them back now.
7 CHAIRMAN MARTIN: That's always the
8 frustrating part, is that we've worked on the plans
9 and what have you for our particular area, and it
10 overlaps County boundaries and it also goes into
11 field office boundaries, et cetera.
12 But to do one overall plan for the entire
13 area is really almost cruel to make you do because
14 each and every one of those areas has some unique
15 qualities that have to be an alternative that don't
16 apply to the other. And it's -- I sympathize with
17 you.
18 MR. CAGNEY: I thought I had it all
19 figured out.
20 CHAIRMAN MARTIN: No, you didn't have it
21 all figured out. That's why it took us about three
22 years just to work this particular plan out and
23 then to take five plans and not call them chapters
24 in certain areas, and then try to come up with one
25 plan for the: What are you going to do when you

1 have to deal with the Idaho and you're going have
2 to deal with the other folks outside, you know, the
3 state and Wyoming and putting it all together for a
4 national plan. I don't think that's going to work.
5 I really don't. I think that that's why the RMPs
6 and also the working plans need to kind of be
7 identified.
8 So that's our frustration. And I know
9 that you're going to run into that again in
10 different states and different field offices that
11 have plans.
12 And how would you deal with the Gunnison
13 Sage Grouse if you had to include Gunnison
14 Sage Grouse in this working plan? And those are
15 some of the things we really have trouble with in
16 how you can use the studies and come up with one
17 single plan.
18 MR. CAGNEY: And we have a court-ordered
19 timeline on this that is really tough.
20 MR. PETTERSON: Is there an opportunity
21 to -- based on your marching orders to use a lot of
22 the PPR plan?
23 COMMISSIONER JANKOVSKY: And that's what
24 we're trying to get done today with coordination.
25 That's really why we are here.

1 MR. CAGNEY: I would like to explore that
2 to the maximum extent possible today.
3 COMMISSIONER JANKOVSKY: Well, I would
4 you like you to follow the -- I mean it's in your
5 handbook. I mean it's in FLPMA. We would like to
6 see our plan included in the EIS. That is one of
7 the reasons we're here.
8 MR. PETTERSON: I think the counties, you
9 know, they're looking at the PPR plan. It's like,
10 well, this is what was developed with their
11 constituents, you know, their local landowners, you
12 know, local Division of Wildlife, local BLM.
13 So I think that the County is like: Why,
14 we've already been through a mini EIS on this
15 thing, can we just you know, get that into the main
16 EIS? Is it going to work? And if there's some
17 things that need to get tweaked, can we start
18 coordinating and getting that figured out now to
19 make it a better alternative.
20 COMMISSIONER JANKOVSKY: And I'll go a
21 step further. I think according to what I read in
22 here, the burden is on the BLM's shoulders to tell
23 us why that cannot be in the EIS. So that's my
24 concern there.
25 And when you go back to all of our plans

1 put together, I understand how much volume that is,
2 but then when I get a -- and I have three of them
3 right now, BLM EISs that are four volumes and
4 they're 1,600 and 2,000 pages, and I look at that
5 and go as a County Commissioner with other duties,
6 how am I to get through that? So I understand the
7 pain of that, but comes back on the other side as
8 well.
9 CHAIRMAN MARTIN: But if you're not
10 involved in it, there are consequences that will,
11 again, ripple all the way through the County and
12 everything that we do in reference to land and also
13 the citizens' use of the land.
14 I mean, right down to the private
15 property owner and then to grazing permits and the
16 other issues as they come up about with water, fowl
17 habitat and on and on and on. And it just ripples
18 larger and larger so we have to participate.
19 MR. CAGNEY: So here's the challenge, the
20 way I see it, in terms of structuring that
21 alternative. And by the way, it's a given that I
22 would like to do that. I mean we're not discussing
23 whether that's a good idea or not.
24 We're talking about how we could get that
25 done. And so that the issue becomes -- and then

1 one of the things that's a pretty clear marching
2 order from the Fish and Wildlife Service is a lot
3 of that work that's done, local working groups and
4 that type of thing, is way too general and it's way
5 too voluntary, and so we can't include that in our
6 listing decision, if it's just a voluntary thing.
7 So we've got to deal with that. That's a
8 very important issue that, you know, we need to
9 review what we've got there.
10 And so I mean it doesn't do us any good
11 to put something on the table that's just a
12 complete dead-on-arrival would result in a listing
13 kind of thing. And if I did that, the Bureau of
14 Land Management would be very, very unhappy with
15 me, and you probably wouldn't have to worry about
16 me anymore.
17 CHAIRMAN MARTIN: We want to worry about
18 you, Jim.
19 MR. CAGNEY: But the other point of that
20 on the other side is if we don't get some of those
21 materials in, then we foreclose those options at
22 the draft, okay.
23 And I think of this as, you know, there's
24 13 tricks in a round and we haven't played very
25 many hands yet, you know. So this is really early

1 and we don't want to start foreclosing on options.
2 So the challenge is to keep as many
3 options on the table as possible without handing
4 over a strawman that's just a no-go.
5 CHAIRMAN MARTIN: Would it complicate
6 your life or maybe play no part or maybe help --
7 you know, there's a gambit of what could happen.
8 But in my conversation yesterday with Don Ash, out
9 of Baltimore, who is the US Fish and Wildlife
10 person, as well as the Trout Unlimited sponsor out
11 of Baltimore as well, which is very -- was the
12 forming entity in Pennsylvania, et cetera.
13 But anyway, they were at the meeting. We
14 were talking about the different endangered species
15 and the Grouse did come up.
16 And as Don said, their idea is just like
17 BLM, is to recognize all plans. And if you have a
18 working plan, they need to be paying attention to
19 that and giving it credit and then to work out how
20 it would work.
21 Would that help if he had a
22 representative with an idea or, say, just piled
23 everything on you and you're going to have to sort
24 it out through the bureaucracy on your own. We'd
25 like to help.

1 MR. CAGNEY: And that comes up a lot.
2 And if the Fish and Wildlife Service just said: We
3 want this, this and this, I mean that in itself
4 would be a NEPA violation.
5 I mean it's illegal for those guys to
6 say, prior to the NEPA document, what they want.
7 So they have to be very, very careful that they
8 don't get into a pre-decisional, you know, kind of
9 thing, too.
10 CHAIRMAN MARTIN: They're not saying that
11 they're going to make a determination, but what
12 they would like to maybe say is that please
13 consider these, is what they're saying. And I
14 think that's what it was, to again work with local
15 governments on these plans, which you have a
16 working plan in place. They would give it
17 credence.
18 And I'm just saying, you know, with that
19 kind of support, general support, coming from Don,
20 would that help out or not, I don't know.
21 COMMISSIONER JANKOVSKY: If I would
22 interrupt, Mr. Martin. And I do want to just state
23 that we're going to try to work with the Fish and
24 Wildlife Service with coordination, too.
25 And it's a little bit different because

1 at this point it's not a NEPA document with them.
2 But we're going to try to do some -- maybe like ask
3 Margaret, maybe, to discuss that, how we can go
4 about that process.
5 MS. BYFIELD: This is Margaret Byfield.
6 And I think that it would be very beneficial for
7 the County to sit down with Fish and Wildlife and
8 have that conversation directly as to it pertains
9 to the Sage Grouse, what it foresees as issues that
10 are going to come up and that they're going to be
11 looking at through the listing process. And that I
12 think starting those discussions early will be very
13 helpful and it will be helpful in the BLM's EIS
14 process.
15 Also, if I could, one of the experiences
16 that when we were involved in is the recent
17 withdrawal of the Dunes Sagebrush Lizard, which
18 came out about a month ago.
19 The Dunes Sagebrush Lizard was on the
20 candidate list in the Permian Basin area, another
21 oil and gas area of Texas and New Mexico.
22 And that process was very interesting
23 because BLM was faced with, really, the same kind
24 of challenge. And in that case the BLM had
25 prepared CCAs and CCAA agreements, had about a

1 million acres enlisted in their program for the
2 Dunes Sagebrush Lizard and it was going very well,
3 but, on the New Mexico side.
4 When Fish and Wildlife came out with
5 their proposed listing for the Dunes Sagebrush
6 Lizard, they said even though BLM had amended their
7 Resource Management Plan -- which is what you're
8 working on now -- and even though BLM had these
9 agreements in place and had regulatory assurance,
10 they actually read it as not having regulatory
11 assurance. And they, in the proposed listing, said
12 that unless every landowner of every use enrolls,
13 we can't consider it.
14 And so one of the interesting things in
15 that issue is that one of the hardest hitting
16 comments that came back on that was actually from
17 State Director Linda Rendell at the time for
18 New Mexico BLM where she pointed out there is
19 regulatory assurance, and she really pushed back on
20 that pretty hard.
21 The other thing that happened is that the
22 County -- there were eight counties involved in
23 that and they all challenged the science that Fish
24 and Wildlife was depending on because there were a
25 lot of holes in the science and there was a lot of

1 questions in the science. And then the counties,
2 of course, also supported the BLM in their letter
3 off to Dr. Ash and Secretary Salazar.
4 And so what was good about that was that,
5 you know, BLM was kind of in the same position that
6 you're in where they were hearing unless you have
7 regulatory assurance, we won't accept anything
8 voluntary.
9 The CCA part of it, of course, was
10 voluntary. And, also, on the Texas side, they did
11 put together a completely voluntary program because
12 Texas is private land and didn't have BLM lands at
13 play in it. And so they put together an entirely
14 voluntary program conservation agreement.
15 And the end result is that US Fish and
16 Wildlife, when they made their withdrawal -- which
17 they made their withdrawal of the species as
18 endangered about a month ago -- and when they did
19 that, they said that they had misread the BLM's
20 program and that it was clarified that they did
21 have -- that there was some regulatory assurance,
22 and then they also accept the voluntary plan of the
23 Texas side.
24 And when you're dealing with private
25 land, you have landowners' participation in a

1 voluntary situation. And that's why the PPR plan I
2 think is so important, as it does bring in that
3 voluntary, you know, participation into the plan,
4 which is very hard to get otherwise. So I don't
5 know, Commissioner, if that answers your question,
6 but --
7 COMMISSIONER JANKOVSKY: It does answer
8 my question. I would like to just go back to the
9 science as part of what Eric brought up about the
10 studies in the NTT where they were done, that's one
11 thing on the science, I think.
12 Another thing on the science, it is in
13 the PPR plan, but not in the NTT report, and we've
14 talked about numerous times is predation. And that
15 threat is definitely talked about in the PPR plan,
16 and so I question that that's not in the NTT
17 report.
18 The other item is mitigation. And at
19 least in our area we're losing habitat because of
20 the encroachment of the Juniper Pinion forest. And
21 so, you know, mitigation of that, although it
22 doesn't do anything immediately, I think in the
23 long run it does make a difference.
24 Eric, is there more you'd like to add to
25 that, at least on the science side of that?

1 MR. PETTERSON: Well, I think one of the
2 things that came up is, you know, the predation
3 issue. And I mean realizing that pretty much the
4 end of all Grouses, someone's going to eat it.
5 I think that the County wanted to see
6 some kind of plan that if it makes sense,
7 short-term goals, you know, restoration of some
8 habitat. Is there an ability to address predation
9 issues in some alternative or at least have it
10 assessed in some kind of a NEPA process?
11 Recognizing it's not long-term solution,
12 but is it at least something that they can have in
13 the toolbox, if it makes sense to coincide with
14 habitat restoration or, you know, reintroduction in
15 an area or something like that so.
16 COMMISSIONER JANKOVSKY: And my question
17 to BLM would be why is predation not in the NTT
18 report. And then, secondly, why is there not more
19 on mitigation in the NTT report.
20 I read about reclamation in the NTT
21 report, but not much about habitat mitigation. And
22 so my question would be why are those not in that
23 report.
24 MR. CAGNEY: Well, the predation thing is
25 the Bureau of Land Management doesn't have any

1 jurisdiction. That's a Parks and Wildlife issue,
2 managing the animals themselves.
3 So that would be outside the scope of
4 anything that the Bureau of Land Management does.
5 We can only handle the land-use type issues. So
6 that's why it's not in there and that's why I'm
7 pretty helpless on that issue.
8 The mitigation thing is going to be
9 absolutely crucial because the NTT talks about
10 three percents. They want 1 per 640 and 3 percent
11 disturbance. And then I say, if you exceed that,
12 then you need to identify some mitigation in
13 conjunction with the Parks and Wildlife and
14 et cetera, et cetera.
15 And so I think that there will be lots of
16 opportunities to address that PJ because, you know,
17 one thing that Colorado can really you know be
18 proud of is that most of Colorado's occupied
19 habitat is occupied, you know.
20 I mean, it isn't like Idaho where cheat
21 grass just swept millions of acres of habitat off
22 the planet and it's unoccupied.
23 So when it turns to offsite mitigation,
24 those guys can do all kinds of things that we
25 really don't have that kind of opportunity because

1 our Sage Grouse habitat is really occupied, and
2 there's almost none to speak of that's historic
3 that isn't on this map.
4 But in terms of that, I think that's one
5 of the good things about this is that they'll be
6 some big opportunities and some funding. Because
7 what you need is to put a power line from Wyoming
8 through northwest Colorado. You can't get it
9 through without hitting some pretty important
10 Sage Grouse habitat. So we're going to have to
11 negotiate some packages right in line with what you
12 just suggested.
13 CHAIRMAN MARTIN: Just leave out, you
14 know, up there Moffat County because they're just
15 all red on that particular habitat. I mean you
16 don't even want to go there.
17 COMMISSIONER JANKOVSKY: And Jackson
18 County.
19 CHAIRMAN MARTIN: Jackson County, yeah,
20 all of the open area that you can put a line is
21 also covered that way. Go ahead, Fred.
22 MR. JARMAN: Okay, thanks. Jim, thanks
23 for bringing these. We can talk about them
24 publicly, I'm guessing.
25 MR. PETTERSON: Those are public maps.

MR. JARMAN: Great. So there's a finger -- if you're looking at a copy in front of you, there's a finger that is all the way west. It's the longest finger in Garfield County that's -- I think it's basically the last major finger that runs up north of the Roan, of Roan Creek.

MR. PETTERSON: I think that's Four Eight Ridge, I think that's what they call that.

CHAIRMAN MARTIN: Anybody needed it out there.

UNIDENTIFIED SPEAKER: That real long --

UNIDENTIFIED SPEAKER: I have more.

MR. JARMAN: The question that I've always wondered about -- I've got a number of questions, but on the mapping anyway, there is mapping that shows all the lek counts and lek sites that are all on the fingers and land that it is east of that, but there's not a single lek on that entire finger.

And so the question I've got, really again back to the science, is I'm trying to understand from the mapping why it's still in preliminary priority habitat when there's not an lek there versus if you go down -- of course, down

1 to the valley floor and back up the other side
2 there's whole other ridge is densely populated.
3 Like from the north all the way to the south
4 there's not a single lek on it. So I need help
5 understanding that just from science perspective.
6 Any help there would be great.
7 MR. CAGNEY: That's a Parks and Wildlife
8 map. They're the ones that are doing the
9 monitoring of the birds and where the birds are.
10 And, quite frankly, my approach on this is to
11 accept what they've said on that and just take care
12 of my business afterwards. So I really do need to
13 defer you to Parks and Wildlife on that question,
14 Fred, I'm sorry.
15 CHAIRMAN MARTIN: And, Fred, some of that
16 information was gathered by a couple of retired
17 folks that had done individual notations and
18 locations.
19 It was not part of the job description.
20 They also used airplanes back in the '60s and '70s
21 to get those particular sites. No one had
22 monitored those for 15 to 20 years, and they're not
23 sure what took place and some of the locations were
24 not, again, found. So it had potential and I think
25 that's what we came. It had the potential of

1 habitat.
2 But, again, as you pointed out the
3 surface growth of the Juniper, Sage and a bunch of
4 other stuff that used to be there aren't there
5 anymore. And now you have just the big Juniper
6 trees and bare ground.
7 MR. CAGNEY: Once they really came up
8 with some reliable means to do telemetry data they
9 found some pretty substantive patterns where birds
10 are nesting and Leking way down low early in March
11 and then they're summering much, much higher.
12 I mean, picture little baby Grouse birds
13 walking a long, long way between winter and summer
14 range. And then the take-home lesson there is that
15 a lot of our lek-based management isn't working.
16 MR. PETTERSON: Do you think there's
17 going to be an opportunity, through the EIS
18 process, to tighten those maps before it becomes,
19 you know, like cast in concrete, or do you think
20 the EIS is going to say like: Well, we recognize
21 here's our best information at this time, but is
22 there going to be some abilities to ground truth
23 and look at -- like you were saying earlier, you
24 know, when you've got the island of PJ in the
25 middle of the Sage, how are we going to handle

that?

MR. CAGNEY: Well, I think we have to handle the issues in terms of that. And the islands of Sage would be a product of how we calculate and we manage the disturbance cap. There's a lot of things to be figured out on that.

In terms of the map, you know, this is not an unprecedented development. The Bureau of Land Management gets elk crucial winter range maps all the time that we use in the exact same manner, and when they update them we can do an amendment to fix that. But in terms of am I pressuring Parks and Wildlife to redo their map? Not even a little bit.

MR. PETTERSEN: Okay.

MR. CAGNEY: I'm trying to get the show on the road with what I need to do.

MR. GORGEY: Do you know what the basis for the 3 percent disturbance threshold is? How did you get to that number?

MR. CAGNEY: You know that number came from the team. It was listed on the back page of that. That's the folks that were convened to work on that and it's just the preponderance of the research.

1 You know, the Wyoming governor's plan is
2 5 percent. But basically I think there's -- and I
3 am not a Grouse biologist by any means, but there's
4 a preponderance of the evidence that one
5 disturbance per 640 acres is the threshold by which
6 Grouse tend to stop using the habitat, whether they
7 get predated or whether they just choose not to use
8 that anymore.
9 And the 3 percent, 5 percent are all
10 derivations on people's calculations of how much
11 disturbance 1 per 640 entails.
12 Some people think, well, that's 5 percent
13 and some people think it's 3. And so I think
14 that's -- it's no more than that. It's a
15 preponderance of the evidence from the researchers.
16 MR. GORGEY: As presented in the NTT or
17 somewhere else?
18 MR. CAGNEY: Well, the NTT references a
19 myriad of other research documents. And I clearly
20 have not gone back and double-checked their logic.
21 And, really, there's no reason why I would because
22 my instruction, you know, from the Bureau of Land
23 Management is analyze this, and my instruction is
24 not ponder the science behind that. So now if the
25 people of the United States want to do that, that's

1 fine, but I'm not doing it.
2 CHAIRMAN MARTIN: Or that would be a
3 challenge that we would have to do on our own to
4 have that discussion and bring it up even farther.
5 MR. CAGNEY: Right.
6 MR. GORGEY: Well, I guess that's the
7 point. In the PPR if our scientific conclusions
8 are different from the scientific conclusions
9 you're currently relying on, do you think you have
10 an obligation, legal or otherwise, to reconcile the
11 difference?
12 MR. CAGNEY: Well, I have a legal
13 obligation under any scenario to carefully consider
14 any information I get at the draft.
15 MR. JARMAN: Well, and that's honestly --
16 and thank you, Jim, for -- was it two meetings ago,
17 one meeting, I can't remember, where we were
18 frustrated, as there was no doubt, in that meeting
19 and I understand your charge.
20 Part of the frustration or what built to
21 that frustration was what the instruction
22 memorandum states from, I guess, Salazar. And that
23 is the instruction memo to the BLM that says you've
24 got to consider the local plans.
25 And so I'm sitting here trying to make

1 sense of some of these things saying, well, okay,
2 we do have these local plans. And so the direction
3 from Washington essentially to the BLM is like
4 consider the local plans.
5 It says it several times through their
6 instruction memorandum that's a public document.
7 And so that's, I think, part of the challenge you
8 certainly have, I think.
9 MR. CAGNEY: Yeah, but I can't really
10 blame the secretary for that because I had a plan
11 to incorporate that and that was to bring forward
12 all our existing documents that I was presuming for
13 the most part had done that.
14 And that plan just bogged down in the
15 volume of it, you know. So I mean I'd say that's
16 my fault. And now I have to recover from that and
17 get another approach that does that on the table.
18 COMMISSIONER JANKOVSKY: Because I read
19 our plan. It's 160-some pages. Some of it's
20 signed-off sheets and so forth. And it's actually
21 an easy read. It's not a difficult read at all.
22 And then I go back and I haven't read
23 Moffat County's and Jeff can't speak, I guess, but
24 they have much more science. They probably have
25 some of the best science in Colorado and probably

1 science that could challenge some of the things
2 that are in NTT, as we've mentioned ourselves.
3 We feel that there are potentially some
4 problems with the NTT report.
5 CHAIRMAN MARTIN: We're not attacking,
6 Jim, are we?
7 UNIDENTIFIED SPEAKER: No, not attacking
8 Jim at all.
9 MR. CAGNEY: It doesn't feel that way.
10 COMMISSIONER JANKOVSKY: I'm trying to
11 work government to government and have a
12 discussion.
13 CHAIRMAN MARTIN: (Inaudible) Rio Blanco,
14 Moffat County, Gunnison, Eagle County, Routt
15 County, Grand County all have their plans and what
16 have you and there's science behind them that it
17 would behoove us to make sure that we talk to each
18 other and then present that so that the scientific
19 team or the technical team would have that
20 information to reconsider and see if they do give
21 it credence.
22 If not, they support their science and
23 they go forward with what they tell Jim to do.
24 MR. CAGNEY: This is so important that I
25 would ask you to not worry about hurting my

1 feelings, you know. Don't even give it a thought.
2 CHAIRMAN MARTIN: Young Mr. Boyd we like
3 and Steve we like. Everybody down at the field
4 office we like. It's not that. It's just -- what
5 it is, is the process that we're trying to struggle
6 through, and so are you.
7 We're just trying to find the right
8 solution and not miss the Grouse as an endangered
9 species, but also to protect bird without
10 destroying the entire habitat, you know, that kind
11 of stuff, because the other states are going to
12 have to do the same thing.
13 This affects 15 different states, I
14 believe, 14, 15, something like that, not to
15 mention Canada way up north.
16 COMMISSIONER JANKOVSKY: And I guess one
17 thing that is concerting, which goes back to
18 predation, which you guys are not -- as you
19 mentioned, you guys are not -- you're looking at
20 habitat, not management of the bird, per se, or
21 looking at the habitat, but the fact that the bird
22 is hunted and the numbers are -- that I've seen are
23 28,000 to 34,000 birds a year are taken through
24 hunting, which is about 10 percent of the
25 population that we are here talking about, you

1 know, the potential listing of the species.
2 And it just doesn't seem like that
3 that's -- if you go out and tell a rancher that you
4 can't have grazing, but you can still have hunting,
5 I mean it just doesn't seem right to me as an
6 individual.
7 CHAIRMAN MARTIN: It's a limited hunting
8 and that is out of the Division of Wildlife. They
9 took part in our plan. I thought they had quite a
10 bit of input in reference to how they would manage
11 that particular species in coordination with the
12 plan.
13 They knew what their responsibilities
14 were and there was a separation there from the land
15 and the animal. And I think that in our plan we do
16 that based upon their science, based upon on how
17 they went forward.
18 So I think we also need to forward that
19 again to the Division of Wildlife. I'm still going
20 to call it that, even though they're Parks and
21 Wildlife -- I'm true to the old way -- and give
22 that to the technical team and have a good
23 discussion in reference to science and maybe we can
24 do some good.
25 COMMISSIONER JANKOVSKY: And just for the

record, I don't believe there's any hunting in the PPR area, unless Commissioner Samson -- but there is in Moffat County. Is that correct, Commissioner Samson?

UNIDENTIFIED SPEAKER: (Inaudible).

MR. PETTERSON: Well, in the PPR that's -- well, first, it's mostly private, but where there's public access it's -- I think they have bag limits. It's like two birds, something like that, two, three birds depending where you're at, so...

CHAIRMAN MARTIN: Based upon the historic population and the information that they --

MR. JARMAN: Well, there are only two units that you can (inaudible).

CHAIRMAN MARTIN: And most of it's on private.

What else you want to cover, Tom?

COMMISSIONER JANKOVSKY: Well, I'd like to get to purpose and need a little bit. I mean I know, you know, that there's going to be additional alternatives drawn up, and if we don't have a purpose or need, how can we -- you know, it hasn't been shared, at least that I know of -- if we don't have those, how can we draw up two additional

1 alternatives?
2 You know, plus the no-action alternative
3 and the NTT alternative. There somehow needs to be
4 some direction to -- in this case I guess it would
5 be cooperating agencies, but how do you do that
6 without purpose and need?
7 MR. CAGNEY: There is one. It was done
8 national. It was a national purpose and need. So
9 I guess I should reveal right now that I haven't
10 studied that as much as I should have either. So I
11 mean I will -- you know, I need to read that again.
12 It's been a long time since I looked at it, but I
13 think that's posted on the web. But I'll get that
14 information available.
15 COMMISSIONER JANKOVSKY: And then on the
16 Citizens Alternative and then potentially on the
17 Development Alternative, who writes those up? Who
18 is the author of those alternatives?
19 MR. CAGNEY: The BLM.
20 COMMISSIONER JANKOVSKY: The BLM writes
21 those?
22 MR. CAGNEY: Just craft an alternative
23 taken from scoping comments.
24 CHAIRMAN MARTIN: I just want to make
25 sure a no alternative is what we have in place

1 right now.
2 MR. CAGNEY: No action?
3 UNIDENTIFIED SPEAKER: No action.
4 CHAIRMAN MARTIN: Right. And it would be
5 the working plan and what have you that's been
6 adopted and signed off by local BLM, Fish and Game,
7 Wildlife, the State of Colorado, local governments
8 and property owners. Would that stand as a via
9 (sic) no alternative, Jim?
10 MR. CAGNEY: Well, no, that's the problem
11 because the no -- I would just love it if the
12 no-action alternative was our completed documents
13 that are modern.
14 CHAIRMAN MARTIN: That's what you tried
15 to do anyway and that's why you got shot down, am I
16 correct in assuming that? Now we don't really have
17 a no action --
18 MR. CAGNEY: The no-action alternative
19 goes all the way back to the documents that are
20 being revised all across northwest Colorado --
21 CHAIRMAN MARTIN: Okay.
22 MR. CAGNEY: -- and so the timing of this
23 is really tough.
24 CHAIRMAN MARTIN: And that means that
25 that's an overall -- it's not just a localized

1 plan, but it would be entire regional plan is what
2 you're looking at.
3 MR. CAGNEY: You know, if we were doing
4 this two years from now, our no-action alternatives
5 would be pretty doggone sweet. Well, we don't have
6 that.
7 CHAIRMAN MARTIN: Okay. I just wanted to
8 clear the air on that particular issue, that we're
9 not ignoring the bird or anything else, but we'd
10 love to have our no-action alternative.
11 MR. CAGNEY: The original proposal was
12 based on the idea that there's been a ton of really
13 good Grouse ideas put into these documents that
14 were, you know, putting out for final or putting
15 out for draft, depending on where they are.
16 But the timeline that is a product of the
17 judicial order says don't wait for that, do this
18 now. So we are in a pinch on the no-action
19 alternative.
20 CHAIRMAN MARTIN: And I just want to
21 reiterate the stage that we're playing on here in
22 reference to what we're trying to get accomplished.
23 MR. CAGNEY: That's under the category of
24 a crying shame.
25 COMMISSIONER JANKOVSKY: I would like to

1 just -- and what Jim's talking about is on their
2 calendar they gave us is that September 21st
3 they're supposed to prepare a draft RMP amendments,
4 RMP amendment EISs and clean up loose ends. And
5 that's -- I don't know if that's possible, but
6 that's -- with all these questions is a very short
7 time frame.
8 MR. CAGNEY: That document that you just
9 read from says we'd have the alternatives done on
10 May 22nd.
11 CHAIRMAN MARTIN: I think it's been
12 revised, Jim.
13 MR. CAGNEY: It hasn't been revised. We
14 need the -- we need to get the alternatives done as
15 soon as we can do so in an organized manner and
16 then redo that schedule, and it's ugly.
17 MR. GORGEY: What are your target dates
18 now beyond -- I mean thanks for saying all the
19 dates so far, but what's your best understanding of
20 your own time frame now moving forward?
21 MR. CAGNEY: I need a better idea of how
22 long it's going to take to do what the core of this
23 meeting is, how you're going to incorporate these
24 County plans.
25 MR. GORGEY: Right.

1 MR. CAGNEY: I don't see that to fruition
2 right now. As soon as I know that, and we can get
3 the alternatives pretty much roughed out, then I
4 can redo that schedule.
5 MR. GORGEY: Do you feel you've had
6 enough time to familiarize yourself with the PPR,
7 the one we're here talking about today?
8 Personally.
9 MR. CAGNEY: Personally?
10 MR. GORGEY: Yes, sir.
11 MR. CAGNEY: No. No, I thought I had
12 that base covered in the original plan and then --
13 MR. GORGEY: Right.
14 MR. CAGNEY: I have to fix it.
15 MR. GORGEY: Thanks.
16 CHAIRMAN MARTIN: Well, that actually
17 puts the pressure on us in reference to what we
18 have to do in reference to our science, our
19 argument, and pushing everything forward with Fred
20 and Tom as our folks with questions and finding the
21 solutions. A lot of pressure on you guys in
22 reference to these meetings.
23 MR. JARMAN: Let me talk to that for a
24 second. Actually, through coordination we're
25 hoping that the BLM actually can help us understand

1 why and how, on a scientific basis, that the PPR
2 plan doesn't meet what the objectives -- doesn't
3 get us there. So there's a lot in that plan,
4 Chairman.
5 In particular, one of the issues that we
6 talked about last time was the notion of
7 reclamation and how does that add in to -- or I
8 should say against the 3 percent cap and that
9 issue. So I'm diving, Chairman, from a 10,000 foot
10 view now to almost a 5-foot view. But I think it's
11 critical that everybody understands that what we're
12 doing is really asking to the BLM, frankly, to tell
13 us how the PPR plan doesn't get to the same
14 objective and we all have the same objective. But
15 that is, I think, a critical component here, if
16 I'm --
17 CHAIRMAN MARTIN: No, no, it is. But I
18 don't think that Jim is able to go ahead and answer
19 that. I think it's going to be your technical and
20 the science that you need to go ahead and have your
21 discussion with, based upon your science that you
22 have here in your argument, and bring that forward
23 and your cooperating agency status based on that
24 science and challenge whatever findings they have,
25 or are have them defend it so that you can answer

1 those questions, is what I'm looking at.
2 COMMISSIONER JANKOVSKY: I guess I would
3 like to just state that, you know, I'd like to make
4 sure before we leave we can set up another meeting
5 because I mean these two issues are out there, and
6 that one is to assist in resolving inconsistencies
7 between federal and non-federal government plans.
8 And then the second is make federal plans
9 consistent with local plans.
10 And so those are two things that are very
11 much there in FLPMA and I just want to -- you know,
12 I know you need to go back and get a read on that,
13 but I would like it to set up a meeting -- a second
14 meeting to discuss that.
15 Then the other thing is that we are, as a
16 County, we are working to get Parks and Wildlife --
17 took me a second to get that name -- Parks and
18 Wildlife and then some of our large landowners all
19 in one room so we can get a better discussion
20 amongst us on what's going on with the PPR plan and
21 get an idea from all parties concerned about, you
22 know, what is working on our plan.
23 CHAIRMAN MARTIN: With what you wish to
24 move forward?
25 COMMISSIONER JANKOVSKY: Yes, which we

1 wish to move forward, yes.
2 MR. CAGNEY: I have a process format kind
3 of issue that I'd like to raise that concerns me.
4 To do these documents, what we basically
5 have to do is set up that table -- Chapter 2 table
6 with the range of alternatives.
7 So we've got some stuff that's formatted
8 up and it's -- you know, we started that format by
9 extracting information from this NTT alternative.
10 So now we have to format.
11 So what I'd like to do, with your
12 permission, I'd like to expand this to the other
13 commissioners and other County folks that are here,
14 is that if we could get an alternative on the table
15 to capture the essence of those plans -- because
16 for me to just say we're going to do this plan as a
17 stand-alone and not have it set up so that it
18 compares very specifically to the other
19 alternatives would be -- that would be a huge
20 thing.
21 So we need to -- I'm hoping against hope
22 that we can get that formatted so that there's a
23 clear comparison between alternatives.
24 And then I'd certainly like to go with
25 one alternative rather than have the Parachute

1 Piceance one and then the Moffat County one and
2 then the Jackson County one because that's what I
3 tried to do with the BLM plans, and that's just
4 imploded on me. So I got the same problem with the
5 County plan.
6 CHAIRMAN MARTIN: There are three in
7 reference to those plans, I understand (inaudible).
8 MR. CAGNEY: So that will implode on me
9 for the exact same way with the County plan. So
10 I'd like to get those formatted into one
11 alternative that captures the essence of that. And
12 then we'll do impact analysis on that.
13 And if we say that, no, this isn't
14 adequate, then it would have to come out of that
15 process. But if we -- you know, and then you get
16 into preferred alternative issues.
17 Are we going to have something that's
18 going to be an extreme capture all the decision
19 making thing or are we going to have something
20 that's strong enough that we can actually call it
21 the preferred alternative? We haven't even talked
22 about that yet, but we've got to cross that bridge
23 at some point.
24 MR. GORGEY: I want to make sure I
25 understood what your request is, or at least part

1 of it of it. And I promise you this, is my first
2 time through this.
3 Some people have been here a lot longer
4 than me. But the five -- did I understand you to
5 say that it would help you for the authors of the
6 five RMPs to try to find common ground and tell you
7 what that is? I got more -- the work plans, I'm
8 sorry.
9 COMMISSIONER JANKOVSKY: Yeah, work
10 plans.
11 COMMISSIONER JANKOVSKY: And I don't know
12 if there are five. There are four or five.
13 MR. GORGEY: I guess the point is is that
14 some of the data that you're relying on is provided
15 to you by other agencies. Some of it is national
16 in character, like the purpose and needs statement.
17 Some of this is just voluminous.
18 And really, we understand -- I think we
19 understand your obligations as the national agency
20 and we are trying to ensure that science and land
21 management that's local to us, what we know best,
22 makes it into your plan. That's really all it's
23 about.
24 And, you know, to be thorough. And we've
25 committed -- thanks for your time, too, but, you

1 know, we've committed a lot of time on this side
2 with consultants, both scientific consultants and
3 sort of policy consultants, our own land use staff,
4 our commissioner time, trying to -- just trying to
5 get something that's going to work.
6 And the PPR we feel works, is not headed
7 towards listing any species, is respectful of the
8 species. You have a lot of constituents who care
9 deeply about the species and what the -- you know,
10 what the commissioners do and do not do. And for
11 years we've been trying to honor all points of view
12 that way.
13 So we're trying to figure out,
14 independent of whatever any of the cooperating
15 agency meetings accomplish, independent of that to
16 try to coordinate with you directly to resolve any
17 inconsistencies between what you're trying to do
18 and what we're trying to do and help you meet your
19 goal and also have you sort of honor our goal. And
20 I guess can you speak to any of that?
21 MR. CAGNEY: Well, I don't have any
22 problem with any of that, except I hope that I've
23 conveyed that I can't have a whole bunch of
24 different alternatives written up in different
25 formats.

1 So if the proposal is that I just simply
2 adopt that plan as is, I can't do that. It's got
3 to fit a Chapter 2 kind of format.
4 So, hopefully, we can do that and we can
5 make that work. And I can get with the other
6 counties and pull that together on the whole where
7 we can get something that covers that base.
8 MR. GORGEY: Can I ask you, as a
9 practical matter, if those plans were merged in one
10 document that the concerns of the individual
11 counties -- and we're speaking only for Garfield
12 County today, but there are some representatives
13 from other counties present also -- if each of the
14 individual counties or localities' points of view
15 were retained in a merged document, does that meet
16 your need?
17 MR. CAGNEY: Sure.
18 MR. JARMAN: Jim, let me ask you a
19 follow-up to that.
20 Jim, in your experience, is the Colorado
21 plan a similar document? Does the Colorado plan
22 incorporate the essence of the five northwest
23 plans?
24 MR. CAGNEY: I'll have to look into that.
25 MR. JARMAN: Because that sits out there,

1 too with the Colorado plan. And my understanding
2 was -- and I could be totally wrong about that, but
3 I thought that was essentially made up or comprised
4 of the five base or field office plans.
5 MR. CAGNEY: You know, I need to do some
6 homework on that. I'm afraid what I'll find is
7 that that will be really general and really
8 voluntary, but I'll look.
9 CHAIRMAN MARTIN: I think you're right.
10 COMMISSIONER JANKOVSKY: And we have
11 been -- Fred and I were at a meeting at the
12 governor's office -- well, not the governor's
13 office but a representative from the governor's
14 office, and we believe there is going to be some
15 traction from the governor's office that we can put
16 potential put this -- we might be able to get our
17 plans into it, if they don't go off some other
18 direction.
19 CHAIRMAN MARTIN: Anything else, Drew?
20 MR. GORGEY: Can I ask a real basic
21 question, Mr. Chairman?
22 CHAIRMAN MARTIN: Sure.
23 MR. GORGEY: Because, again, you guys
24 have been to a lot of these meetings and I haven't.
25 And I do not understand when meetings are closed to

1 public comment and when they are not, whether it's
2 through this meeting coordination or -- there's
3 some that are open and there's some that are not.
4 And I studied the Administrative
5 Procedures Act in law school and I'm fully familiar
6 with changes in regulations and comment period and
7 gathering comments and publishing them and so
8 forth.
9 But there is some concern about when that
10 happens and when it doesn't happen and how it
11 doesn't. And I'm not asking you to be a lawyer
12 right now, but just generally from your role,
13 what's your understanding of when those comments
14 are allowed and when they're not?
15 MR. CAGNEY: Well, there's materials that
16 are specific to this project that are just underway
17 and under construction and being considered. Those
18 are pre-decisional.
19 We've come close to the edge a couple
20 times here, but I mean I think it's -- I'm happy
21 with the way the dialogue's been.
22 We've stuck to information that's
23 publicly available. So we haven't gotten into a
24 situation where we've discussed and disclosed
25 information that's only available to some people,

1 okay.
2 So if I had a circumstance where I say:
3 You know, you guys went over that map and you
4 talked about that and then other people didn't have
5 that opportunity to discuss that, then that's where
6 you crossed that threshold.
7 MR. GORGEY: Do you want everyone to see
8 the same information at the same time?
9 MR. CAGNEY: Right.
10 CHAIRMAN MARTIN: Without moving forward,
11 they've got to participate in that before there's a
12 big move forward. It's a work in process.
13 Everybody in the cooperating agency status needs to
14 be along the same line. I think that's what we've
15 always done.
16 MR. GORGEY: Is that why cooperating
17 agency meetings are closed?
18 MR. CAGNEY: Right.
19 MR. GORGEY: Okay. It's effectively
20 saying we're working on it. When we're done and we
21 know for sure what we're talking about, then we'll
22 talk about it.
23 CHAIRMAN MARTIN: It becomes a work
24 product and not a final --
25 MR. CAGNEY: Well, when we release it,

it's a draft, and then everyone has the exact same opportunity to comment. That's when it's -- when we can go forth with that kind of information.

CHAIRMAN MARTIN: And you don't take a partner by surprise, is what it really amounts to, without their participation. They may agree or disagree with it, but at least they had the opportunity to discuss it with the rest of the group.

Okay. Any other questions?

COMMISSIONER JANKOVSKY: I have three issues.

CHAIRMAN MARTIN: Three issues?

COMMISSIONER JANKOVSKY: Yeah. One, is I would like to set a date for our next meeting. I would like to -- and I heard you on the formatting and so forth.

I think, according to this, the burden is on the BLM, but I think I heard you state that you need some help, and I think the counties would be willing to help with some of that, I don't know. I just speak for Garfield County. So that's one item.

Second item, in our last meeting there was talk about including the Roan in the -- and I

1 don't know if we can talk about that -- we just
2 talk about including the Roan in the study, which I
3 know is general habitat.
4 There are no leks on the Roan at this
5 time. I don't know how far that will have to go,
6 but I would like to hear some comments, if you can
7 comment on that.
8 MR. CAGNEY: We are still trying to
9 evaluate the issues associated with that decision
10 that we got on the Roan. And our choices take us
11 into all kinds of twists and turns, so I can't go
12 there right now because just can't -- I just don't
13 have any confidence I can be -- that what I tell
14 you will pan out to be the way we go.
15 So the Grouse part of the Roan is no
16 different from that. That's under consideration
17 and we don't know what we're going to do.
18 COMMISSIONER JANKOVSKY: So that will be
19 part of your supplements then. That will not be
20 part of this; it will be part of the supplements to
21 the judge's decision.
22 MR. CAGNEY: That can go either way.
23 COMMISSIONER JANKOVSKY: I would like to
24 go back to if we could set a date in August. I
25 don't know if that's possible for you to do, but it

1 would be -- I would like to get back to this
2 meeting and the questions that we had out here.
3 MR. CAGNEY: Well, I intend to be here in
4 August, but I unbelievably did not bring my
5 calendar. I never do that, but I did today. So
6 let's just pick a date and I'll call you right
7 back, if that turns out to be --
8 COMMISSIONER JANKOVSKY: If we go
9 government to government meeting, I don't know if
10 we could -- if governments could be included.
11 CHAIRMAN MARTIN: That's what you wanted
12 to do in reference to these issues and what have
13 and our partners, just as we're doing right now in
14 answering -- at least giving some information,
15 helping each other down this process.
16 So why don't we go ahead and look at a
17 certain date. First or middle of August.
18 MR. CAGNEY: I think the 13th and 14th
19 are out for me. And then, Jeff, do you know what
20 the Resource Advisory Council dates are in August?
21 MR. GORGEY: Could you look at Monday,
22 the 27th, simply because that is the day that the
23 commissioners do not normally meet. I don't know
24 if the commissioners agree, but that is --
25 COMMISSIONER SAMSON: Monday the 27th.

1 Fourth Monday of the month.
2 CHAIRMAN MARTIN: I'm open.
3 MR. GORGEY: Mr. Samson?
4 CHAIRMAN MARTIN: Can we put the Monday
5 and then we can work from there. Then we can go
6 ahead and do a posting, make sure that it's
7 advertised and posted and then we can make a
8 change, if necessary, Jim.
9 MR. CAGNEY: Mondays are the best for me
10 because I got BLM business Monday morning. I try
11 to keep those days open. So Monday afternoon is --
12 CHAIRMAN MARTIN: 1:00, 2:00, what do you
13 think?
14 MR. GORGEY: 1:00.
15 CHAIRMAN MARTIN: Okay. Why don't we
16 shoot for 1:00 on the 27th, and if it does not work
17 out, we'll coordinate and then we'll make sure that
18 the general public knows. We'll also announce that
19 at one of our meetings so that we can have that
20 going between now and then.
21 MR. CAGNEY: I'll let you know tomorrow
22 if Monday is no good.
23 CHAIRMAN MARTIN: If it isn't, I still
24 have to make sure that the general viewing audience
25 and the public have that information knowing when

1 we're going to meet. So we'll do that.
2 COMMISSIONER JANKOVSKY: I have one other
3 thing. And that is that yesterday at our meeting
4 we pulled off our agreement with the American
5 Stewards of Liberty so it could be discussed
6 publicly.
7 And there were a lot of issues that were
8 brought up by constituents, which I was not able to
9 respond to, but I'm just wondering if Margaret --
10 no, these guys, you know, they got -- said that
11 people were funding them that aren't funding them.
12 I just thought yesterday was unfair in that respect
13 and --
14 MR. GORGEY: I honestly would just save
15 that for your next regular meeting.
16 I think the purpose of today's meeting is
17 a government-to-government meeting for the
18 announced purposes. And if we -- if you choose or
19 direct your staff to issue any sort of clarifying
20 statement or if the contractor wishes to issue any
21 clarifying statement, we can do so.
22 COMMISSIONER JANKOVSKY: I just felt
23 there was -- you know, we couldn't stand up here
24 and -- okay. I will go with that. And the press
25 is here, maybe that's something that can end up in

1 the press.
2 CHAIRMAN MARTIN: If we need the
3 discussion put on the agenda, our next meeting is
4 on the 6th, if you wish to make it an agenda issue
5 (inaudible).
6 COMMISSIONER SAMSON: My main purpose in
7 being here is to listen. I think there were some
8 really good questions. I want to thank Mr. Cagney
9 for coming, for wanting to come again.
10 I think people out in the viewing
11 audience, whether it's on TV or here today, as well
12 as will read what's transpired in the news media, I
13 hope they come to a better realization. You've
14 said some things today that I think help them
15 understand what this process is.
16 I've never been through this process
17 before. Tom goes to the meetings and is doing a
18 great job. John has been intricately involved with
19 the process that came up with the PPR, and I'm kind
20 of in a learning process about all of that, plus
21 the coordination process itself.
22 So in the process of doing that, I hope
23 the general public is aware that we are trying to
24 do the best we can for Garfield County and what we
25 feel will be the best for our constituents in

1 conjunction with you and the job that you have
2 to -- the role that you have to play also.
3 I believe that we can all come to a
4 coordination, if you will, compromise. I think
5 that it can be worked out and that the bird will be
6 preserved for generations and that the use of the
7 land will continue to be used for the best use of
8 all concerned.
9 MR. CAGNEY: In addition to Tom, please
10 add Fred to your list of people.
11 COMMISSIONER SAMSON: You're absolutely
12 correct. I'm sorry for the oversight.
13 CHAIRMAN MARTIN: And I did want the
14 viewing audience to know also Jim Cagney's name was
15 used in Pittsburgh and also Cynthia Moses sends her
16 regard and sympathy in reference to this process.
17 However, she has her own issues and they pulled all
18 her traveling funds because of cutbacks, et cetera.
19 So as a liaison from the Department of
20 Interior to local governments that's going to be a
21 limited issue and has to be either on website or
22 e-mail type stuff, maybe a phone call. But, again,
23 she sympathizes with your challenge. Thank you.
24 And is there any other comment from the
25 boys up here, girls up here? Anybody?

MR. GORGEY: If the 27th date doesn't work for you, Mr. Cagney, will you help us find a date that does?

MR. CAGNEY: I think it's going to work. And, Eric, thank you, too. That's an oversight on my part.

COMMISSIONER JANKOVSKY: Jim, I have a BLM RMP meeting on Thursday, so I'm not going to be able to make it to the meeting in Craig, just to let you know.

MR. CAGNEY: Well, that's what I get for that last-minute change, but we'll see what we what we can do with the people that can make it.

MR. GORGEY: I had a last question, just to help. Is there -- what can we do in coordinating with you before the 27th to help? I've got the macro goal of trying to merge the local plans into one and retain our individual goals as counties or communities, but what can we do coordinating with you before the 27th to help advance this?

MR. CAGNEY: And, you know, I'm really happy to come here and do this, but what I need more than anything else is to pound out that alternative with the cooperating agencies. That's

what I need.

CHAIRMAN MARTIN: He needs the information so can format it.

COMMISSIONER JANKOVSKY: Will that be a potential decision discussion on Thursday then?

MR. CAGNEY: I'd like to get started. I mean we're not going to finish. I mean we're got going to get a finished project because we don't have, you know, the right group of people. But we're going to have some people that are pretty talented and we'll get started.

CHAIRMAN MARTIN: That's all we can ask. Put the burden back on us.

Let's go ahead go ahead call it good and end our meeting today. We're adjourned.

COMMISSIONER SAMSON: Thank you.

(The proceedings were concluded.)

1 REPORTER'S CERTIFICATE

2 STATE OF COLORADO)
) ss.
3 COUNTY OF ADAMS)

4 I, Geneva T. Hansen, do hereby
certify that I am a Professional Shorthand Reporter
5 and Notary Public within the State of Colorado.

6 I further certify that the foregoing
transcript constitutes a true and correct
7 transcript to the best of my ability to hear and
understand the audio recording.
8
I further certify that I am not related to,
9 employed by, nor of counsel for any of the parties
or attorneys herein, nor otherwise interested in
10 the result of the within action.

11 IN WITNESS WHEREOF, I have affixed my

12 signature and seal this 3rd day of May, 2013.

13

14 My commission expires 11-18-15.

15

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16 GENEVA T. HANSEN

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August 13, 2012

Helen Hankins
Bureau of Land Management
Colorado State Director
2850 Youngfield Street
Lakewood, Colorado 80215-7093

Re: BLM's Greater Sage-Grouse Environmental Impact Statement

Dear Director Hankins,

The undersigned local governments have been participating in the regular Greater Sage-Grouse Cooperating Agency meetings that the Bureau of Land Management (BLM) hosts. We are particularly appreciative of the magnitude of the planning effort BLM is directed to undertake. We are even more appreciative of the candid straight-forward information BLM has shared during Cooperating Agency meetings. Although we plan to continue participating in the process, we are deeply concerned the process does not accommodate the mandates that BLM consider the views of local governments as envisioned under the Federal Land Policy and Management Act (FLPMA) or the National Environmental Policy Act (NEPA).

Since before the first Cooperating Agency meeting May 18, 2012, many participants have publically raised concerns about the BLM giving little deference to existing sage grouse planning documents which we have spent years developing. We have also commented on the too-narrow range of alternatives which BLM will be analyzing, and specifically that the alternatives BLM is considering do not balance the basic need of grouse conservation and social and economic growth within our jurisdictions.

As various situations have arisen in Cooperating Agency meetings, it is apparent that BLM is bound by parameters that reflect advance decisions by BLM on the preferred alternative while not addressing the scientific controversies regarding the status of sage grouse populations. These parameters are also not consistent with the needs within our respective communities. From the outset we believed the National Technical Team (NTT) Report supported an extreme grouse-conservation alternative, warranting analysis as an extreme alternative. Then a few weeks ago, we learned that the Washington Office of BLM had directed BLM to consider an even more conservation-oriented alternative, one that makes the NTT report look "middle of the road." When local governments requested an equally balanced alternative providing for

the current development of oil and gas, recreation uses, and grazing resources, we were constrained to modifying the NTT Report. This direction flies in the face of NEPA's mandate that BLM consider a range of reasonable alternatives. A balanced use alternative should be among those analyzed in the Draft Environmental Impact Statement. In addition, the NTT report focuses on limiting ground disturbance to a 3% threshold in primary grouse areas which will drastically affect the economies of NW Colorado. We do not support BLM Washington defining what constitutes disturbance in solely Washington driven committees, rather, BLM should use its Cooperating Agencies to determine disturbance definitions.

BLM's parameters directed from the Washington BLM Office provide little opportunity for meaningful input from local governments. These limits ensure that BLM does not address consistency with local government plans, the broader multiple use mandates of FLPMA and other federal laws, use only peer-reviewed quality data, or explore the scientific controversies regarding conservation of the sage grouse. We are even more concerned that Washington has already determined the preferred alternative that BLM must select, hence the limited latitude given to the Cooperating Agencies.

In addition to the limitations BLM has placed upon the land use planning process, we are deeply concerned about the unrealistic timeframe for completing the Sage Grouse Environmental Impact Statement. A Draft Environmental Impact Statement is scheduled to be published by the spring of 2013, across Northwest Colorado, much less 11-western states with insufficient time to meaningfully involve the stakeholders. The short time-frames will drastically limit the quality of the document, and more importantly the level of protection the sage grouse receives. We fully recognize these timeframes can be traced back to a 2011 court decision dictating such timeframes, but nevertheless find them ridiculously burdensome, and impossible for BLM to adequately address such a complex issue.

We recommend first that BLM return this process to what the law requires, which is close coordination with state and local governments. Second, BLM must develop a balanced-use alternative that includes and reflects state and local government conservation efforts, not just federal agency viewpoints. Third, BLM needs to secure an extension of time, because the EIS

will be challenged and short-cutting the process will only end in failure, and finally BLM must immediately involve the Cooperating Agencies in defining what constitutes ground disturbance.

Sincerely,

Garfield County Commissioners

Moffat County Commissioners

Jackson County Commissioners

Rio Blanco County Commissioners

Douglas B. Monson
Chairman
Routt County Commissioners 2 of 3 Boce
Support Letter

Douglas Creek Conservation District

White River Conservation District

CC: Jim Cagney, BLM Regional Director
John Hickenlooper, Governor of Colorado
Congressman Scott Tipton
Senator Mark Udall
Senator Michael Bennet
Senator Jean White
Representative Randy Baumgardner

AUDIOTAPED BOARD OF COUNTY COMMISSIONERS
OF GARFIELD COUNTY
108 8th Street, Room 100
Glenwood Springs, Colorado

August 27, 2012
1 p.m.

Re: BLM SAGE GROUSE MEETING

1 APPEARANCES:
2 Commissioner Tom Jankowsky
3 Commissioner John Martin - Absent
4 Commissioner Mike Samson
5
6 David Boyd, Public Affairs Specialist
7 Jim Cagney, District Manager
8 Drew Gorgey, Garfield County Manager
9 Margaret Byfield, American Stewards
10 Fred Jarman, Director of Building and
11 Planning
12 Eric Petterson, Wildlife Biologist
13 Carey Cagnon, County Attorney
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COMMISSIONER SAMSON: I'd like to welcome everyone to our work session with the BLM on Sage Grouse, and I'd like to welcome you here again, both of you. Thank you for coming.

MR. CAGNEY: My pleasure.

COMMISSIONER SAMSON: And we'll start with the roll call from Marion, please.

(Roll was called.)

COMMISSIONER SAMSON: John is absent. He's taking care of some business in Grand Junction. Hopefully, he will be here later on, but we will continue without him and, hopefully, he'll get here before the meeting is over with.

So once again, welcome to everybody and I believe -- are we on the air.

MARIAN CLAYTON: I'm not sure.

COMMISSIONER SAMSON: Well, it says we're on the air, so anyone the TV audience welcome, too.

So as you know, we had your last meeting -- what was it, July 17th, I'm thinking. Was that the date that we met?

COMMISSIONER JANKOVSKY: That is correct.

COMMISSIONER SAMSON: July 17th. That's pretty good memory to remember that. And we got some things accomplished there and going forward

with the second meeting.

Tom, since you basically are the one that's heading this up for us, I'm going to turn the time over to you.

COMMISSIONER JANKOVSKY: Okay. I guess Mr. Chair or Commissioner Samson, would you like to just have everybody introduce themselves at the front table here.

COMMISSIONER SAMSON: That probably would be good. I think everybody here knows everybody, but if we are on the air, that probably would be good for those that perhaps don't. So start -- go this way, I guess.

MR. BOYD: Okay. I'm David Boyd. I am a public affairs specialist for the Northwest District of BLM and I'm based in Silt.

MR. CAGNEY: And I am Jim Cagney. I am the District Manager for Bureau of Land Management based in Grand Junction.

COMMISSIONER JANKOVSKY: Tom Jankovsky, Garfield County Commissioner.

COMMISSIONER SAMSON: Mike Samson, Garfield County Commissioner.

MR. GORGEY: Drew Gorgey, Garfield County Manager.

MS. BYFIELD: Margaret Byfield, American Stewards of Liberty.

MR. JARMAN: Fred Jarman, Director of Building and Planning Department for the County.

MR. PETTERSON: Eric Petterson, Rocky Mountain Ecological Services.

MS. CAGNON: Carey Cagnon, acting County Attorney.

COMMISSIONER SAMSON: I guess I should have said at the beginning of the meeting, but I'll say it right now. This meeting is basically a discussion among those that are at the table. It's open to the public, but we will not be taking any comments from the public. I should have addressed that at the beginning.

Tom?

COMMISSIONER JANKOVSKY: I just would like to go to the agenda and just state this is a government-to-government meeting for open discussion between Garfield County and the Bureau of Land Management on Sage Grouse and the potential -- and the EIS or the -- I guess it's a coordination meeting, so it's not on the EIS.

This is just to talk about our plan, the PPR plan, and the NTT Plan which has been presented

1 by the Bureau of Land Management through an EIS.
2 And I'd first just like to ask if there
3 are any comments from our last meeting. And
4 anything -- I do have some comments, which come
5 back from this letter that we sent to Director
6 Hankins and just would like to touch on a few
7 things that are in the letter.
8 And one of the things is that we just ask
9 that we consider our local Sage Grouse conservation
10 plan, the PPR plan, Parachute Piceance and Roan
11 Plan, as an alternative to be rigorously analyzed
12 during the environmental impact process.
13 And we had specifically asked Jim,
14 Mr. Cagney, if you could go ahead and review our
15 plan, and I'm just wondering if you had a chance to
16 do that.
17 MR. CAGNEY: I did.
18 COMMISSIONER JANKOVSKY: And I guess I
19 would like to you ask you about any comments you
20 may have about our plan and kind of what we have,
21 you know, just asked, as far as having our plan
22 analyzed and included in the EIS.
23 MR. CAGNEY: I think that plan is an
24 excellent piece of work. I would have absolutely
25 signed that. But, I mean, I'm sure you know --

1 actually, there's two issues that make it difficult
2 for me to deal with right now.
3 Number one, is -- I have to ask you a
4 question. When you've got voluntary stipulations,
5 okay, so then in your impact analysis in an EIS,
6 you're trying to identify whether those would be
7 always applied, never applied, and sometimes
8 applied.
9 And the obvious answer is sometimes
10 applied, but what kind of guidance have you for me
11 in terms of how I would deal with the sometimes
12 applied nature of that in the impact analysis, if I
13 were to do that.
14 COMMISSIONER JANKOVSKY: I guess you're
15 talking about regulatory assurance more than
16 anything else.
17 MR. CAGNEY: And how would I articulate
18 the impacts when I don't know whether those
19 provisions are always -- that's the very difficult
20 question for me. It's really a question of
21 assumptions for analysis.
22 So I mean that's really a tough question
23 for me to ask you on the spot, but if you'd spend
24 some time on that, that would be pretty helpful.
25 But if you've got something for me right now I'd

1 sure take it.
2 COMMISSIONER JANKOVSKY: I can help you
3 with some of that and I do think it's something
4 that we would -- as a County we'll need to talk
5 about some more about how do we put teeth in that
6 or do we put teeth into it.
7 We are familiar with the Dunes Lizard Map
8 Plan in New Mexico, which was a voluntary plan and
9 ended the US Fish and Wildlife Service did sign off
10 on that plan, so we are familiar with that to some
11 extent. It does set some precedents.
12 But I guess, also, from our standpoint
13 and primarily what the BLM is doing -- it's kind of
14 divided because what the BLM is doing is coming up
15 with regulations, primarily on habitat. Because
16 you guys -- the Fish and Wildlife Service, they're
17 the ones that are in charge of the bird, per se.
18 You guys are looking at the habitat.
19 And then we have Parks and Wildlife also
20 involved in this and Parks and Wildlife is a state
21 organization with the biologists that actually are
22 managing the bird and so forth on the ground.
23 So I think what we have as a County is we
24 have the ability to not only deal with the BLM on
25 the habitat, but, hopefully, we're going to be able

1 to work with Parks and Wildlife and the service
2 to -- Fish and Wildlife Service to get an overall
3 comprehensive idea of how to manage this bird in
4 Garfield County.
5 And then the guess the other thing that I
6 look at is -- and Fred will get to this when he's
7 talking about his slides and so forth that out of
8 the -- and I don't have it right in front of me,
9 but I think it's 160,000 acres -- maybe it's a
10 120,000 acres that are primary habitat, priority
11 habitat.
12 Only 20,000 of those are BLM acres and
13 then there's probably another 40,000 that are
14 private land where BLM has the mineral rights under
15 that.
16 So that the vast majority of this land is
17 privately owned that's -- at least in our County
18 and so how do we come back together to improve the
19 habitat and really look after the bird when you
20 have all these -- you have three different
21 agencies, plus ourself, so four government
22 agencies, and then you also have private land,
23 federal land and private land federal leasing.
24 So I think you know the regulatory
25 assurance, you know, some of that voluntary

1 approach is going to go over a lot better with the
2 landowners and working with the landowners. And so
3 hopefully when we're dealing -- and I know you're
4 dealing primarily with habitat, but when we are
5 dealing with Fish and Wildlife Service, hopefully
6 they will look at that, look at some of that as
7 well.
8 MR. CAGNEY: Are you dealing with the
9 Fish and Wildlife Service now?
10 COMMISSIONER JANKOVSKY: No, but we hope
11 that we -- we're going to ask them -- well, first
12 of all, with the state, we have a meeting with the
13 state with the state Parks and Wildlife and that's
14 set for September 7th, and we would like to invite
15 the BLM to be there as well.
16 We're going to have those biologists
17 there, along with Kathy Griffin, to talk about our
18 existing plan, how well it's working, and their --
19 how they see that plan working, and just get a
20 better understanding ourselves because that plan
21 has been in effect since 2008, so we can get a
22 better idea of from the state of Colorado about
23 that plan and, hopefully, also a little bit more
24 information on their -- how they are working with
25 the BLM through the EIS process. I believe they're

1 also a cooperating agency, if I'm correct.
2 The other thing is we do plan to work
3 with the Governor's office because I believe the
4 Governor's office is putting together a state plan,
5 which we'll come in again, as we have here, and
6 just really talk about our plan and why it's
7 important to us to at least acknowledge and look at
8 the differences between our plan and so forth.
9 Anything else -- I mean, you know,
10 regulatory assurance is one thing. Anything else
11 that you see that might -- in the PPR plan that
12 might be reason for it to not be accepted by the
13 Bureau of Land Management?
14 MR. CAGNEY: This doesn't qualify as a
15 reason to not accept it, but my other question that
16 I had when I was reading is there was a lot action
17 items tables.
18 Is there an update paper on that about
19 what's been done since it was finalized or anything
20 like that?
21 COMMISSIONER JANKOVSKY: Again, we hope
22 to get better information on the 7th from the
23 biologist on the action items and so forth, but we
24 do have one here for this meeting.
25 I guess the other thing is, you know,

1 guess we'd asked about -- potentially about a
2 timeline, as well, for development of the local
3 plans for, you know, alternatives. And so, you
4 know, we've -- and I don't know if you've thought
5 about that at all, but we'd like to -- we would
6 sure like to see some sort of a timeline that would
7 tie back into this agency scoping deadline.
8 MR. CAGNEY: Fred, do you have the last
9 schedule we passed out?
10 MR. JARMAN: For the cooperating agency
11 stuff? I don't have the updated one with me.
12 MR. CAGNEY: Well, we need to update that
13 because I mean, obviously, there's been delays and
14 we're quite a bit behind that.
15 COMMISSION JANKOVSKY: I have the
16 original schedule. I don't think I have the --
17 MR. CAGNEY: I think you'll find that
18 we're going to have the alternatives done in May.
19 Needless to say, I'm concerned about that.
20 COMMISSIONER JANKOVSKY: I know it's a
21 big undertaking and there's -- you're having to
22 deal with each of these five counties, which all
23 this their own perspective on this.
24 I just would like to go back, you know,
25 on that about our plan just to Secretary Salazar's

1 policy action memo, which I imagine is probably
2 tied in with the scoping, but where he just stated
3 that the NTT report, which is the report that's
4 out, states that: These goals and objectives are a
5 guiding philosophy that should inform the goals and
6 objectives developed for individual land use plans.
7 Then he has a "however": It's
8 anticipated that individual plans may develop goals
9 and objectives that differ and are specific to
10 individual planning areas. And that's really
11 where -- and some of what Fred is going to present,
12 that's what we're trying to get back to.
13 There are definitely some things that are
14 very specific to our region, to our geology and
15 landscape and so forth that we've -- and some of
16 those very reasons why we feel the PPR plan has
17 some strength and should be considered.
18 COMMISSIONER SAMSON: So turn it over to
19 Fred.
20 COMMISSIONER JANKOVSKY: I think Margaret
21 had a --
22 MS. BYFIELD: You mentioned that there's
23 sometimes applied category in the PPR plan. Can
24 you give us an example of specifically what
25 elements you're thinking of that in the PPR plan is

1 sometimes applied, but you're asking -- you're
2 asking for how we recommend that you deal with
3 that.
4 Can you give us a specific example of one
5 of the elements that you see are sometimes applied?
6 MR. CAGNEY: Well, it's virtually the
7 entire document. I mean any -- you know, for
8 example, any best management practices that you've
9 got in there -- and it includes all of them -- it's
10 very clear that those are voluntary. And Fish and
11 Wildlife Service -- well, let me stay away from
12 that and go back to the original question that I
13 had.
14 So when I do impact analysis on
15 provisions that are voluntary, I've got to have
16 some assumption for analysis about when those
17 voluntary provisions would be picked up and applied
18 and when they would not. So what I'm asking for is
19 some guidance on how that would work.
20 COMMISSIONER SAMSON: Okay. Any other
21 questions?
22 COMMISSIONER JANKOVSKY: No, I'm good.
23 COMMISSIONER SAMSON: All right. I
24 think, Fred, we're ready for your presentation.
25 MR. JARMAN: Okay. Thank you.

1 All right. So I've got a variety of
2 slides here that I'm hoping we can work through,
3 and the intent is to have these slides sort of
4 highlight what questions we have that we really
5 need your guidance from, Jim, on some of the
6 science behind where we feel there is an
7 inconsistency in between the two plans. So that's
8 really the focus of this.
9 And we've got three specific areas that
10 we want to work with. And I'll do this jointly
11 with Eric Petterson and myself, but should show up
12 on the screen for you.
13 And this, of course, is the agenda for
14 today, and those three -- A, B and C are really the
15 three themes that we want to have a discussion
16 about. First being the 4-mile buffer; second being
17 the mapping and the priority habitat and how that
18 is applied to Garfield County in particular; and
19 then, again, the 3 percent disturbance cap.
20 So I want to work through these
21 systematically and I want to highlight each one
22 using the slides here.
23 So, again, the major discussion is
24 between these two plans and these are both public
25 documents on the web.

1 So as a matter of background that was
2 important to show, again, the national perspective
3 of the issue.
4 These are the 11 states showing the
5 Sage Grouse habitat, the range, I should say, in
6 green, and here is where the PPR plan focused, so
7 just as a matter of context. But he sees that
8 pullout, the blowout shows the western portion of
9 Garfield County and a portion of Rio Blanco, so
10 those are the two areas. And then on to the land
11 ownership scheme, something you probably already
12 know pretty well.
13 MR. PETTERSON: Skipped one.
14 MR. JARMAN: Oh, did I skip one? Here we
15 go. Thank you.
16 So land ownership you -- may not be able
17 to see the legend very clearly, but what's
18 important to note -- I'll use my cursor, if it will
19 work -- is BLM, of course, shows up in yellow.
20 The green is split estates, so private
21 surface BLM leased minerals, that's what the green
22 is here. And then the gray is private land.
23 And then just by context here's Parachute
24 down here, Parachute Creek drainage and then the
25 Roan Creek drainage here.

1 I'm going to spend a little time in the
2 next couple of slides up in this area, which is
3 Clear Creek. But it give you a sense of the land
4 area we're talking about. So the EIS covers this,
5 and your BLM jurisdiction.
6 So here's a slide that shows the most
7 recent uploaded data for existing gas wells and
8 permitted gas wells. So existing being green and
9 the permitted, not drilled yet, are in red.
10 It gives you a sense of what that looks
11 like. A lot of it is on private land. The
12 majority of it in fact's on private land.
13 And this next slide here -- and
14 Commission Jankovsky talked about this a little bit
15 earlier, but this gives you -- this is the posted
16 mapping online of the priority habitat, which was
17 the C-PAW -- the Colorado Parks and Wildlife
18 mapping -- shows the priority habitat in red with
19 the general in green.
20 And it gives you a sense of the
21 underlying land ownership compared to that. And
22 then for additional context you can see this matrix
23 down below of what this means in terms of acreage
24 for Garfield County.
25 By way of example, you have, using these

1 percentages in the County total, about a third of
2 Garfield County, a little over a third, is
3 privately held with the remainder being publicly
4 held. And so if you chase those across, you've got
5 the percentages of areas in both priority habitat
6 and then general habitat, and here are your totals.
7 So it's a significant coverage within the
8 private land ownership of the County. So a quarter
9 of the privately held lands then 5 percent of BLM.
10 Okay. On to the Grouse, per se. So here
11 you have the same mapping from the Colorado Parks
12 showing the leks that are out in these areas of the
13 primary habitat, and then overlaying include the
14 gas wells, existing and permitted, as well as the
15 priority and general habitat, with the underlying
16 ownership still coming through as a layer here.
17 Okay. So this gets more -- that was more
18 background than anything else, but I think it's
19 important at this point to sort of focus in on
20 questions for you on applicability from the NTT and
21 the science behind that to Garfield County.
22 And the reason I showed this slide is
23 this is actually from the BLM's website from a
24 conservation project and this is in the Pinedale,
25 Wyoming Anticline area.

1 And the website, if you wanted to go back
2 to that, is on the bottom so you can go and see
3 exactly what that's all about.
4 And so as we read the NTT, it had this as
5 the basis for their model. And Eric, you can chime
6 in anytime you want to. But as we read that, we
7 saw the buffering and the 3 percent gap and so on
8 used primarily from this kind of landscape.
9 And so I want to contrast that with the
10 value, at least as we see it, with the PPR and why
11 the PPR we think is a bit different.
12 And so the square on this map -- here's
13 the County. The square is where I'm going to zoom
14 in, which is basically the north end of Clear Creek
15 within the priority habitat.
16 And so here's the Garfield County
17 experience and landscape. So this is the Clear
18 Creek drainage looking due south. And so from the
19 lek data that was the map you saw previously -- and
20 I'll highlight it again -- the end of that line
21 under the word elevation actually hits a mapped lek
22 right now.
23 And so that's at about 8,000 feet. And
24 then you've got an elevation drop of 2,300 feet to
25 the valley floor. And then, of course, in between

1 there you've talus slopes and then the escarpment
2 as the landscape or as the geology goes.
3 And so our main question is how can --
4 should say it this way. Does the science behind
5 the NTT support this kind of difference in
6 elevation as a model versus the Pinedale, Wyoming
7 experience.
8 And so more to that, here is the lek
9 itself. I showed you that in profile view. This
10 is in map view. And so you see where the lek shows
11 and added to that is a 4-mile buffer that the NTT
12 talks about.
13 And so our question for you, really --
14 and maybe it's a good place to stop for the
15 moment -- but if you take from the cursor here and
16 you go out, you've dropped then 2,300 feet, back up
17 2,300 feet, at least, across the top of this
18 plateau and then down here to the other side. And
19 so did you want to add to that question as far as
20 the buffering?
21 MR. PETTERSON: Well, I think one of the
22 things that we're -- in going through the NTT
23 report we've been looking at the literature that's
24 used to determine the 4-mile buffer.
25 And based on our review of how it's cited

in the NTT report it references some pretty specifically studies up in Wyoming around the Pinedale area, a few other major gas development areas.

And I think one of the things that's coming out is, well, is it appropriate or suitable to be using that research to apply to topography and stuff and conditions -- habitats down here in Colorado.

And I think that where the County is coming from is is there a way to use more local and maybe some of Tony Apa's work here in Colorado, more site specific work that's been done up in the Roan.

Is there any wiggle room with where this NTT is going as far as the proposed action for the EIS? Is there any other ability to use other information that's more local? And least with the 4-mile buffer stuff.

I think with the 4-mile buffer is what we're seeing is that there's some pretty good studies that have some very good science behind them for those areas. And we're wondering, well, is there an ability to use and look at some more local stuff.

1 MR. CAGNEY: I don't know how I can
2 present this without appearing argumentative, but
3 we looked at some exception stuff in the
4 cooperating agency meetings, and I can't talk about
5 that right now without violating NEPA.
6 The answer to your question is yes, but I
7 would point out that Tony Apa was on the NTT
8 committee, so...
9 Another question I want to ask is what's
10 the thought here in terms of the -- there was a lot
11 of discussion of private lands? What's the
12 prevailing perspective here in terms of how this
13 BLM planning exercise affects private lands?
14 MR. JARMAN: Okay. So we'll jump ahead I
15 guess to the map here shows -- that's a great
16 question, Jim. The map here shows -- you can kind
17 of see it by using the cursor here to get you
18 focused. Okay. BLM is in yellow, all right.
19 And you've got the split estate in green,
20 which kind of comes out here. It's hard to see a
21 little bit, but the green general habitat.
22 But in any event, taking the leks -- we
23 took these leks that were in the BLM here and
24 applied the 4-mile buffer, and so this is the
25 extent of the BLM authority at of this line where

1 my cursor is pointing. Everything south of this is
2 all private land. And the same is true with all of
3 these.
4 So pick your BLM, pick your lek, but then
5 you apply the 4-mile buffer. So that's the
6 question that we have.
7 MR. CAGNEY: Okay. So what we're doing
8 is we're doing a planning exercise that addresses
9 public resources, public land to start out with.
10 So if it's federal minerals and private surface,
11 then we can apply any terms and conditions we want
12 on the public leaseholder, okay.
13 So if we lease some of the federal
14 minerals, we can talk about distance from leks in
15 our authorizations or whatever we do. We have no
16 similar authority of private landowners. So we're
17 not doing any planning on surface owners.
18 So there will be no requirements on feed
19 lands and feed minerals. On public minerals,
20 private surface the requirements would be only on
21 the BLM permittee lessee type thing.
22 And now the third issue that interplays
23 on that, that if we're trying to manage by surface
24 caps, then what private landowners do might affect
25 what the BLM can authorize.

1 If we exceed the cap for a management
2 unit, then private landowners could conceivably
3 work -- you know, use up the cap. And then the way
4 I understand it, that we would be stuck, you know,
5 subject to valid existing rights, which, of course,
6 I don't have any authority to change.
7 So that's what the situation is on that.
8 Is that clear?
9 COMMISSIONER JANKOVSKY: So when we go
10 back to that map, then once we hit that BLM line,
11 even though they're half a mile from the lek or a
12 quarter mile from the lek be, then you are not
13 going to have any authority on private land, which
14 is on the other side of the line.
15 MR. PETTERSON: Unless it's a federal
16 nexus.
17 COMMISSIONER JANKOVSKY: Unless it
18 becomes an endangered species.
19 MR. PETTERSON: Unless there's a pipeline
20 that goes across BLM land, that flat forest thing.
21 MR. CAGNEY: Thank you. That's a true
22 statement.
23 COMMISSIONER JANKOVSKY: And then the
24 other thing I heard you say is that existing leases
25 that are already on BLM land would or would not be

1 affected. Because I mean when you look at that, at
2 least in that top northern section, there are --
3 the green is existing wells, correct?
4 MR. JARMAN: Right.
5 COMMISSIONER JANKOVSKY: And then the red
6 is permitted wells. You can see some of those are,
7 you know, right within leks. And so at this time
8 you're saying that those would not be affected.
9 MR. CAGNEY: I'm saying that I personally
10 don't think I have any authority over anybody's
11 valid existing rights. You've either got them or
12 you don't. Obviously, those come into dispute
13 sometimes and then the courts decide that.
14 But BLM solicitors have looked at the NTT
15 report and they feel like we haven't usurped
16 anybody's valid existing rights.
17 COMMISSION JANKOVSKY: Okay. Thank you.
18 MR. JARMAN: Okay. We'll come back here.
19 I want to talk a little bit more about the
20 difference in landscape here and between the top
21 slide picture is what the scientific basis has been
22 so it's been cited in the NTT. That's the
23 Pinedale, Wyoming area. And then the bottom is the
24 PPR area that we experience in Garfield County.
25 And so what I'm trying to understand

1 really from you from a science basis, is it your
2 belief that that model to use in the top photograph
3 from a science basis makes sense for what our
4 Garfield landscape experience is.
5 MR. CAGNEY: Okay. I would offer that
6 there's more than just the terrain features. I
7 mean our stuff has, for example, patches of Pinion
8 Juniper.
9 And so we when map the priority habitats,
10 they couldn't do that at a scale that precluded
11 getting into different habitat types in the
12 Colorado area.
13 So in the sub-regional alternative that
14 we're working on we're trying to address that type
15 of thing.
16 MR. JARMAN: Okay. Do you want to talk
17 about this?
18 MR. PETTERSON: No, I think, you know,
19 one of the questions that the County has brought up
20 is, you know, where does the 4-mile buffer come
21 from.
22 And I think to -- you know, and looking
23 at the literature that's cited in the NTT report,
24 pretty much comes down to this table, which is in
25 the big Grouse book, Connelly and -- I forget the

1 other author's name. And it pretty much comes down
2 to this, is what we can find.
3 And it's pretty much a collection of
4 studies from Wyoming, the greater Pinedale area and
5 some of the work that's up in the Powder River
6 Basin.
7 And, you know, again it's like, okay,
8 well, if this is the scientific basis, you know, is
9 there going to be room through the EIS process, you
10 know, how is this long-term going to be managed at
11 a scale of like the Garfield County, as other
12 information becomes available because I'm sure
13 they'll be one -- well, one would hope that there's
14 some more studies out there.
15 There's just a lot of concern about that
16 initial flush of, you know, wait a minute all the
17 studies are from the Pinedale in Wyoming. We've
18 got a lot different of a system and ecology and
19 Grouse going on down here.
20 Are we going to, you know -- is there
21 going to be some kind of a marrying of the local
22 conditions to the NTT to bridge that gap based on
23 the differences in topography and numbers of Grouse
24 and lek attendants and just where the Grouse are
25 living up there?

1 So I think there's just a lot of initial
2 concern about, you know, where is this going. Is
3 this all based on studies up in Wyoming and the
4 Pinedale.
5 MR. CAGNEY: What's the local plan say
6 about that?
7 MR. PETTERSON: About what? 4-mile
8 buffers? Local plan says 4-mile buffer, no more
9 than 1 percent impact in 4-mile buffer.
10 MR. CAGNEY: Okay, that wasn't a set-up
11 question because --
12 (Inaudible speakers.)
13 MR. PETTERSON: I'm not a Grouse
14 biologist.
15 MR. CAGNEY: I mean that was not a
16 deliberate attempt to set you up.
17 MR. PETTERSON: No, no, that's fine.
18 COMMISSIONER JANKOVSKY: Eric, can you
19 explain this graph?
20 MR. PETTERSON: Well, pretty much.
21 MR. JARMAN: Well, it's an regression
22 analysis is what this is basically.
23 MR. PETTERSON: Based on various studies
24 in Wyoming, these are the -- what they're seeing as
25 far as -- number of Grouse that are attending a lek

1 based on the distance to the closest drilling rig
2 in kilometers. And the further out you get, the --
3 yeah, the more male Grouse are attending the lek.
4 And so based on a, you know, 4-mile
5 buffer, which is 6.5 kilometers, we're coming
6 upright around in here, which -- so pretty much the
7 science is showing that within a 6.5 kilometer
8 buffer you're still seeing about a 20 percent
9 decrease in lek attendance for males.
10 MR. CAGNEY: So it used to be a quarter
11 mile. We went a long time with a quarter mile now
12 it's 6/10 of a mile. That was the standard. And
13 the basic --
14 MR. PETTERSON: The four mile is down
15 here.
16 MR. CAGNEY: And the basic premise now --
17 and I mean I only know what I've been told on
18 that -- is that 80 percent of the females next
19 within 4 miles of a lek. So that's where that
20 4-mile thing comes from.
21 Now, you know, if you're going to look at
22 Fred's pictures and say in our country sometimes
23 that's across a giant canyon, you know, obviously,
24 you know, we need to look at the terrain.
25 MR. PETTERSON: Yeah, and I think

1 that's -- you know, cut to the chase as the
2 question is is there going to be that ability or if
3 the EIS goes through is gonna be nope, the 4 mile
4 is the 4 mile and it doesn't matter. You know what
5 side of the canyon you're on.
6 MR. CAGNEY: No, we've already worked on
7 some different stuff.
8 MR. PETTERSON: And I do think there's
9 some really good research out there on this 4-mile
10 buffer stuff. We're not questioning the science
11 behind it.
12 MR. JARMAN: Okay, let's jump to habitat
13 here. So the two -- you've seen both of these,
14 Jim. So the slide on the left is what you've
15 already reviewed in the PPR, and so that is that's
16 also mapped by CDOW in 2008.
17 And then the image to the right is the
18 same now -- then the CDOW, now Colorado Parks and
19 Wildlife mapping four years later.
20 So the overall range appeared to be the
21 same, but it appears that the primary habitat for
22 the Grouse in the slide image to the left shows the
23 dark colors are where the primary habitat falls.
24 So the question that sort of piqued our
25 interest was what's the big change in habitat from

1 four years ago to today.
2 MR. CAGNEY: I'm going to defer to Parks
3 and Wildlife on that. I'm playing the hand I got
4 dealt.
5 MR. JARMAN: Is this the mapping, though,
6 that you're using for the NTT for the alternatives?
7 MR. CAGNEY: Uh-huh.
8 MR. JARMAN: Okay.
9 COMMISSIONER JANKOVSKY: So I guess the
10 one thing we're seeing there is on the PPR plan
11 that, you know, the primary habitat is on -- just
12 on the ridge tops, and in the Sage Grouse -- in the
13 Sage Grouse habitat.
14 While it seems like on the NTT report
15 we've got more of a broad brush approach to that
16 where it's just -- it takes up not only primary
17 habitat, but everything in between.
18 It could take -- in there there is --
19 there are the difference in elevations and there's
20 also just black timber in there in some of that
21 habitat. There's just things that aren't
22 Sage Grouse habitat, aren't Sage habitat.
23 MR. CAGNEY: And that's a matter of
24 scale. So we need to address -- and the
25 alternative that we're working on is called the

1 sub-regional alternative.
2 And we've got to address the possibility
3 that some of these things inside what's mapped at
4 the broad scale as prairie habitat, it could be a
5 stand of Pinion Juniper or the side of a -- the
6 shale lease side of the mountains, there you go.
7 We know about that. Just to -- not to nitpick, but
8 there's no map in the National Technical Team
9 report.
10 MR. JARMAN: This is the mapping that you
11 provided (inaudible).
12 COMMISSIONER JANKOVSKY: And you're
13 saying that's Parks and Wildlife mapping?
14 MR. CAGNEY: Yeah. We had been using an
15 occupied habitat map for a long time. And as part
16 of this project, Parks and Wildlife made that map.
17 COMMISSIONER JANKOVSKY: So that when we
18 meet with Parks and Wildlife then on the 7th, that
19 would be a good question for us to ask them.
20 MR. CAGNEY: Right.
21 MR. JARMAN: Do you have anything else on
22 this one?
23 MR. PETTERSON: The other thing that we
24 had Garfield County's GIS person produce is a map
25 showing the different sagebrush habitat types

1 within this area.
2 A lot of it typed out as not exactly
3 great habitat up there and it's kind of an internal
4 -- not internal, but, you know, let's see what's up
5 there. I mean it's tough to get up in that country
6 and actually see what's up there, so we're just
7 going off some GIS to see how that's mapped at this
8 time. And a lot of it's mixed mountain shrub type
9 communities, so...
10 MR. CAGNEY: Right. And Parks and
11 Wildlife didn't map it at that scale. I mean they
12 didn't want to put a map of swiss cheese on the
13 table they identified, the blocks on the outside.
14 And, you know, occasionally they did some
15 things like, you know, take out a parcel like the
16 town of Meeker that was big enough.
17 But I would assume that they thought that
18 those kind of issues would be addressed in the
19 implementation phase. And like I say, we have
20 worked on some language to deal with that.
21 COMMISSIONER JANKOVSKY: And, again,
22 that's just our concerns just in dealing with these
23 studies. That gets said, but once the study gets
24 out there, then the mapping gets referred to and we
25 all know that even sometimes a line on a map can

1 make a huge difference in how something is
2 identified.
3 MS. BYFIELD: Have you ever prepared an
4 EIS that has the candidate conservation agreement
5 component and a candidate conservation agreement
6 with assurances component?
7 MR. CAGNEY: Well, the latter doesn't
8 apply to the BLM, so no. And the other one, even
9 though it does apply to the BLM, I've never
10 finished one.
11 MS. BYFIELD: The BLM in New Mexico did a
12 program and they amended their resource plan that
13 had the CCAA component to it. And they did an EIS
14 process --
15 MR. CAGNEY: For prairie chicken?
16 MS. BYFIELD: No, the lizard, Dunes
17 Sagebrush Lizard. But the CCA component is a
18 voluntary component, and they had to go through the
19 environmental analysis, impact analysis on that.
20 It might be when you're asking the question of how
21 do you -- and I understand the question and the
22 dilemma -- which is how do you analyze the impacts
23 in your EIS on a voluntary measure?
24 There might be something to take a look
25 at to see how they prepared that. Fish and

1 Wildlife ultimately relied on that in their final
2 decision.
3 MR. CAGNEY: Okay.
4 MS. BYFIELD: And, also, I wanted to
5 point out that the PPR program managed by Colorado
6 Parks and Wildlife, they do do pretty regular
7 reports, semi-regular reports.
8 And I'm just looking online at their
9 reports and their latest one was in 2010. And it's
10 about a 45-page report on the particular work that
11 they've done and their monitoring in that process.
12 So there have been -- there has been follow-up with
13 Parks and Wildlife on that to answer that question.
14 MR. JARMAN: Okay. So again, back to the
15 terrain here. You can see why we have questions
16 about how that applies and the science behind it
17 I'm just looking for some answers behind that.
18 We've worked through this little bit with
19 the habitat questions. It sounds like what you're
20 saying, Jim, is really the habitat as it's mapped
21 is not a BLM issue, per se, as it is a DOW or CPAW
22 issue. Is that what I'm hearing you saying?
23 MR. CAGNEY: Yeah. I know some BLM
24 biologists looked at that map, but I'm accepting
25 that map verbatim as though that was a constant in

1 the equation, once that came out in January.
2 That's a done deal for me. I'm not questioning
3 that map. I don't think it's my place.
4 COMMISSIONER JANKOVSKY: And again, that
5 is a Parks and Wildlife map?
6 MR. CAGNEY: Yeah, they made that map.
7 COMMISSIONER JANKOVSKY: And that is a
8 habitat map?
9 MR. CAGNEY: Yes, sir. It's priority
10 habitat and general habitat and then there's a kind
11 of activate piece also.
12 COMMISSIONER JANKOVSKY: Right.
13 MR. JARMAN: I think I'll leave it
14 here -- well, let's go back here. So this final
15 slide -- I think it's the final slide, anyway --
16 shows the lek data that is placed over the
17 topography, again for Garfield County, but it also
18 shows as you apply the 4-mile buffer outside of the
19 red circles, which are the lek sites.
20 And so, of course, a lot of that is
21 private ground towards the south, and then much of
22 the land on the north quarter with Rio Blanco
23 County is in either public land in BLM ownership or
24 split estate ownership in particular up in this
25 area. But the net effect is you have a 4-mile

1 buffer that covers a great deal of ground.
2 We've talked about that a little bit. I
3 think we're interested at this point in talking
4 about the 3 percent cap for disturbance, and
5 understanding, in your words, where the 3 percent
6 science comes from.
7 MR. CAGNEY: What I've been told --
8 again, I'm not a Grouse biologist, but I've
9 certainly heard this dialogue many times, okay. So
10 this is what I've heard, okay. It's 1 per 640
11 acres.
12 One per section is what the preponderance
13 of the evidence is is the Grouse stopped using it,
14 whether they get predated or whether they just --
15 you know, whatever it is, that that appears to be
16 the threshold.
17 On the Wyoming 5 percent, the NTT 3
18 percent, those are a pair of interpretations on
19 what you end up with if you do the 1 per square
20 mile.
21 MR. JARMAN: One what? I'm not sure I
22 understand what you mean.
23 MR. CAGNEY: One disturbance per square
24 mile.
25 MR. PETTERSON: Oh, one disturbance. And

1 does it matter what kind of disturbance answer it
2 is? Do they quantity that or --
3 MR. CAGNEY: That's pretty open-ended.
4 We're going to have a meeting to start trying to
5 hammer that out for clarity. Because if we're
6 going to have a cap, we're going to have to be
7 clear on how to manage a disturbance.
8 And then by corollary you have to
9 identify when you're going to call it undisturbed.
10 Because if you're managing caps, there has to be a
11 path for something that was disturbed to come off
12 the disturbance list and free up capped space.
13 So we're going to get together early next
14 month with the BLM and get something on the table,
15 and we will run that by the cooperating agency
16 process.
17 MR. JARMAN: Why did Wyoming pick the 5
18 percent, do you have any idea?
19 MR. CAGNEY: That was an interpretation
20 of 1 per 640.
21 MR. JARMAN: So the 1 per 640, what I'm
22 hearing you say is one disturbance per 640 equals
23 anywhere between 3 and 5 percent should be okay per
24 section.
25 MR. CAGNEY: Something like that.

1 MR. JARMAN: Which is like 19.2 to 23
2 acres, I guess.
3 MR. CAGNEY: Is that what it is?
4 MR. JARMAN: Yeah, per section. But
5 you're saying the BLM is looking at a different
6 area to apply the cap than per section.
7 MR. CAGNEY: Yes. And just for
8 conversation sake, the White River Resource
9 Management Amendment, I mean that assumes that a
10 well, you know, including the access road, is only
11 12 acres. And that's at its moose acute point.
12 And then as you scale it back and -- you
13 know, because you have both disturbance and
14 disruptive features. So when you're actually
15 drilling the well, then you have a disruptive
16 imprint right there, too.
17 So then you've got to buffer it because
18 of the noise and the activity and that type of
19 thing. But then when you finish a well and it's
20 just in production and, you know, the interim
21 reclamation takes place, then you can bring that
22 back, and that's how things become undisturbed. So
23 we have to have something like that.
24 And I don't want to get into a
25 pre-decisional thing here, but count on us trying

1 to not reinvent the stuff that was already been
2 thought through in that White River Resource
3 Management Plan Amendment.
4 MR. BOYD: Which is just available online
5 on Wednesday, taking the BLM Colorado site plan,
6 that White River filed office oil and gas
7 amendment.
8 COMMISSIONER JANKOVSKY: And we were a
9 cooperating agency in that.
10 MR. JARMAN: Let's go back and get a
11 better slide here.
12 Okay. So back to the issue of the 3
13 percent, this is stuff that you've heard, is what
14 you're telling me, but is there science that we can
15 look to?
16 Is there hard science that says yeah, the
17 3 percent -- or this one disturbance per 640, is
18 there something that you can send us shows, Fred,
19 here, look at this, this is what we're saying
20 because that would be very interesting to see.
21 MR. CAGNEY: I'm sure I can, but I'm sure
22 those citations are in the NTT report.
23 MR. PETTERSON: I can get you the
24 citations and those citations offer -- they're all
25 with regards to leks from drilling activity. And

1 so we were kind of having to make a pretty -- not a
2 huge jump, but a jump from like, well, so if we're
3 going to look at, you know, studies that look at
4 lek impacts from drilling, where's the -- you know,
5 is it a model? You know, what was the mechanism to
6 go from those type of studies to the caps, the
7 surface area impact caps.
8 And the way it's cited in NTT is kind of
9 like, well, you know, based on professional opinion
10 from reviewing all these papers, we're going with 3
11 percent. And I think that it's -- you know,
12 everyone's starting to picknit (sic), so...
13 UNIDENTIFIED SPEAKER: Everyone's
14 starting to what?
15 MR. PETTERSON: Everyone is picking nit.
16 So we're like, well, okay, we've looked at these
17 studies, but none of these studies say 3 percent
18 or, you know, have these caps spelled out in the
19 studies.
20 So then it's you know if we wanted to try
21 to get a little bit more information you know is
22 there something more concrete you know. Is there a
23 study that does have looks at surface impacts and
24 not just impacts from like a drill rig and then lek
25 attendance, you know, based on buffers.

1 MR. JARMAN: Jim, if you had something,
2 could you forward it to us, something that's more
3 specific on the 3 percent? That would be great.
4 COMMISSIONER JANKOVSKY: Yeah, maybe we
5 can talk to some of the scientists advertises
6 that -- or biologists that put
7 the NTT report together, talk to them directly.
8 Fred, if you'd go back to the slide, it
9 just shows a number of wells in the area of the --
10 and, you know what, you can see that, you know,
11 it's almost highly industrialized in that area, the
12 PPR report is.
13 I know in Unitah County they were able to
14 pull out -- in Utah in general they were able to
15 pull out some areas and say: Look, these are
16 already -- they're highly industrialized, they were
17 able to separate them from the mapping and so forth
18 because they were so industrialized.
19 And I guess then to add to that is from
20 what I've read, there are 300 -- low end, 180,000
21 Sage Grouse in the United States to 360,000 Sage
22 Grouse.
23 Those are the information that I've seen
24 anyway, which is a lot of Sage Grouse. And so I
25 guess it's not for me to question if it should be

1 listed or not.
2 But in our area we are at about 500
3 Sage Grouse. And you can see from the leks and so
4 forth, we've got leks, they've got wells on them,
5 proposed wells on them and everything else and
6 we're going to find out from the state how well
7 the -- that population is doing.
8 But I just -- I just look at this and go:
9 Oh, we are so industrialized in this area that I
10 mean should this even be part of the overall plan
11 or should this just be pulled out and saying:
12 Look, you guys already got a lot of wells, a lot of
13 roads, a lot of activity going in there.
14 Is the PPR -- really, is it -- does it
15 have the same criteria as other sections where
16 there's not as much disturbance? And I know you go
17 up into -- I think in Colorado there's not a lot of
18 birds, but I think we're somewhere around 9,000 or
19 so birds, 6 to 9,000, with the majority of them
20 being in Moffat and Jackson County.
21 So I think when you get into an area
22 that's this industrialized already, we have -- we
23 definitely have ongoing conservation for the bird
24 with our PPR plan.
25 But if you come back in with these kind

of restrictions or so forth that are in the -- potentially in the NTT report, in the EIS, is it going to have any effect on the population here.

And I guess that's a question and like Utah, can certain areas be pulled back out where there's already a lot of industrial activity.

MR. CAGNEY: I'm working with the Governor's map, so I would argue that that map is more to do with you than it is to me.

COMMISSIONER JANKOVSKY: So the state of Colorado is who that -- who we'd need to direct that question to?

MR. CAGNEY: That's right. If you're suggesting that just by taking a little bit of habitat you could remove several billion dollars worth of natural gas from the table, I noticed that.

The other issue becomes if we finish these density calculations, are we going to have some areas where the Grouse population appears to be doing okay, but we're already in excess of the cap? I'll be anxious to see that.

COMMISSIONER JANKOVSKY: That gets us back to socio-economic studies, you know, you're right. Several billion dollars worth of natural

1 gas and millions of dollars back to the County in
2 property taxes.
3 So there is a socio-economic factor there
4 that may not be anywhere else in this State of
5 Colorado to this scale.
6 And the interesting thing is, in looking
7 at the PPR report, the majority of the leks are in
8 the southern half of the PPR, not the northern
9 half, but the majority of the well activity's in
10 the southern half of the PPR plan.
11 MR. CAGNEY: I would argue that's only
12 because of the deferrals based on Roan and the
13 White River RMP, but that's probably true right
14 now.
15 MR. JARMAN: I had a question, Chairman,
16 sort of along the same lines. You know, as I read
17 the NTT, there's not much in there in the way of
18 seasonal restrictions or seasonal stipulations.
19 But the PPR does talk about timing
20 restrictions and how that might be applied so that
21 both disturbance could happen, as long as it
22 happens outside of the particular time frames,
23 whether it's March to May, you know, some of these
24 different types of time frames that are required
25 for nesting for the bird.

1 Can you tell us -- that is a suggestion
2 in the PPR. Why couldn't that work in the EIS?
3 Have you thought about that?
4 MR. CAGNEY: Every population is
5 different. That would work in a lot of different
6 places. I mean there was a lot of birds where if
7 you did a timing limitation right by the lek and a
8 4-mile buffer around that, you would have 80
9 percent nesting success, which I think most people
10 would argue would be adequate.
11 Then you also have populations where
12 there's a pretty substantial movement between
13 winter range and summer range. And they're moving
14 far more, you know, with the chicks after they're
15 old enough to get around.
16 And if you get blockages in between
17 winter range and summer range, then you extricate
18 that group and nobody knows which group is what
19 right now. And we are starting to get some
20 instances on that with telemetry data, but we don't
21 have that sorted out.
22 COMMISSION JANKOVSKY: And again, in
23 Moffat County they are -- you know, they're showing
24 that the bird will sometimes travel 60 miles or so
25 forth, but I don't know if this particular

population is.

And it would be interesting to see if there they're connecting with the birds back up north. If there is connectivity or not, that would be important to us.

MR. CAGNEY: They're wintering, they're leking and they're nesting way down in the desert and then they're summering on -- not high mountain meadows, but, you know, foothills like Perry and stuff.

COMMISSIONER JANKOVSKY: And the other thing is that the habitat. I mean even though we have a lot of activity here, I we believe our habitat's actually pretty good habitat.

The sagebrush is pretty good. We don't have a lot after cheat grass and that type of thing. So I kind of remember from our last meeting you said the habitat in Colorado was pretty good for Sage Grouse.

MR. CAGNEY: Certainly compared to southern Idaho.

MR. JARMAN: That's all I have I think for right now.

COMMISSIONER SAMSON: Okay. Did we get A, B, C taken care of?

MR. JARMAN: Yes.

COMMISSIONER SAMSON: All right. Socio-economic analysis. We did talk about the 4-mile buffer, but I guess you want to talk about that in regards to multiple use?

COMMISSIONER JANKOVSKY: Well, you know, again, we are going to do our own socio-economic study and we would like to have that be part of the socio-economic study that's going to be done by the BLM, have those numbers included.

There are -- I mean oil and gas development's very important for our County, very important for jobs, very important for taxes.

It's a big part of the western side of our County, so we definitely would like to be able to work with your socio-economic people that are doing the report for the EIS and have at least our study looked at.

COMMISSIONER SAMSON: There won't be any problem with that, will there, Jim?

MR. CAGNEY: No, I don't think so.

COMMISSIONER JANKOVSKY: I guess kind of where we're headed is that we want to continue to coordinate with the BLM. We are going to meet with the Colorado Parks and Wildlife and work with the

1 Governor's report.
2 The Governor and the State of Colorado
3 are real important in this process. We will be
4 bringing on the same -- have the same message there
5 on the Governor's group and the state report, and
6 that is what you've seen here as far as how the
7 geography is very important.
8 The number of wells and so forth that are
9 in this area, how important they are for our County
10 and for our citizens, and just the whole message
11 that you kind of heard from us today is we're going
12 to do that with the Governor.
13 We'd also like to -- and we'll see how
14 well we're received by Fish and Wildlife, have some
15 sit-down meetings with Fish and Wildlife as well to
16 talk about some of this.
17 Because you guys are doing habitat, Fish
18 and Wildlife and the State of Colorado are managing
19 the bird, and so we have to somehow pull all that
20 together so it makes sense for our County. And for
21 the bird, for that matter, so...
22 COMMISSIONER SAMSON: Did you have
23 something else, Fred?
24 MR. JARMAN: No.
25 COMMISSIONER SAMSON: Last call.

1 COMMISSIONER JANKOVSKY: I would like to
2 set another meeting date. It may not be -- maybe
3 we're -- and we have missed the last couple
4 cooperating agency meetings, and that's been
5 primarily because of our schedules. We've just had
6 conflicts with our schedules.
7 The one on the 13th of July that was
8 called, it was a short call on that. We had
9 conflicts. And then on August 9th we were -- had
10 an employee appreciation day where we were all
11 here. Maybe it was later in August. It was just a
12 couple weeks ago. But we do plan to participate.
13 We are definitely involved, very closely with the
14 other counties in Colorado.
15 We have had some discussion with some of
16 the counties in Utah as well concerning
17 Sage Grouse.
18 But I would like to set another meeting
19 date. Maybe it's not a -- maybe it's later in
20 October because we would like to meet with the
21 State of Colorado, and if we can, start some
22 preliminary meetings with Fish and Wildlife.
23 So we would like to be able to talk to
24 the scientists that are coming up with this
25 information and get more information for ourselves

1 so we can become better educated and move forward,
2 but I would like that.
3 The one question there, which is when we
4 had -- is this particular area, the PPR, is it so
5 industrialized already that it may not be need to
6 be part of the overall plan for Sage Grouse
7 protection.
8 And maybe we go the direction of where we
9 work with our voluntary plan and so forth and move
10 forward with that, because it is highly
11 industrialized and the birds are working right now
12 within what's going on.
13 We showed some growth last year and the
14 number of birds that were there the year before,
15 but sometimes you wonder was there growth or was
16 that just -- were they counted better, all those
17 things because it's not easy to get out there and
18 count those birds on the ground.
19 MR. CAGNEY: Well, if you're successful
20 in altering that map or anything like that, then I
21 say good on you, but that's not my walking orders
22 right now, is to argue about that map.
23 COMMISSIONER JANKOVSKY: And you feel
24 that's more from the State than it is from Fish and
25 Wildlife?

1 MR. CAGNEY: It's not my place in this
2 process to argue about that map. You know, I've
3 got to have some (inaudible) from where I'm going,
4 and I can't make progress forward if I'm arguing
5 about all the steps that happened backwards.
6 Now, if you've got a different take on
7 something and you're successful in making a change
8 on that, then that's fine with me.
9 MR. BOYD: But the map was generated by
10 the state.
11 MR. CAGNEY: I mean BLM biologists looked
12 at that map and gave some input, but that's a state
13 map. In terms of skipping industrial areas like,
14 you know, the (inaudible) field, Wyoming cut those
15 out in their (inaudible) area program.
16 UNIDENTIFIED SPEAKER: Right.
17 MR. CAGNEY: But I've got to tell you,
18 they did that over the course of years and years
19 while they were working on that. And trying to do
20 that if you 11th hour now is -- I wish you the very
21 best on that.
22 MR. GORGEY: Jim, if I could ask you just
23 one more question about trying to reconcile the
24 local plans. And you talked about a timeline and
25 that at one point May of 2012 was the target.

1 That deadline's passed. And one of the
2 goals that we're trying to do is to avail ourselves
3 of any right we have under federal law to
4 coordinate with you as to the specifics of our plan
5 and how it impacts our swatch of the County here or
6 our County and our little swatch of the overall
7 area.
8 And when we talked about this last -- in
9 July, there was some goal -- my recollection was
10 there was a goal that in order to not slow anything
11 down that the individual plans that you have would
12 be considered within -- they would actually be
13 looked at individually.
14 And so to give an individual treatment --
15 and I do not want to give you -- get you into sort
16 of a pre-decisional posture here, but we are trying
17 to get a sense for how long it will take to
18 consider these individual plans going forward.
19 And we're trying to get some target date
20 so that we will know how much time we have to get
21 done the things we're trying to get done.
22 MR. CAGNEY: I don't have an update from
23 that schedule.
24 MR. GORGEY: Okay.
25 COMMISSIONER JANKOVSKY: When could we

1 get an update on that?
2 MR. CAGNEY: As soon as I have it. I
3 mean the main issue is I've got to get some
4 preliminary work done on working on that
5 disturbances. And I've got to see how that goes.
6 That's really important for both
7 describing affected environment and doing the
8 impact analysis. And, really, we can argue 3
9 percent, 5 percent until the -- you know,
10 indefinitely, but if we don't have a clear
11 understanding of how we're going to calculate that,
12 then that's really pretty wide open.
13 So I have to do that next. And when
14 we've got that done, then we can put together a
15 schedule where we can actually see it.
16 I mean I consider that to be the main
17 event right now, is figuring out how we're going to
18 manage those disturbances and how we're going to
19 calculate it and how we're going to manage the cap,
20 those kind of ground rules. That's the main event
21 right now.
22 I got to tell you, Drew, I've got a
23 completely different recollection of our
24 conversation about that plan.
25 We had a long conversation about how I

1 tried to incorporate five local BLM plans and how
2 that didn't work. And I said, what I thought
3 really clearly, is that I couldn't redo that
4 process with all the local working group plans in
5 that --
6 MR. GORGEY: Right.
7 MR. CAGNEY: -- and that we were going to
8 get together and we were going to reconcile that
9 through the cooperating agency process.
10 That was my only chance to do that, and
11 that's what I thought I said, and that's not what's
12 in that letter that you sent.
13 MR. GORGEY: Well, but that is the
14 answer, right? I mean you're saying that you would
15 reconcile them through the cooperating agency
16 process.
17 MR. CAGNEY: Right, and I have to have --
18 you know, and if you look at BLM land use planning
19 document, you have those tables where you can
20 compare point to point what the difference between
21 the alternatives are.
22 UNIDENTIFIED SPEAKER: Yes.
23 MR. CAGNEY: And I can't have many
24 different alternatives differences put together in
25 wildly different formats and then expect the public

1 to understand the difference. I have to have a
2 role by role analysis of those alternatives.
3 MR. JARMAN: Jim, and that's what you
4 referred to as the sub-regional alternative?
5 MR. CAGNEY: Yes.
6 MR. GORGEY: Okay. In terms of
7 scheduling a follow-up meeting to this meeting, the
8 commissioners generally meet -- the reason you're
9 here today is commissioners have their standing
10 meetings the first three Mondays of the month,
11 leaving the fourth Monday open. So the next two
12 dates that fit that are September 24 and October
13 22.
14 (Scheduling discussion was discussed.)
15 COMMISSIONER SAMSON: All right. Is
16 there anything else?
17 COMMISSIONER JANKOVSKY: No, I would like
18 to say, you know, I understand where you're coming
19 from, Jim, and there's a lot of work that you guys
20 are having to do on this.
21 And it's mandated to you, it's not
22 something that you guys probably would have done on
23 your own, but at the same time we feel strongly
24 about the geographical issues that we've presented
25 and questions on the 4-mile buffer and 3 percent

disturbance, and also the importance of this landscape to our County from a socio-economic standpoint.

And we need to continue these meetings for those reasons, because it's very important to our County and I understand the questions about the bird being listed, but again, when I go back to there's -- I mean the numbers are huge, 180,000 to 360,000, I just question that the bird should be listed. But that's not mine to say. That goes back to the Fish and Wildlife and to some extent the judicial system.

MR. CAGNEY: As long as they don't get listed because I didn't get my job done. That's the one thing that I really, really care about in terms of, you know, me second-guessing the listing decision.

Nobody cares about that. I want to make sure that I don't cause that to happen because I didn't get this matter dealt with.

COMMISSIONER SAMSON: Fair enough.

COMMISSIONER JANKOVSKY: I don't disagree with that. There is a big picture, which is habitat which you're dealing with. Actually the actual taking care of the bird and which is Fish

1 and Wildlife's and Parks and Wildlife, they're in
2 charge of the species itself and the care of that
3 species.
4 So there's some moving parts to that
5 entire piece, which Garfield County -- at least in
6 Garfield County can help with because we with work
7 with all three agencies.
8 COMMISSIONER SAMSON: Last call.
9 Anything?
10 MR. GORGEY: No.
11 COMMISSIONER SAMSON: Carey, are you
12 sure?
13 All right. Jim, I'll let you have the
14 last word. You're our guest.
15 MR. CAGNEY: No, I don't have anything
16 profound.
17 COMMISSIONER SAMSON: Okay. Well, thank
18 you once again for coming.
19 UNIDENTIFIED SPEAKER: All right.
20 Appreciate it.
21 COMMISSIONER SAMSON: And we will look
22 forward to seeing on Tuesday, the 23rd of October,
23 at 1:00 p.m. Thank you very much.
24 (The hearing was concluded.)
25

1 REPORTER'S CERTIFICATE

2 STATE OF COLORADO)
) ss.
3 COUNTY OF ADAMS)

4 I, Geneva T. Hansen, do hereby
certify that I am a Professional Shorthand Reporter
5 and Notary Public within the State of Colorado.

6 I further certify that the foregoing
transcript constitutes a true and correct
7 transcript to the best of my ability to hear and
understand the audio recording.
8
I further certify that I am not related to,
9 employed by, nor of counsel for any of the parties
or attorneys herein, nor otherwise interested in
10 the result of the within action.

11 IN WITNESS WHEREOF, I have affixed my

12 signature and seal this 11th day of May, 2013.

13

14 My commission expires 11-18-15.

15

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16 GENEVA T. HANSEN

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AUDIOTAPED BOARD OF COUNTY COMMISSIONERS

OF GARFIELD COUNTY

WORK SESSION MEETING

108 8th Street, Room 100

Glenwood Springs, Colorado

September 5, 2012

9 a.m.

Re: BLM SAGE-GROUSE MEETING

APPEARANCES:

Commissioner John Martin - Chairman

Commissioner Tom Jankowsky

Commissioner Mike Samson

Dan Neubaum, Wildlife Biologist

Kathy Griffin, Species Conservation Coordinator for the State for Grouse

Brad Petch, Parks and Wildlife

Fred Jarman, Director of Planning Community Development

(Garfield County Work Session starts at 1:07:03.)

CHAIRMAN MARTIN: Let's go ahead and introduce everyone at the table and then talk about Sage-Grouse.

MR. NEUBAUM: Commissioners, thanks for having us here today. My name is Dan Neubaum and I'm the Wildlife Biologist out of Grand Junction office and I help coordinate the Parachute Piceance-Roan working group that we've had over the years. I inherited it from a previous Division of Wildlife biologist, John Toolen.

MS. GRIFFIN: My name is Kathy Griffin. I'm the Species Conservation Coordinator for the State for Grouse. So I work with Gunnison Sage-Grouse, Greater Sage-Grouse and Columbia Sharp-Tail Grouse out of Grand Junction.

CHAIRMAN MARTIN: As known as a lesser Grouse?

MS. GRIFFIN: Exactly. We'll be changing the name soon.

MR. PETCH: Good morning, Commissioners. I'm Brad Petch. I'm the Senior Terrestrial Biologist for Parks and Wildlife in the northwest region.

CHAIRMAN MARTIN: Welcome, guys. We really appreciate you coming. Take off.

MR. JARMAN: I'm going to set this up a little bit, Chairman, if that's all right.

CHAIRMAN MARTIN: Fred, go ahead.

MR. JARMAN: Okay. Thank you. And welcome. Thank you all very much. I echo the Commissioner's comments. Thank you a lot for coming to visit with us on this.

What I want to do is walk through the presentation I just handed to you, share some of the thoughts that we shared with the BLM just on August 27th that really talks about the Garfield County portion of the PPR and how that stacks up against the NTT report and really boiling it down to the mapping.

And so the questions that we have really seem to focus around the mapping and how that pertains to our county and the various topography that we have.

So we're really trying to see if there's any variability in the mapping, I guess is the best way to put it. So that's part two, I guess. I jumped ahead.

Part one is really understanding the PPR.

1 And it seems maybe you all really are the best
2 experts at what's going on with that plan and how
3 it's being implemented. So I really appreciate you
4 being here and sharing Dan with us today. That's
5 kind of the way I see it unfolding.
6 (PowerPoint presentation begins.)
7 This is just a cover of both of the plans.
8 One, of course, to the left you know very well, and
9 to the right, I think, at this point you know very
10 well as well, which is the NTT.
11 This is just a shot of the national range
12 and then kind of where we are. Also familiar to you
13 here. Land ownership-wise, we covered this a little
14 bit before, but this gives you a sense of the -- let
15 me go back.
16 So the yellow up in the north area, the
17 course of the BLM. And then you have, some of this
18 green, which I think you can pick out is sort of the
19 split estate, so private surface but federal
20 minerals. So it gives you a sense really of this
21 kind of top area. Of course, this area over here
22 off the Roan. And then here's Roan Creek. And then
23 you've got these big fingers that come down. So all
24 of the gray is privately-held fee land.
25 And here is the natural gas development of

that same area. A lot of intense development up Parachute Creek here, but then you've got this area here.

A lot of this, I think, is Chevron land, some Puckett, and so forth, and then a little bit up into the BLM here. And then not a whole lot going on here except along the tributaries to Roan Creek.

CHAIRMAN MARTIN: Those are county roads, too.

MR. JARMAN: They are county roads, absolutely. So the next couple of slides will be of this area here, which is Clear Creek. So I'll be right in this area.

This is a map that you're very familiar with. The breakout down here just gives you a sense of what those figures are for land ownership and percentage of the county.

So if you kind of go all the way out here at the end, this is sort of the end of the story. Here's where the public lands are and the private lands within the habitat.

So this did combine both the general and the priority habitat here.

COMMISSIONER SAMSON: Let me ask a question just not totally off the subject, but we always say

that Garfield County is two-thirds, 63 -- 67 percent government lands. Are we saying federal just or --

MR. JARMAN: No.

UNIDENTIFIED MALE: State and federal.

COMMISSIONER SAMSON: Or are we saying 67 percent is government, that includes all government.

MR. JARMAN: This is the mapping Rob just gave me, so his numbers show you that it is about -- 62 percent is federal here and State lands is very -- there's very little State land really when you total it out. So you're still looking at about 63 percent is public land, so under public ownership.

COMMISSIONER SAMSON: Okay. Because I thought it was 67. It's 63 basically?

MR. JARMAN: Yeah.

COMMISSIONER SAMSON: Okay. Thank you.

MR. JARMAN: So this is also a slide that shows the leks in the white circles laid up against the priority habitat and then the general habitat out here. And, of course, the green dots are existing wells and then the red dots are permitted gas wells.

COMMISSIONER SAMSON: Can I ask one more question here?

MR. JARMAN: Uh-huh.

COMMISSIONER SAMSON: What is the official definition of a lek according to the biologist here? What is the official definition of a lek, if I might ask that?

MR. JARMAN: I'm going to let maybe Brad or Kathy take that one.

MS. GRIFFIN: Go ahead.

COMMISSIONER SAMSON: Well, I thought the biologist would be the best to answer that one.

MR. NEUBAUM: Lek sites are communal breeding sites. Sage-Grouse gather on them periodically each spring to breed.

Sage-Grouse are unique among some other birds. There are other Grouse that do it as well, but there are several lekking species that arrive at the same point on the landscape each year to breed.

Some of these lek sites in the Piceance basin have been active, to the extent we have data, continuously since the '80s. In many other parts of the range where the data goes back longer, we have continuous activity since the '50s on some of these sites.

So the site itself is often used for extended periods of time for breeding.

COMMISSIONER SAMSON: And how big of an

area is that? I mean, does that vary or on an average is that like 50 square feet or 100 square feet or are we talking half mile?

MR. PETCH: It varies pretty substantially. In smaller populations and especially in the Piceance, given the topographic and vegetating issues up there, they tend to be two, three, maybe five acres in size, many them of them.

Other places in the range in Colorado, some of those lek sites, and they tend to form in clearings. It can be as much as 40 acres or greater in size. So there's a fair bit of spacial differences as we move around the state.

COMMISSIONER SAMSON: Does that like boarder on territoriality where the males have their particular breed ground and then they return to that every year or attempt to?

MR. PETCH: They return to that site although there is some moving of birds from site to site. But generally birds return to the same site to breed.

There are small territories that form a lek site itself, but those are really only for that breeding season.

MS. GRIFFIN: They're very transitory, the

actual territory on a lek site could be just even daily, who happens to be the best male that day.

MR. PETCH: The other thing with lek sites is they tend to form, you know, they select good visibility sites, openings, bald knobs, things like that.

But what really drives where those lek sites form is the quality of nest and habitat around them. You can have good lek sites and no Grouse there if you have no nesting habitat around.

So it's really the suitability and the availability of nesting habitat that causes the breeding grounds to form and to maintain (inaudible).

COMMISSIONER JANKOVSKY: And how does the nesting habitat tie into riparian?

MR. PETCH: Nesting habitats are almost entirely in the sagebrush environments in Colorado. Many of those environments are 25, 35 percent sagebrush canopy cover, and sagebrush tall enough to nest under, 18 to 24 inches or so. So sagebrush primarily during the nesting season.

Riparian areas are important. And by riparian areas I really mean wet areas not always associated with a stream, but wet meadows, upland

swales, riparian areas, depending on where you are in the range are areas that the birds tend to move into for brief periods in July, August, September as they're raising their chicks, and then move back into sagebrush environments later on.

CHAIRMAN MARTIN: Are you still using the formulae on the sighting of leks by the ratio of males per female instead of just actually physically counting one?

Because I know that the only way that they were counting leks and birds were from aircraft. And at that point you had to use a formula, so there's no on-the-ground sighting?

MR. PETCH: We're only doing male counts in Greater Sage-Grouse habitat. In Gunnison's Sage-Grouse they are trying to come up with population estimates. There's a fair bit of guesswork and a lot of math that has to go into doing that.

And we've opted not to do so for Greater Sage-Grouse. That's not consistent around the range. Other states do it differently.

We do, because of the difficulty of getting into the Piceance in April, we do all of our lek counts up there by aircraft, rotary wing helicopter.

We follow-up with all of them that we can on the ground, but we can't get to all of them, especially the ones out on the rim until after the (inaudible).

CHAIRMAN MARTIN: When we did this particular plan, we ran into data gaps in reference to many, many years in between and that there was no records or lek counts made, et cetera, so you don't know if they remained, if they died off, if they -- et cetera.

What is the timeline now on leks and the review of them and the counts? Is it annual now based upon, again, the plan or the lack of data?

MR. PETCH: It is annual. And actually we have some slides here in a little bit that show what data we have.

CHAIRMAN MARTIN: Okay.

MR. PETCH: You're correct on the Piceance. Because of the difficulty of getting there, our data is shorter here than anywhere else in the state and really dates from the start of the conservation plan in 2005 through present. But it is done annually, again, from the aircraft.

CHAIRMAN MARTIN: And a pat on the back from to the guys that were running the range and what have you. They were actually doing it in their

log books and they were trying to keep up with it.

So those guys back in the '50s, '60s and '70s were actually doing it on their own because they wanted to keep track.

MR. PETCH: Right.

CHAIRMAN MARTIN: Okay.

MR. JARMAN: So this next slide is of the Pinedale area. And when we had Jim Cagney here we spent some time talking about the applicability of what we thought the NTT was really designed to cover as far as habitat goes and what that might mean for indifference with our topography and the experience we have with the landscape in the Piceance. So that's why I showed this.

This is actually from the BLM's website of a project they were working on in that area. And then to zoom in where that black square is up in the Piceance, that's this area. So it is a bit different.

And more specifically, I should say, one of the leks that I'll point to is right where that black line hits the mountaintop there. And that's a little bit over 8,000 feet. And then of course the bottom is 5600 feet. So there's your delta.

And so when we look at the mapping, where

1 we were concerned about the more broad brush it
2 appears anyway of the habitat designation and what
3 does that really mean when you get on the ground and
4 start ground-truthing some of these areas? And is
5 there room for discussion on the interpretation of
6 the mapping?
7 And so that's really the point of this.
8 When you go further from -- it seems where the NTT
9 wants to go with the four-mile buffer, that's that
10 same lek up on top where I showed that elevation.
11 You go out four miles.
12 So for us as a matter of the policy, if
13 that's really applied, the question for us is does
14 that mean that the priority habitat comes then down
15 here, up to the other side, across the top, and then
16 out here as far as a management response?
17 And so that's the discussion we have with
18 the BLM when they were here and trying to really
19 understand what the science was behind this being a
20 reality. And so we wanted to present that to you.
21 This also shows the wells active and
22 proposed in that same area. And we just think
23 there's a very different reality in how the
24 Pinedale, Wyoming experience is and the Piceance and
25 what does that mean for the mapping.

1 So that's really, I think, what's foremost
2 in our minds. And the same thing, here's just
3 another shot giving you the contours. These are
4 ten-meter contours showing where the leks are then
5 relative to the ground. And then that's just
6 another comparison on the two.
7 I forget who the author is, the Famous
8 Grouse book. It really is the main resource that
9 seems to be cited in the NTT and widely cited
10 actually.
11 So this is the only thing that we could
12 find really that they point to as far as the
13 four-mile buffer. If you have any thoughts on that,
14 I would love to hear it and how that comes to be.
15 This is a regression curve and shows disturbance to
16 lek attendance.
17 And then really the most salient part
18 probably of our slides today is this. So the PPR
19 has the picture on the left as the primary habitat.
20 Of course the boundaries all look pretty similar to
21 what the mapping is that you all have today.
22 The question that we have is when you
23 really look at that mapping the dark pieces, dark
24 areas show really where the main Grouse, I think,
25 are in that versus the broad brush red.

1 And so that's really a main question that I
2 think we have is the difference between the two
3 since we have four years of difference, maybe the
4 science has changed or what have you. If you can
5 help us explain that.
6 This is I think is DOW data actually. We
7 had our (inaudible) guy pull this. And this might
8 be familiar to you, but it just shows the range of
9 the sagebrush communities.
10 And they vary, of course, along that same
11 scale with the legend down there as far as the
12 mountain shrub mix, grass mix, rabbit brush mix and
13 so on. And was this the data that you used for the
14 broad brush or is this more specific, that kind of
15 thing?
16 Then again, same thing, landscape
17 comparison. And some of these areas do show up in
18 the mapping and we would like to know more about
19 that.
20 And I think that -- let's see, a couple
21 more slides here. This slide shows of course the
22 four-mile buffer. If you just look at the leks on
23 public lands and if that's applied what that might
24 mean.
25 And then finally it should -- of course

1 this is in a listing scenario, if the four-mile
2 buffer happens and it lists this, then it would
3 affect private lands, this is what that might look
4 like for us.
5 That's it. So I wanted to briefly go
6 through this. The commissioners have seen it, but I
7 wanted to make sure you had had a chance to see kind
8 of the questions that we were wrestling with,
9 primarily from a mapping landscape ecology
10 background. So with that, I'll turn it over to you.
11 MS. GRIFFIN: Okay. Fred, I have a couple
12 of slides that I think are going to address some of
13 your questions. But it might be helpful -- it's a
14 few points maybe to go back to your slide, like
15 maybe in between mine. I don't know how easy that
16 will be.
17 MR. JARMAN: Sure, very easy. We can have
18 Marion just swap us back and forth.
19 MS. GRIFFIN: Okay. Because I don't know
20 if -- we might not need to based on what my slides
21 show or what our slides show, but there might be
22 some that we want to address your slides
23 specifically.
24 MR. JARMAN: Great. Perfect.
25 MS. GRIFFIN: I've prepared a bunch of

1 different things for this talk, not exactly sure
2 where it was going to go.
3 So first I'll talk about the population
4 levels and where those are or have been. And then
5 Dan will go into the plan itself. And then I'll go
6 back and go through how we developed those maps
7 because I think that will be very helpful to answer
8 some of your questions. And so I have that kind of
9 towards the end.
10 I'm going to walk through two slides that
11 have the various populations of Grouse here in
12 Colorado. And both of the slides look the same in
13 that we have the high male count.
14 And again we're indexing the high male
15 count and not including the females in this. We
16 have not used any of the equations. This is just
17 our counts so that we're not throwing any biases in.
18 So we've determined that rather than keep
19 adding layers of bias or inconsistencies or perhaps
20 inaccuracies, we're just sticking with the actual
21 count of males. And across the bottom we have the
22 years.
23 In Colorado our populations are very
24 different in their sizes. So this graph shows our
25 two highest population levels we have. This is

northwestern Colorado and the blue line is North Park.

The black line is all the populations in Colorado. We don't go back before 2005 because you'll see for example in PPR we don't have accurate data before that. So rather than having a line that's again biased, we just kept our total population at this for this slide at 2005.

So you can see the northwest Colorado has the highest population counts. And if you notice this scale on the high male count side, we're in increments of 500. Does that help give you an idea?

And the next slide are our smaller populations. And these are the four smallest populations. And if you look on the scale on the left side again is -- now we've changed it. And rather than 500 increments, we're at 50 increments. So it's a very, very different scale.

And here we have black line is Middle Park. The white line is PPR. Red line is north Eagle/south Routt population. And the blue line is Meeker/White River population.

So you can see in all of our populations we're going through a downward cycle, a downward trend. We're hoping that this trough is going to go

1 back up and we're going to start coming up out of
2 this trough, these fluctuations.
3 I'm sorry. The one population I don't have
4 this year's data is PPR's. Sorry about that. It's
5 actually continuing up slightly this year. So we're
6 hoping that that's where the direction is going for
7 all our populations.
8 To focus in on PPR, because there is
9 variation between the years, when we're showing
10 trend graphs we want to do a three-year average to
11 take some of that variability out.
12 We might have a high snow year and it's
13 more difficult to count, and those are not true
14 changes. So by taking a three-year average we're
15 hoping to kind of get rid of some of that bias.
16 So again, we have our high male count on
17 one side and the years across the bottom. And you
18 can see the population in PPR has been going down
19 and is perhaps starting to come up after a downward
20 trend.
21 COMMISSIONER JANKOVSKY: Do you think 2012
22 is because of the mild winter? I mean, that's a
23 significant increase in two years. Or do you think
24 it's because it's of a better count?
25 MR. NEUBAUM: We'll dive into that exact

1 question here in a second. And it has a lot to do
2 with increased effort on our part through some
3 research projects to try to look at more leks and
4 discover unknown leks. And we had some success with
5 that this last year and we'll talk about that here
6 in a bit.
7 MS. GRIFFIN: Just to give you an idea, the
8 trend line for our data shows that we are on a
9 downward trend in the population counts for PPR.
10 Again, we're hoping that that trajectory will
11 change. As we're seeing that this trough, we're
12 hopefully coming out of that trough.
13 COMMISSIONER JANKOVSKY: On that 174, I
14 mean, what is the number in Garfield County versus
15 Rio Blanco county? I mean, I've read something
16 where the population is more in the southern part of
17 the PPR than in the northern part, which is also the
18 part which is more industrialized as far as the oil
19 and gas development.
20 MR. NEUBAUM: Yeah, off the top of my head,
21 I don't have the exact number, but it is a larger
22 proportion of that count than the northern portion
23 would be contributing, quite substantially more of
24 it. And I can certainly get to you those numbers.
25 We have those broken out.

1 COMMISSIONER JANKOVSKY: I can't remember
2 where I saw that other than it was drastically
3 (inaudible).
4 MS. GRIFFIN: Is it like two-thirds,
5 one-third?
6 CHAIRMAN MARTIN: Yeah.
7 MR. NEUBAUM: Yeah, exactly.
8 CHAIRMAN MARTIN: And I think that also
9 came in reference to the some of the property owners
10 and the mineral owners to go ahead and to improve
11 habitat.
12 And I think there was quite a program that
13 improved it and opened things up, moved them off the
14 road and what have you. So I think that you're
15 seeing a recovery simply because of common sense and
16 habitat restoration.
17 MS. GRIFFIN: It's difficult to tease those
18 things apart because if you look at say North Park,
19 for example, we have substantial lek count data
20 going back with fairly similar efforts since the
21 '70s.
22 And you can see in that population
23 fluctuations that go up and down, almost cyclical,
24 but not quite. We can't technically call it a cycle
25 because it's not as steady and consistent as a

1 cycle, but you do see these ups and downs
2 fluctuations over the years.
3 We haven't been monitoring the PPR long
4 enough to know if this is perhaps one of those --
5 the trough of one of those fluctuations.
6 So this could be coming up because of those
7 fluctuations or it could be habitat enhancement, all
8 kinds of things.
9 CHAIRMAN MARTIN: And you're also running a
10 scenario in reference to the depth of the snow or
11 the temperature changes that are taking place in
12 that particular same year and showing the ups and
13 downs?
14 And also, are you also monitoring predators
15 in reference to the same cycle? And have you seen
16 an increase of predators or a decrease in predators
17 showing that there's an up and down cycle with them
18 as well?
19 And that all is, again, for habitat and
20 also for the recovery of birds and predators, et
21 cetera. So after all, fox and skunks and coyotes
22 and raptors and all that have a cycle as well.
23 And so what I am saying is, are we putting
24 all the data together that can actually show us a
25 true picture of what's really going on out there?

1 MR. PETCH: We don't have really anywhere
2 in the state, other than with bear and with lion, a
3 good census effort or a good inventory effort on
4 carnivore species --
5 CHAIRMAN MARTIN: Okay.
6 MR. PETCH: -- in the same with the
7 (inaudible) raptors, or with ravens, crows, magpies.
8 CHAIRMAN MARTIN: Magpies are a great egg
9 killer.
10 MR. PETCH: There are a number of predatory
11 animals that pray on Sage-Grouse. They are at the
12 root of food chains within these environments.
13 We don't see places where we've done
14 intensive research on the demographics, nest success
15 rates, chick survival, those kinds of thing. We
16 have not seen anywhere in Colorado, although we
17 don't have that information yet for the Piceance,
18 where predation seems to be having a
19 disproportionate effect over what we've seen
20 elsewhere in the range.
21 CHAIRMAN MARTIN: Yeah. The only study
22 that I saw was out of Montana/Wyoming. And that was
23 the one that was intensive on predator control. And
24 then they saw the overall increase. And then they
25 saw a drastic decrease when they stopped the

1 predator control. So they go hand in hand.
2 MS. GRIFFIN: Yeah. That's one of the
3 drawbacks is as soon as you stop the predator
4 control, it just reverts right back to where it was.
5 CHAIRMAN MARTIN: Yeah.
6 MS. GRIFFIN: It's very, very difficult to
7 (inaudible).
8 CHAIRMAN MARTIN: That was a U.S. Fish and
9 Game study that they had commissioned to do so.
10 MS. GRIFFIN: So are there any other
11 questions on population counts before we kind of
12 switch over towards the plan itself?
13 (Inaudible.)
14 MR. NEUBAUM: So I'll just give you a
15 little bit of overview on the Plan and how it
16 evolved.
17 In 2005, a working group was formed for the
18 PPR. And we put a couple of quotes here that came
19 straight out of the Plan that kind of described at
20 that time what they were putting forth as the goals
21 and purpose of the Plan. And I'll just read those
22 out.
23 The Parachute-Piceance-Roan Greater
24 Sage-Grouse Conservation Plan informs and guides the
25 activities of participants of the local PPR Greater

1 Sage-Grouse Working Group and others who care to use
2 the Plan.
3 And I think that was an important -- it was
4 phrased carefully so that everyone who was
5 participating had buy-in and was willing to be a
6 part of that working group.
7 The second one designated as the purpose of
8 the Plan is to provide a coordinated management
9 across those jurisdictional and ownership boundaries
10 and to develop a wide community support that is
11 necessary to assure the survival and improve
12 sustainability, longevity and vigor.
13 And I think that was kind of getting at
14 this is a plan that would attempt to bring in all
15 different landowners and different constituents and
16 try to put the best foot forward.
17 CHAIRMAN MARTIN: And to emphasize that, do
18 you have the list of all of the participants, since
19 I was there too? And it was quite a list of who was
20 participating, giving information, working and
21 giving expertise.
22 I think that needs to go along with there
23 because it was a true effort of all agencies and
24 property owners and governments working together.
25 However, as Mr. Cagney will tell you, it's

1 voluntary. It is not mandatory. And he cannot
2 consider that.
3 MS. GRIFFIN: When you have such a wide
4 group of people signing a plan and they have all
5 different missions and such, in order to get the
6 plans finalized and put forth, you have to put in
7 things like this, "and those who care to use the
8 Plan."
9 CHAIRMAN MARTIN: Exactly.
10 MS. GRIFFIN: So that if someone decides,
11 well, I'm going to sign it but I always have my out.
12 I don't care to use the plan.
13 CHAIRMAN MARTIN: I think that's being used
14 now because I think a couple agencies are using that
15 particular out right now. But the intent was there
16 and was truly an honest, almost a three-year plan
17 that went forward.
18 MR. NEUBAUM: And those folks who did
19 participate, there are signature pages in the back
20 of the Plan that have those signatures and represent
21 those folks who participated, which was important.
22 So like we mentioned, the Work Group Plan
23 is not a regulatory document. It was to encourage
24 the voluntary participation of some of the
25 strategies that were identified that would address

1 issues that were identified as impacting the Grouse
2 in that population.
3 CHAIRMAN MARTIN: A clarification also.
4 Some of the governments didn't have budgets to go
5 ahead and make it mandatory, which was the other
6 issue. No monies were allocated to implement the
7 Plan and make it mandatory.
8 So I think that that is also one of the
9 keys that are there, why it remained, again,
10 voluntary. No money available.
11 MR. NEUBAUM: And that's typically true of
12 working groups across all the species that we work
13 with.
14 MR. PETCH: Really without exception, in
15 this plan and in others, every agency signature
16 letter can be (inaudible) in that sense to the
17 extend that budget manpower allows.
18 CHAIRMAN MARTIN: Exactly. And we know
19 that.
20 MR. PETCH: So you're absolutely right.
21 That is part of the reason for the voluntary nature.
22 CHAIRMAN MARTIN: Thank you.
23 MR. NEUBAUM: So after the plan was put
24 together, the work group basically moved forward
25 with what we call this implementation plan ranking

1 process.
2 And the group got together and hashed
3 through all of these topics and tried to identify
4 how they related to our given population that we
5 were working with, the PPR in this case, and then
6 eventually ranked those in priority of which one's
7 they felt had the biggest potential to play a role
8 or be an issue with the Greater Sage-Grouse in those
9 areas.
10 And so this table basically shows you how
11 those topics broke out on a statewide ranking level
12 across the populations.
13 It shows you the implementation team and
14 how they ranked them. Those were a group of folks
15 that ranked these issues before the individual
16 population working groups got together and worked on
17 these. And then there's the rankings of how the
18 local working group put the rankings on them.
19 And so there is some difference across the
20 board there. And so I think it kind of points out
21 that there is no silver bullet across the state
22 that's going to address these issues for Grouse.
23 Every population is a little bit different. And
24 then how the different agencies and groups perceives
25 some of these issues is going to vary a little bit

as well.

COMMISSIONER JANKOVSKY: So this is ranking based on an impact to the Sage-Grouse?

MR. NEUBAUM: I think they were considered as the top ranking issues that were affecting the population that should be where focus could be placed to try to make the biggest bang for buck, if you had to pick and choose.

COMMISSIONER JANKOVSKY: So the local working groups considered grazing number two?

MR. NEUBAUM: They did. That's how they ranked it during that process.

And we do have the original justification that was placed on all of those to kind of help explain the nitty-gritty of how those rankings fell out on the local working group level.

And I will say that when the Plan was being put together, the working group was fairly large. And by the time we got to the implementation plan, the numbers had dwindled a fair amount.

But there was still representatives from most of the different types of constituents that were there (inaudible).

CHAIRMAN MARTIN: And one of the biggest telltale signs on that I think that you'll see is

housing development because in the working plan, the folks that were there on the local working plan know the population, know the development, and know the country, where the State just gives it an overall broad brush and say, well, we can't have houses out there.

But they don't know the topography. They don't know the layout of the land, et cetera. That's why I think that the working plan is much more detailed and tailored to the actual environment instead of having the State do a rating overall.

You take every working plan in the state, put them all together and then come up with a rating. So again, I think more clout should be given to the different working plans.

And that's what's missing, I think, sometimes in the overall broad brush working plan or one size fits all. Because Gunnison is in the same boat in reference to their working plan with the Gunnison Sage-Grouse, which is a captured species within a certain climate.

So again, it wouldn't always fall in the same as in Pinedale as if you applied the Pinedale approach to Gunnison, it probably wouldn't work as well.

1 MR. PETCH: But I think your points borne
2 out to some extent, Commissioner Martin. The
3 left-hand column, the statewide rank is averaging
4 across all of six populations in Colorado.
5 The center column, the implementation team
6 rank is -- agency biologist, the one's who wrote the
7 state plan, but looking specifically at the issues
8 of the Piceance Basin or the Parachute-Piceance-Roan
9 population. There's much more similarity there at a
10 local scale.
11 CHAIRMAN MARTIN: Yeah, that's what I
12 noticed.
13 MR. PETCH: So you're right. I think the
14 scale --
15 CHAIRMAN MARTIN: Well, what happened --
16 the reason I bring that out, guys, is simply because
17 if you take a national view now and a national
18 average, what will you have actually and what is
19 again local versus the specialists like yourselves
20 and laying out on the plan what shows to be in
21 priority? So I think we need to give more emphasis
22 to that.
23 MR. NEUBAUM: So Fred kind of pointed out
24 that there was the interest in how is the Plan now
25 being implemented? We kind of wanted to dive into

1 that as best we could.
2 Management and energy mineral development
3 impacts through the implementation of wildlife
4 mitigation plans was one strategy that was used.
5 And it's in effect tied to a lot of these other
6 issues that were listed in those same ranking
7 processes.
8 It addressed things like grazing
9 management. Things like directional drilling and
10 avoidance of seasonal habitats were all strategies
11 that were built into these plans to try to deal with
12 some of those top-ranking issues that were concerns,
13 such as energy development and grazing.
14 So that was one strategy that was used
15 where the Plan was used as a reference to try to
16 guide our actions on the ground.
17 COMMISSIONER JANKOVSKY: What kind of --
18 you know, this plan was done in 2008. And it's
19 voluntary. And it kind of fell into your lap to
20 monitor it and implement it as best you can,
21 although it's voluntary.
22 So what kind of help are you getting or not
23 getting?
24 MS. GRIFFIN: Can I answer that in terms of
25 these numbers?

1 MR. NEUBAUM: Sure.
2 MS. GRIFFIN: So the stuff that Dan is
3 talking about here with the wildlife mitigation
4 plans, those are agreements between the private
5 landowners, basically the oil companies and Colorado
6 Parks and Wildlife to come up with a plan for the
7 Grouse.
8 We have over 107,000 acres in wildlife
9 mitigation plans. I think there's only a total of
10 five -- is that true?
11 MR. PETCH: That are Sage-Grouse?
12 MR. GRIFFIN: Yeah.
13 MR. PETCH: Yes.
14 MS. GRIFFIN: Five plans that are specific
15 to Sage-Grouse. And like I said, they cover over
16 100,000 acres. This is just for PPR.
17 Wait -- no, no, no. Excuse me. Sorry,
18 sorry, sorry. That's statewide. For Greater
19 Sage-Grouse. Sorry.
20 So beyond the wildlife mitigation plans,
21 there's all kinds of stuff within those plans that
22 I'm not counting here. But beyond that we've done
23 over 200,000 acres of habitat treatments.
24 And in terms of conservation easements and
25 fee title, we have over 40,000 acres that are just

held by Colorado Parks and Wildlife and then another 13,000 that are other entities like Cattlemen's Land Trust or the Nature Conservancy.

CHAIRMAN MARTIN: But that's statewide.

MS. GRIFFIN: No, that's only within Greater Sage-Grouse habitat, just Greater. So it's not --

CHAIRMAN MARTIN: That's Moffat County, Rio Blanco, Garfield, Mesa, Jackson, Routt, et cetera?

MS. GRIFFIN: Right. Yes.

COMMISSIONER JANKOVSKY: So can we get an idea of what those numbers are in Garfield County?

MS. GRIFFIN: I don't have those here. I can. I can.

COMMISSIONER JANKOVSKY: I would like to get an idea of how well our -- I mean, the big landowners right now are all energy companies up there.

MS. GRIFFIN: Right.

COMMISSIONER JANKOVSKY: Until you get further west and then you start getting into some large ranges. They have leks and the general habitat.

MR. PETCH: In the near term, I can break that down for you a little bit. Given the

landownership pattern there are, we have not done any easements in Garfield County. In fact, we haven't done any easements in the PPR population for Greater Sage-Grouse.

The vast majority of wildlife mitigation plans however are in the PPR population. A number of those are on the Rio Blanco side of the population, but a good chunk of the Garfield portion is being managed under Wildlife Mitigation Plans as well.

CHAIRMAN MARTIN: And again, it's voluntary.

COMMISSIONER JANKOVSKY: Are the companies in, do they have active plans? Do they have biologists and active plans themselves?

MR. PETCH: In various --

COMMISSIONER JANKOVSKY: Are they participating?

MR. PETCH: It varies a great deal from company to company. There are some companies that have been very proactive and very active in putting conservation measures on the ground.

There are others that have only been interested to the point of clearing regulatory hurdles for continued permitting. As you might

1 expect with any voluntary effort, you do get that
2 full range of participation.
3 COMMISSIONER JANKOVSKY: As a county, we
4 rely on the COGCC for all permitting. We have
5 somebody that knows where the permits are going in,
6 but they do not come in front of us for (inaudible)
7 permitting.
8 MR. PETCH: Right.
9 COMMISSIONER JANKOVSKY: And that's the
10 other tie is how does this tie back into them,
11 COGCC?
12 MR. PETCH: The Wildlife Mitigation Plans
13 are a portion that are provided for in the COGCC
14 rules and have been implemented since 2008 in the
15 context of those rules.
16 They are voluntary. Otherwise with COGCC,
17 the Division -- some of the rules require or at
18 least encourage consultation with Parks and Wildlife
19 during the development of sighting plans, drilling
20 plans.
21 And then we have the opportunity to make
22 recommendations on BMPs and other protective
23 measures back to the Oil and Gas Commission.
24 And again, you see a range depending on
25 landowner interest, energy company interest, where

1 those do differ and other regulatory issues. At
2 times those are implemented, at times they are not.
3 I actually think we have a couple of slides
4 in here later on that show some of the good and bad
5 of what's been achieved.
6 COMMISSIONER JANKOVSKY: And then are any
7 of the grazing partners -- and they're mostly -- it
8 was more on public land, but are they participating
9 in this?
10 MR. PETCH: Again, some are. And
11 particularly in the context of Garfield County of
12 grazing management on some of the larger energy
13 holdings, there have been some marked improvements
14 in grazing management pursuant to some of these
15 mitigation plans, but following the prescriptions
16 that are laid out in the PPR Plan.
17 There are others, and some of them on
18 federal lands, where that's not. But we haven't
19 made as much progress.
20 COMMISSIONER JANKOVSKY: It seems like if
21 you have some federal lands that would be
22 overgrazed. And especially riparian areas are
23 damaged --
24 MR. PETCH: Certainly, that does occur and
25 does with the PPR at times.

1 CHAIRMAN MARTIN: And that's again back to
2 the peer pressure in reference to the wool growers
3 and also the Cattlemen's Association and they have
4 an internal review process.
5 And also they need to have good partners on
6 the federal land in not allowing them to do it and
7 making sure that the contracts are telling them how
8 many days they should have, et cetera, and what is
9 available based upon the weather and the vegetation
10 growth, et cetera.
11 So I think it's a cooperation there. And
12 overgrazing sometimes is the lack of manpower, lack
13 of inspection, and not paying attention. But may be
14 even some of it is intentional.
15 COMMISSIONER JANKOVSKY: Some of it falls
16 also back on federal agency.
17 CHAIRMAN MARTIN: Yes, that's what I'm
18 saying.
19 COMMISSIONER JANKOVSKY: It is a lot better
20 than it used to be. In the '40s whenever the
21 Grazing Act came in, in the '40s, I heard stories of
22 families who were on the Piceance would have to
23 travel for a day so they could get their elk or deer
24 for the winter because it was so overgrazed that
25 there weren't any elk and deer.

1 That's an old story I think goes back to
2 the old-timer who talked about his childhood on the
3 Piceance back when he was there in the '30s.
4 MR. PETCH: In a general sense in terms of
5 implementing this and other local plans, we're
6 having this kind of conversation at every
7 opportunity, whether it's working with BLM on a
8 grazing permit, working with an energy company on a
9 development plan, the kinds of things that are
10 including in the PPR Plan are being discussed by
11 Division folks, whether it's our field people, or
12 biologist, by BLM biologist, at really every
13 opportunity.
14 The outcomes of those vary pretty widely.
15 But the conversation, keeping this plan in the
16 public eye, as one of Dan's earlier slide shows,
17 it's to inform and help guide those management
18 practices and certainly continues to do that to this
19 day.
20 MR. NEUBAUM: There's also some other
21 efforts that are referencing the Plan, monitoring
22 populations. This includes some increased efforts,
23 as I mentioned this last year. And we'll dive into
24 those a little bit more detail here in a second.
25 But there's also been a number of research

1 projects that we've put out on the ground and
2 they've been funded through a lot of different
3 resources including some of the energy development
4 companies.
5 Dr. Tony Apa has been looking at some
6 seasonal habitat use, movements, genetics, and vital
7 rates of birds up on the PPR. And that report, I
8 believe, was finished. Has that actually been
9 posted on like the website for public access yet?
10 MR. PETCH: The progress reports are. I
11 don't think the final is.
12 MR. NEUBAUM: Okay. So the work is done
13 and I think he's just about done wrapping up the
14 writing of that.
15 Another researcher, Danielle Johnston, has
16 been looking at restoring energy fields for
17 wildlife, doing a number of different treatment
18 types for removing weeds and other studies. That
19 work's ongoing.
20 CHAIRMAN MARTIN: Is that down at Molina?
21 There was a project there in reference to using all
22 of the restored energy lands, pipelines and access
23 roads in reference to secondary vegetation and
24 feeding of wildlife, using that as a voluntary
25 program as well.

Did you get a report on that one at all? On the success or not because that was a good program I thought was coming out of the Division and Energy and also private landowners.

MR. PETCH: The evaluation on the Molina project specifically is still in progress.

CHAIRMAN MARTIN: Okay.

MR. PETCH: Danielle's work is all north of the interstate.

CHAIRMAN MARTIN: North of the interstate, okay.

MR. PETCH: And some of it on the Rio Blanco side.

CHAIRMAN MARTIN: Okay. Good. All right.

COMMISSIONER JANKOVSKY: As you've been talking to Jeff, it shows that birds are traveling 60-plus miles and sometime from Moffat County back up into Wyoming. Are you seeing that type of activity as we are or is this population isolated?

MS. GRIFFIN: Did you talk about Brett's work?

MR. NEUBAUM: I bulleted it, but it would be worth hitting on. I mean, Brett Walker's work I'll show on the next slide. He did see some fairly large movements of Grouse within the PPR population.

1 But as far as those birds leaving the population and
2 going up into like the northwest, I don't believe he
3 saw anything like that.
4 MS. GRIFFIN: No, we are not seeing that.
5 COMMISSIONER JANKOVSKY: So this population
6 is isolated. And I guess it gets back into
7 genetics. Is there enough population for this to be
8 any viable population?
9 And then the next question is -- this is
10 from the slides you've showed -- this is a highly
11 industrialized to the fact that we have a lot of oil
12 and gas activity and how does that all fit in? How
13 does that fit together? And does this population
14 warrant being part of the overall national study?
15 MS. GRIFFIN: So a couple of things. One,
16 with the movements, Brett has been trying to
17 document long-range movements. It's very difficult
18 to document long-range movements because if you're
19 not there at the time, you just might miss them.
20 I think he has seen, and I'd have to double
21 check, movements from PPR to Magnolia and back.
22 COMMISSIONER JANKOVSKY: Magnolia is where
23 exactly?
24 MS. GRIFFIN: Just slightly north between
25 the PPR and Meeker/White River. There's a little --

1 MR. NEUBAUM: It's north of the County Road
2 5, the Piceance Creek Road.
3 COMMISSIONER JANKOVSKY: (Inaudible)
4 population (inaudible) 50, you know, birds is not
5 going to (inaudible).
6 MS. GRIFFIN: Yeah, there's very few birds
7 here, yeah.
8 COMMISSIONER JANKOVSKY: But there is
9 travel between those two populations.
10 MS. GRIFFIN: Right. And in our habitat
11 mapping, we have corridors that have we mapped that
12 have pockets of suitable habitat, though it's not
13 all. It also includes a lot of non habitat with the
14 idea of keeping some type of corridor available so
15 that there could be movement between those.
16 In some of our mapped linkage areas we know
17 there are movements. Others we don't know yet if
18 there are movements or not. The hope is that there
19 is. We don't know yet.
20 That goes back to the genetics because that
21 would be one way to look at that.
22 COMMISSIONER JANKOVSKY: Does this
23 population get isolated similar to what happened
24 with -- because I imagine at one time the Gunnison
25 Sage-Grouse was a part of this overall, you know --

there's a thousand years we don't know what, as part of this population (inaudible) isolated.

MS. GRIFFIN: Right.

COMMISSIONER JANKOVSKY: I mean, (inaudible) breed or whatever.

MS. GRIFFIN: So Tony Apa had a graduate student whose work has just been finished. He just finished his PhD. And that document, I think, is going to be soon on our website. I don't think it is yet. I think it was just was finalized last week.

And he looked at some genetics within Colorado. And it shows that there is more of a connection genetically. So this is more like long-term historical connection.

There's this connection between the PPR, the Meeker/White River and the southern portion of the northwest Colorado population. So they share a portion of their genetics.

And then there seems to be this connection about the Great Divide and that southern portion of the northwestern Colorado. They share genetics yet that the Great Divide is not sharing many of the genetics with the PPR.

And then there's also this connection

1 between up by Cold Springs up in that really
2 northwestern corner of Colorado. They're sharing
3 more genetics with the Great Divide population and
4 very, very few with the PPR population.
5 So it's showing there's this type of
6 stepping-stone connection between these populations.
7 So they have been connected over time in the past.
8 And whether that connection continues is a question
9 we don't know.
10 CHAIRMAN MARTIN: And that goes back to the
11 slide. And my poor old mind is kind of failing me,
12 but what was the rating in reference to genetics on
13 your scale back there, state versus local versus
14 other?
15 And I think you need to take a look at that
16 one and where that overall state average comes in,
17 in reference to genetics.
18 MR. NEUBAUM: Yeah. By the local working
19 group it was actually ranked fairly low.
20 CHAIRMAN MARTIN: Genetics 18, 15, and then
21 the local groups at 11. And so that goes back to
22 what your point is, again, looking at those things
23 is important because we know that there's genetic
24 strains back and forth.
25 But again overall statewide genetics

1 doesn't even play a part, at least at the lower
2 rating.
3 MR. NEUBAUM: It might depend on how you
4 parse out those individual issues. In terms of like
5 health of the birds from genetics and stuff, the
6 population is still diverse enough that it's doing
7 okay.
8 We're not seeing mutations or inbreeding or
9 things like that. And that's why you probably saw
10 some other things that got ranked higher that might
11 have dealt with -- like some of the different types
12 of infrastructure on the landscape or things like
13 that that might be breaking down those travel
14 corridors and keeping those birds from being able to
15 maintain those connections.
16 CHAIRMAN MARTIN: Actually, the
17 topographical boundaries is one of them. And I
18 think that's what you saw in Gunnison. And they
19 just didn't overcome that movement outside of that
20 basin.
21 And I think you'll that you'll see the same
22 thing in the PPR, again because it's the height or
23 the elevation versus the plateau in how they can
24 travel on that but they don't drop down to mix with
25 the other folks.

1 And I think that's the importance in the
2 genetics shows that there is a movement there and
3 there is a tie. But it's not always infrastructure
4 that breaks it down. It's a natural barrier.
5 MR. NEUBAUM: That's very true for the PPR
6 population. I mean, the topology is very different
7 from most of the other Grouse populations.
8 CHAIRMAN MARTIN: And that's what we were
9 trying to look at in reference to the Pinedale study
10 and the type of ground cover, the elevation and the
11 layout of the land versus what we're up here.
12 We're struggling with that particular
13 approach, saying wait a minute -- and this will tie
14 back to your genetics -- that there is a movement,
15 yes. And there is a coordination.
16 But it's based upon topography more than it
17 is on the overall management plan. It's just a
18 natural thing that's occurring.
19 So I think Gunnison and we have again the
20 same type of argument that you can't just do the
21 overall state plan or national plan. You'll lose
22 populations, I think.
23 MS. GRIFFIN: I just wanted to point out
24 that not only is genetics down here ranked slightly
25 different, but there's another category of habitat

linkages, and that --

MR. NEUBAUM: That was ranged high.

MS. GRIFFIN: -- ranked very high for the PPR.

CHAIRMAN MARTIN: And I think we saw that in that group.

MS. GRIFFIN: Yeah. So I just wanted to point that out. Wait, one other quick thing with the genetics.

There is a proposal to do a range-wide genetics study so that we can look at connectivity on a large scale, but we're still looking at that proposal.

CHAIRMAN MARTIN: That goes back to dollars, doesn't it?

MS. GRIFFIN: That's a good point.

CHAIRMAN MARTIN: It's not the science. It's just the lack of dollars that makes that possible.

MR. JARMAN: Along the same lines, I was just reading in the socioeconomic stuff that was just released for the BLM's EIS, but one of the concepts they talk about are the viability of the periphery populations to the overall health of the range and the species in the range.

1 Can you touch on that a little bit?
2 Because that's really kind of what we're talking
3 about is you have these pockets that may be so
4 isolated. And whether the genetics are good or bad,
5 does that contribute either negatively or positively
6 to the overall health of the national range?
7 And so one of the questions that we've been
8 talking about is can we simply cut off Garfield
9 County in the mapping and does that affect the
10 national range? We have few birds. We have a
11 different topography. What does that affect?
12 COMMISSIONER JANKOVSKY: And it is highly
13 industrialized.
14 MR. JARMAN: Exactly.
15 MS. GRIFFIN: There's a couple of different
16 thing there. One is scale, and I'll talk to that in
17 a moment.
18 The Colorado Conservation Plan includes a
19 population viability analysis that includes all the
20 populations in Colorado. And the result of that
21 show that none of the populations in Colorado would
22 go extinct or have a very low probability, less than
23 one percent probability of going extinct the within
24 the next 50 years if everything stayed -- if there
25 were no new threats, no new development on the

1 landscape.
2 The only exception to that was the
3 Meeker/White River population, and that has a much
4 higher probability of going extinct in the next 50
5 years. So we have done some of that population
6 modeling to look at population viability.
7 So as it is now, the PPR is a viable
8 population. Again it's a model. And one of the
9 problems with that modeling is looking at how do you
10 take into account future development?
11 So that baseline or that initial population
12 viability analysis is saying if there's no new loss
13 of habitat, that's what would occur in the next 50
14 years. It's modeling out.
15 When we looked at a scenario of oil and gas
16 development that we had seen in the previous five
17 years, if we played that out, almost all the
18 populations disappear.
19 But when looking back at that modeling
20 effort and going into detail like why is that taking
21 into account -- why is that occurring? The model is
22 too simplified. It's not like you're going to have
23 widespread clear cutting or 800 wells every year in
24 the PPR. That's not the reality of how it plays out
25 on the ground.

1 So they did a second analysis looking at
2 trying to look at the intensity of the development
3 and the duration of that development because we know
4 there's places in Wyoming and here in Colorado where
5 we've had energy development in the past and it has
6 not, as far as we know, greatly affected the
7 populations.
8 So trying to look at it from an intensity
9 and a duration standpoint. So that modeling is
10 very, very difficult to do.
11 COMMISSIONER JANKOVSKY: And the state of
12 the PPR might be a good example of that because if
13 you look at the number of wells that are up there
14 already, and when you look at your population, I
15 mean, it is highly industrialized.
16 We have a high amount of oil and gas
17 activity (inaudible) population is somehow -- and
18 our own biologist tells us that the bird is affected
19 when there's disturbance, (inaudible) around those
20 leks. But somehow this bird's continuing to survive
21 in this area.
22 MS. GRIFFIN: Though the population is
23 trending down though.
24 COMMISSIONER JANKOVSKY: (Inaudible) what I
25 saw in 2012 (inaudible).

1 MS. GRIFFIN: But we've also increased our
2 efforts in the last year. So it's very hard.
3 COMMISSIONER JANKOVSKY: But then is it
4 trending down because our efforts (inaudible)
5 strong? You know, it would have to go the same way.
6 (Overlapping conversation.)
7 COMMISSIONER JANKOVSKY: Because our own
8 biologist tells everything. I mean, I have no doubt
9 that you want to hear from our biologist that
10 activity, it affects the birds (inaudible).
11 But then at the same time if you look at
12 those leks and you see four, five different well
13 sites or pads and you go, well --
14 CHAIRMAN MARTIN: I think this next slide
15 will also answer that particular question in
16 reference to the removal of the Juniper and the
17 other in clearing certain areas and then actually
18 returns habitat. So you will see a more of a use.
19 But again, the BLM in reference to Juniper
20 and Pinyon, they let wildfire go just to get rid of
21 Juniper and some of their Pinyon.
22 But also that takes in sage. And that's
23 the latter fuel for those others. And at that point
24 then you have a total removal of habitat which takes
25 a long time to come back. And that's also a real

problem if you have wildfires.

So some of those mitigation plans in reference to the sage is also fire mitigation plans and that you'll see safety areas and then they become again a lek, if they're in a right spot and location, working with the Division -- I still call you the Division of Wildlife. I'm just not going give up on that.

But I think that that is one of the working relationships with the energy companies and also the farmers on their private land that has worked in this plan, that they recognize that the sage needs to be there but they work around that and remove the other stuff that takes their habitat.

So I'd like to see that continue, even though it's a voluntary program.

MR. NEUBAUM: This next slide shows some of Dr. Walker's work. And he was trying to get a better handle on some of the habitat that we were finding the Grouse using or preferring.

And then one of the things that they did look at was assessing Pinyon-Juniper removal. That was a joint effort with the BLM to use some mechanical treatments to remove the Junipers and then see whether we were still finding Grouse coming

in and using those areas.

And then he also had some new work starting up this year to evaluate lek-based monitoring and management strategies.

And that's the project where he had more techs getting into accessible areas on the ground, trying to watch leks simultaneously with aircraft flights over them to see in the lek counts varied between the two techniques, which is really hard to do, but he had some success with that.

And then they use another methodology called dual-frame sampling, where they designate flying time to just fly over the landscape to randomly chosen locations and see, is there a lek there that we've just not picking up because we've been flying these other traditional routes? And so are we missing some of these things?

And they did find a few new leks in doing that work. And as a result, we saw our lek count numbers boost up this year that you noted in 2012.

I think that an important thing to know is that we have been watching a good set of the leks on the landscape, a good proportion of them for multiple years now.

And so that downward trend that we're

1 seeing is still legitimate. It's showing the tread
2 across the population. Whether the population is
3 actually bigger, the total numbers are bigger than
4 we actually think they are or not, the tread is
5 still negative in that regard.
6 Again, maybe we're pulling out of it and
7 it's in just one of those downward cyclical motions.
8 We all kind of hope so, but I think time will tell
9 on that one.
10 MS. GRIFFIN: And the downward cycle or
11 that downward trend that we've seen and you're
12 questioning whether it's not effort at that point,
13 those years that we have in the trend of just PPR,
14 there's not an effort difference except in that last
15 year, this year, because that's the only difference
16 in the effort that we've had since 2005.
17 CHAIRMAN MARTIN: And in that formula,
18 you're adding the new leks to it in reference to
19 your count and then taking an overall average of the
20 number of leks that you have found, et cetera, what
21 their use is, et cetera.
22 And have the only leks been abandoned and
23 the new leks been established, that's another
24 question in, in again, biology and you have to
25 establish that one too.

1 MS. GRIFFIN: Yeah.
2 COMMISSIONER JANKOVSKY: Why is the -- you
3 know, the bird is over on the Roan and in the
4 portion of the area that has a lot of development.
5 But then you have the eastern part of the Roan,
6 which is general habitat and there aren't any leks
7 in that area. There's no development. Is it a
8 difference in habitat or is it grazing?
9 MS. GRIFFIN: No. One of the problems that
10 we have with Grouse and the fact that they are a
11 lekking species is that they have this very, very
12 strong site fidelity. So they go back to an area
13 year after year after year.
14 And so they might not have ever gone over
15 there and explored over there to know. This has
16 been their area. And that go back to that same lek
17 that they've gone to.
18 So even if you do restore other areas, it's
19 very difficult to get them to move into that area
20 that we've just restored because they are so tied to
21 an area.
22 So if you see leks where they are holding
23 on in an area that's been developed, it's not
24 because that's better habitat. It could be just
25 that that's -- they're hardwired for where they go.

1 And it's a problem for us in trying to restore areas
2 and get birds to take up other areas.
3 Or if you're talking about transplants like
4 we are with the Gunnison's, it's very, very
5 difficult to get them to spread out.
6 CHAIRMAN MARTIN: Do you know who else
7 learned that particular trait and has it hardwired?
8 And that's going to be the predators. They know
9 exactly where those birds are going to be and they
10 know exactly when they're going to fledge and they
11 know exactly where their food source is in the year.
12 And so it is part of nature, but it's not
13 just the bird that's hardwired. That's the food
14 source for many others.
15 So how do we deal with that one? And
16 again, that's a bigger question.
17 MR. JARMAN: One, Kathy, it seems the
18 coveys operate exactly the same way.
19 MS. GRIFFIN: The what?
20 MR. JARMAN: The coveys. And I say that --
21 that's cross species. The blue Grouse will do the
22 same thing. You know, they're a lekking species
23 too. But the coveys year after year after year
24 after year --
25 MS. GRIFFIN: Yeah, the mother, you know,

1 takes the daughter. The daughter takes her kid --
2 yeah.
3 MR. JARMAN: Uh-huh.
4 CHAIRMAN MARTIN: I did like the study
5 where they tried to put on the monitors on the
6 chicks and see what their life cycle was like. That
7 must have been an exciting time.
8 Almost like trying to wire up the Preble
9 Jumping Mouse and then watching them through their
10 life cycle. So there's a lot of studying going on
11 there. I don't know how successful it was.
12 MR. NEUBAUM: A lot of this research has
13 been informative to us because it's kind of
14 enlightened how some of the Grouse in the Piceance
15 and in the PPR population are willing to use
16 slightly different habitats that we would tend to
17 think of as traditional for Grouse in other parts of
18 the state.
19 They're more willing to use denser stands
20 of sage. They're even found sometimes in areas
21 where you see other shrubs like Serviceberry
22 growing.
23 And we see that with some of the isolated
24 Gunnison Sage-Grouse populations too. In certain
25 circumstances they're willing to use some of these

1 habitats that aren't as traditional as what we tend
2 to think of.
3 But they always do still have that strong
4 tie to the sagebrush just as they do everywhere
5 else.
6 CHAIRMAN MARTIN: It will be an interesting
7 answer if you could find if it was just that the
8 habitat changed and the birds didn't and that the
9 Serviceberrys and all of the other things that were
10 invasive based upon historical value and those birds
11 were still hardwired to that particular area and how
12 you could prove that particular thesis. So there
13 you go. You have another one.
14 MR. JARMAN: Chairman, can I interrupt here
15 just for a quick second? I wanted to kind of take
16 the pulse of everybody. I know that Drew has
17 indicated he wanted to kind of get to something else
18 at about 11:30.
19 But I know that there is some mapping
20 questions really that I know Commissioner Jankowsky
21 wants to talk about and these guys are prepared. So
22 maybe to jump to that.
23 MR. NEUBAUM: We'll just hop ahead to some
24 of those mapping questions right now.
25 MR. JARMAN: I appreciate that. Thank you.

1 Sorry for the running short on the time.
2 MR. PETCH: Just a couple of notes on -- we
3 alluded to sometimes we win, sometimes we don't win.
4 In the current situation, this is a sense
5 of where current wildlife mitigation plans are in
6 place. Not all of these have Sage-Grouse habitat,
7 but that large block in the center largely does have
8 Sage-Grouse habitat.
9 Some substantial management successes
10 there, many of those represented in the Fish and
11 Wildlife Service prior to the 2010 listing as things
12 that the State had done and that other cooperators
13 were involved in.
14 On the other side of that, there are other
15 instances where we haven't done as well. You can
16 see the underlying development shadowed in there.
17 The stars, yellow stars around those lek
18 sites are bad locations that have fallen within the
19 six-tenth of a mile suggested offset from leks.
20 So in places we were doing some good
21 things. In places we're not. And this is the kind
22 of thing that I think has led the Fish and Wildlife
23 Service to say they want to see more because it's
24 not an open and shut, because we wrote a plan and
25 everything happens is (inaudible).

1 MS. GRIFFIN: And this is not the four-mile
2 buffer on a lek. This is a six-tenth mile buffer.
3 (Inaudible conversation going on.)
4 CHAIRMAN MARTIN: It would also be good to
5 see what that does to with the four-mile particular
6 area on your mapping and see exactly the impact that
7 it would be.
8 COMMISSIONER JANKOVSKY: Fred can take you
9 back. There are a lot of wells there.
10 MS. GRIFFIN: I'll skip ahead to maybe our
11 mapping and just kind of go through how those maps
12 were developed. And I'll try to go quickly, but if
13 you want me to slow down or speed up, give me a --
14 Because we have Grouse all across
15 northwestern Colorado, we needed to do a
16 Colorado-wide mapping so that we could be consistent
17 across the range.
18 So we'll have to address the issues of
19 localized or individual issues afterwards, but first
20 we'll go through the overall range of Greater
21 Sage-Grouse.
22 So one of our researchers, Mindy Rice, did
23 a seasonal habitat mapping. She used data from 11
24 studies here in Colorado. They were all
25 radiotelemetry data. So those studies occurred

1 between 1997 and 2010, range of years.
2 So obviously they're using a range of
3 habitats in those years based weather. Over 16,000
4 locations were included in this modeling exercise.
5 And we used a basin-wide vegetation layer. And that
6 includes all different types of vegetation
7 variables.
8 Some of those are positive for use by
9 Sage-Grouse, such as sagebrush. Others are
10 negative, such as forest shrubland.
11 So you have both where they're using and
12 where they're avoiding. So you include all those
13 vegetation variables in this mapping effort.
14 So she did a seasonal mapping. So what she
15 did, this is just northwestern Colorado. And to
16 kind of give you some perspective, this is North
17 Park. We have Middle Park, north Eagle, south
18 Routt, and you can see the PPR here.
19 The red colors are highly suitable. I
20 believe this one is the breeding map. The yellow
21 colors are suitable. And the blues are unsuitable.
22 And so obviously there's areas across all
23 of this where we don't even find Sage-Grouse. But
24 I'll get to that in a minute.
25 MR. PETCH: Before you go on Kathy, highly

suitable and suitable are based on the likelihood of use by radio marked birds, including birds from the Piceance, that the highly suitable in this breeding model is 75 percent or greater in rough numbers.

Probability of actually encountering a bird in a site that looked like that based on those telemetry (inaudible).

So a pretty high standard, that if it shows red there, it really meets the time and criteria at the scale of which we were mapping for potentially occupancy by Sage-Grouse.

MS. GRIFFIN: So she did this for breeding, summer, and winter habitats. So they all look very similar. You can see PPR has changed a lot more highly suitable habitat. And then this one is winter.

So taking into account that seasonal differences in habitat use but putting anything that was highly suitable or high probability of use in any one of those seasons, putting them all together and then clipping it to our known occupied range -- we know we have birds there.

So this is what you would get is highly -- a high probability of use in some season for Grouse.

To give you an idea where the data came

from, you can see there are a lot of data points there in PPR. So it was an important component of kind of training the model for the entire range.

COMMISSIONER JANKOVSKY: So the black is where there are leks or what's the --

MS. GRIFFIN: The black and the yellow, there's just so many overlapped it becomes --

MR. JARMAN: Telemetry points.

MS. GRIFFIN: -- yeah, they're all telemetry points.

COMMISSIONER JANKOVSKY: You see on that -- the PPR on that western (inaudible) we're not showing any leks.

We're showing -- and those two little isolated, at least on the mapping you have, there's two isolated, I guess, islands that are west. There's like a half a lek. I don't know how there can be half a lek.

MR. PETCH: In the instance you described, and Kathy actually will probably come to this as we're in the map series a little bit further we can come back and touch on that half a lek.

COMMISSIONER JANKOVSKY: And I talked to the guys on High Lonesome, which is further west. They said they actually have some Grouse on their

1 property. And it's not even showing on there. It's
2 not showing (inaudible).
3 MR. PETCH: They believe they do. They
4 have not been able to document that.
5 COMMISSIONER JANKOVSKY: Oh, so they say --
6 so they haven't gotten to it.
7 MR. PETCH: They have had Matt come down
8 and look. There's certainly some potential for
9 habitat there, but we have not documented
10 (inaudible).
11 COMMISSIONER JANKOVSKY: And those are the
12 guys that want to do conservation. They'll be guys
13 that would be great if they had habitat.
14 CHAIRMAN MARTIN: You want to see the
15 carcasses, is what you're telling me?
16 MR. PETCH: Or pellets or tracks or
17 feathers or something other than --
18 MR. NEUBAUM: Something concrete.
19 CHAIRMAN MARTIN: You want something
20 concrete?
21 MR. PETCH: Right. I don't mean that to be
22 disparaging. They really do want to have Grouse out
23 there --
24 CHAIRMAN MARTIN: I know they do.
25 UNIDENTIFIED SPEAKER: -- and I think

1 (inaudible).

2 One of the things we have seen in the

3 Piceance in particularly is there are a lot of

4 historic occurrences of birds in the valley floor

5 like the floor of Clear Creek in some of the area

6 that burned here this summer that did (inaudible)

7 winter use patterns or heavy winter, we don't really

8 have a good sense of that. But at one time we did

9 have birds in the valley floor. Those birds we've

10 lost long since.

11 Some of the old-timers, you may recall some

12 of those conversations during the working group

13 meetings have seen birds there in the '30s, '40s,

14 '50s.

15 CHAIRMAN MARTIN: And they were hunted

16 quite extensively.

17 MR. PETCH: Absolutely.

18 CHAIRMAN MARTIN: Mostly during season and

19 out of season.

20 UNIDENTIFIED SPEAKER: They certainly were.

21 CHAIRMAN MARTIN: Let's be honest, okay? A

22 lot of people survived in the wintertime on those

23 things even though they tasted terrible.

24 MR. PETCH: Just to come back to some of

25 your earlier conversations or earlier slides, Fred.

The Clear Creek drainage itself is excluded right now from priority habitat, general habitat. And we don't consider it occupied range on the valley floor. We do the rim around it.

So we've tried to draw where there are major topographic features, especially on the south side, tried to draw those in and remove those areas.

Parachute Creek, Clear Creek, Brush Creek, you know, the major part of those canyons, especially below the cliffs we've tried to exclude from habitat.

There are other circumstances on a smaller scale that are certainly included in what we are showing here as priority habitat.

MS. GRIFFIN: If you notice that North Park doesn't have any radiotelemetry points. And it's not because we don't have data there.

We purposely did not use the data from North Park to run the model so that we could use that as a validation in testing our model in North Park to see how well it worked.

So we tested where the breeding model with the known leks where we expected there to be breeding habitat and then overlaid the known leks to see how well those correlated.

1 And then we did the same with the other --
2 some more recent telemetry data that we have in
3 North Park.
4 And we have all kinds of validation slides
5 but I don't need to show them, just to say that both
6 for the breeding and the other seasonal habitats,
7 the validation is 96 percent for the other seasons
8 and 98 to 99 percent correlated for North Park. So
9 we feel like we have a good model.
10 MR. JARMAN: So in this case what's not
11 showing up are a lot of the telemetry points I would
12 assume outside of the red that didn't correlate with
13 anything.
14 So you're clipped once against the other.
15 So I'm assuming there are a lot of telemetry points
16 that didn't show anything.
17 MS. GRIFFIN: No.
18 MR. NEUBAUM: No, they're up there. You
19 can see --
20 MS. GRIFFIN: There's a few. See like
21 here, here. There's some here. We clipped it back
22 to occupied range. So if a bird were outside
23 occupied range, we would still keep it in the model
24 because that's training where there's a probability
25 of seeing a bird.

1 In terms of where we're going to manage for
2 birds are what we have determined is occupied range.
3 So the BLM definitions of that priority
4 habitat are areas with the highest conservation
5 value of maintaining sustainable Sage-Grouse
6 populations, and it includes all of those three
7 seasons or all the seasons that the birds use.
8 So those are all areas that are important
9 for us to manage and that we think we need in order
10 to maintain abundance and distribution of the birds
11 in Colorado.
12 The general habitat then are areas that the
13 birds are used -- there's outside the priority
14 habitat yet still within the occupied range of the
15 bird.
16 Obviously, there's a lot of red on that
17 map, but not every single place is priority. So we
18 cut it back using this information of where we have
19 captured birds nesting in relation to a lek.
20 And this is where counters -- it doesn't
21 counter, but it kind of tees into your question of
22 that four-mile buffer and only having data from
23 Pinedale, which is very different.
24 Well, this is data from Colorado. And this
25 is the distance from a lek. And this is the

occurrence. So if you look at two miles from a lek, 52 percent of our birds are nesting within two miles of a lek.

So it ties back to where the leks are and they're there also because of that nesting habitat.

Within four miles of a lek, 80 percent or just over 80 percent of our nests are found within four miles of a lek.

So that's showing the importance of that four miles. So if we're protecting four miles from a lek or have varying levels of conservation measures within four miles of a lek, it's because we're trying to incorporate most of the nesting habitat.

So that's where that comes from. And like I said, this is Tony Apa's research.

MR. JARMAN: I was just going to ask you that, if that was Tony's work.

MS. GRIFFIN: Yeah.

MR. PETCH: Yeah, this is specific to Tony's work. He has also then expanded it out and looked at other studies around the west that incorporate another couple thousand nest points.

And the numbers fluctuate a percent a point or two, but it's pretty well standardized across the

1 west that at four miles you're looking at about 80
2 percent of the nests.
3 MR. JARMAN: What would be curious if you
4 correlated this with what -- is it Dr. Walker's book
5 with the Sage-Grouse -- but the graph I showed you
6 earlier (inaudible) --
7 MS. GRIFFIN: Mm-mm.
8 MR. JARMAN: -- is the regression line.
9 That was comparing the lek to disturbances. And I'm
10 curious to see because I think that regression line
11 was a wee bit tighter than this, but I'd be very
12 curious to see if it has a tale very similar to
13 that.
14 MR. PETCH: Where you see four mile buffers
15 referenced in the NTT report and elsewhere is drawn
16 on this type of analysis of to get a reasonable --
17 and we've in Colorado long since settled on 80
18 percent as being a reasonable proportion of nests --
19 you need to go out four miles to include.
20 MR. JARMAN: This is just Colorado, right?
21 MR. PETCH: It is just Colorado, but these
22 data don't fluctuate a percentage point or two if
23 you took it to Wyoming or Idaho or Montana.
24 But the shape of that curve doesn't change
25 very much (inaudible) --

1 MS. GRIFFIN: And I think I have a table
2 that I can show you that has -- or send to you that
3 has different studies so the reference studies from
4 the different states of what percentage of their
5 nests are within four miles.
6 So you can get an idea of what Idaho's
7 studies have shown and that type of thing. Because
8 like he says, they're all very close to about 80
9 percent at that four-mile mark.
10 So this map with all the red, we took it
11 back to taking our leks and going to four miles. So
12 we take all the red, cutting it back to four miles
13 of a -- so cutting this map back to our four miles,
14 that's how we get the map that you see everywhere.
15 So the fact that there's a green or red
16 color means it's occupied range. And then we took
17 that high probability of use in any one of the three
18 seasons and within four miles of a lek, that's where
19 it gets the red. That's what gets the red.
20 If it's not within four miles of a lek but
21 still within occupied range, that's where you get
22 the green, the general habitat. So it is definitely
23 a biologically-based map.
24 MR. PETCH: And so in the context of the
25 slides you were showing earlier, Fred, did any

1 Pinedale kind of situation, and the closest example
2 we have to that here in Colorado is North Park or
3 Moffat County.
4 So as you get into Moffat County, you start
5 to see very rounded, red sections of priority
6 habitat that are really entirely -- those are
7 four-mile buffers, four-mile radii around a
8 strutting ground.
9 What you don't see, you don't see much
10 roughness in there because that habitat is pretty
11 consistently of high probability of Grouse use.
12 And so as you get into those really rounded
13 areas, those are those large, homogenous sagebrush
14 pans that are sort of a classic Wyoming basin
15 Sage-Grouse habitat.
16 As you get into more fragmented habitat,
17 the southern end of Moffat County, the Piceance,
18 Eagle, south Routt, you start to see there the
19 habitat quality, suitability drops off long before
20 you get to the edge of the four miles.
21 And so you see on the north edge of the
22 Piceance, for instance, that that roughness is drawn
23 in. Again, it's still a fairly core scale, but it's
24 not -- we're not running those four-mile buffers out
25 there into things that are old growth (inaudible).

1 We tried to bring those back into areas that really
2 have the suitability of producing Sage-Grouse
3 habitat.
4 MR. NEUBAUM: If it dropped of the bench
5 down into the valley and we knew that wasn't
6 Sage-Grouse habitat, we manually went back in and
7 trimmed them.
8 CHAIRMAN MARTIN: Yeah, those are all
9 (inaudible) right there and that is also the cliffs
10 over there. And they're not going to stay on those
11 cliffs anyway.
12 MR. NEUBAUM: And that's why you kind of
13 see in certain places you can see parts of those
14 curves of those lek buffers. But in most places
15 they got trimmed off.
16 CHAIRMAN MARTIN: And again, that's where
17 we went back and said you need to go with topography
18 instead of just a four-mile circle around every lek
19 because what happens is you take in way too much
20 territory that is not suitable habitat.
21 MS. GRIFFIN: Well, I --
22 CHAIRMAN MARTIN: You disagree?
23 MS. GRIFFIN: No. My understanding is that
24 the BLM -- you know, if you had a lek, you know, say
25 on the edge on this ridge out here and you had a lek

1 and the four-mile buffer came out and covered the
2 basin, it's my understanding they are not applying
3 those regulations to that buffer. It's clipped to
4 our map, not to a strict buffer.
5 CHAIRMAN MARTIN: We were looking at it the
6 other way, that it was.
7 MS. GRIFFIN: I don't believe so, but
8 that's a good thing we need to clarify.
9 MR. JARMAN: That's why I showed that slide
10 Kathy, that had that.
11 CHAIRMAN MARTIN: Exactly.
12 MR. JARMAN: So you use the mapping and
13 then you clip the four-mile policy approach on top
14 --
15 CHAIRMAN MARTIN: You put it right on top
16 of it and that's what we're talking about.
17 MR. JARMAN: -- you might be three
18 drainages over.
19 MS. GRIFFIN: No. So it's my understanding
20 that all the regulations are to the boundaries of
21 occupied range that we have provided them.
22 MR. PETCH: Right. And I think the way
23 that's couched is that the they're restricting it to
24 priority habitat and/or general habitat.
25 So when you reach the edge of a color band

there, that's when that policy would not be applied by BLM is how, at least the interim policies is worded (inaudible).

CHAIRMAN MARTIN: That may be your understanding. It hasn't been ours.

MR. PETCH: Okay.

MS. GRIFFIN: Okay. That's a good thing that we need to --

CHAIRMAN MARTIN: A flat map, three -- four miles circle around it and it didn't matter if it was high or low.

MR. PETCH: Right. No, I think, you know, those more contiguous areas, say in Moffat County, I think that's a fair assumption that a four-mile radius laid across that is that's the area that the NTT report would suggest (inaudible).

MR. JARMAN: That's the very core reason we showed the comparison in those (inaudible).

CHAIRMAN MARTIN: That's right. Exactly.

MS. GRIFFIN: Yeah.

CHAIRMAN MARTIN: But it's not clear to us and why they're applying that.

MS. GRIFFIN: And that's a --

CHAIRMAN MARTIN: -- four-mile circle because that takes in a whole bunch of drainage that

1 really is not habitat or even necessary.
2 MS. GRIFFIN: And that's an important
3 distinction to make that we need to make sure we're
4 all understanding what BLM is. Because that's not
5 our intention obviously with the maps.
6 UNIDENTIFIED SPEAKER: (Inaudible).
7 CHAIRMAN MARTIN: And what I got out of it
8 is it's a four-mile circle and if you've got a lek,
9 that's a four-mile circle and it doesn't matter how
10 high or low it is.
11 MR. PETCH: It certainly had been our
12 intent with this map to at least take the major
13 topographic features out of there.
14 CHAIRMAN MARTIN: Thank you.
15 UNIDENTIFIED SPEAKER: (Inaudible).
16 MR. JARMAN: And then that shows up --
17 MR. PETCH: Right. That's not perfect. It
18 certainly, as you get into smaller and smaller
19 scales, you run into that. We're working with BLM
20 now on an EIS on the -- most of it's on the north
21 side of the Crook County Line -- to do just that, to
22 target development across the top and put it in the
23 bottom so those drainages -- it would show as green
24 on this map.
25 Now, a lot of the disturbance is still

coming across priority habitat, but at least the physical disturbances we would (inaudible) down in those pads.

All of that was in progress before this whole effort, which still is. You know, BLM's trying to figure out what this means. We are certainly. And I know you all are of what a new EIS revision may look like (inaudible).

CHAIRMAN MARTIN: Yeah. And it's also in reference to disturbance in the priorities that you've got there. You're showing no actual infrastructure that's in place that has been for quite some time.

And at that point then you do have potential of fragmentation of habitat, et cetera. But it's there. It's been there 100 years, et cetera, and the development and everything else needs to be there so that we can make some changes or choices or clarifications or surface use agreements and all the other things that need to go there.

And the other thing is private land versus public land. And that affects again the individual property owners and how are they going to be able to manage it, working with the Division of Wildlife,

1 having the conservation plans in place, et cetera.
2 That's lacking in the information that the general
3 public is not seeing.
4 MS. GRIFFIN: And the purpose of our
5 general habitat and our priority habitat maps is a
6 Colorado-scale map to be consistent across all of
7 our populations and then honed in. But it's at the
8 50,000-mile view, right?
9 The idea is that if you have a proposal or
10 something, you can't use a range-wide map. I mean,
11 that doesn't make sense. This is mapped not for
12 that.
13 It's that first view like, okay, we're
14 really close to that red line. Let's go out on the
15 ground. Let's what's actually out there. I mean,
16 it has to have some site evaluation, some
17 ground-truthing in it.
18 And that's our intention. And if you read
19 our metadata that goes with these maps, it clearly
20 states that.
21 CHAIRMAN MARTIN: Sometimes that's not the
22 public perception. And that's the problem. Those
23 details are left out of the discussion. And this is
24 all you see.
25 At that point this is what it's going to be

1 and everything applies to that as priority and there
2 is no individual and no actual impact.
3 And that's what Tom was getting at. What
4 is that socially economic impact based upon private
5 land, again leases or whatever is going to be there,
6 grazing and what have you, what is that impact?
7 Does this map then trump everything? And
8 the answer is, in some people's minds, it does.
9 Other people, it's an economic downturn to them and
10 they're out of business.
11 So we need those small details that are now
12 down on the ground level instead of 50,000 feet.
13 And then that's where we need to be discussing, how
14 does that affect you and me and the bird?
15 MR. PETCH: That raises an important
16 distinction about this map is this is Colorado's map
17 based on where Grouse are most likely to
18 (inaudible). What is the most important habitat for
19 Grouse in Colorado?
20 It doesn't pretend to bring in all those
21 other considerations, existing infrastructure, value
22 of the energy resources underneath. It's purely a
23 biological description of what's important to
24 Grouse.
25 Those other conversations are valid. They

1 all have to happen. But they take something like
2 this as a starting point and then once you know the
3 biology of it, okay, now what do you do in terms of
4 how you make those priority decisions which are
5 fundamentally political decisions in nature.
6 And in that sense we have not tried to
7 stray under that. And frankly, I think, most
8 everybody in western Colorado would be unhappy if we
9 did of trying to make some assessments about things
10 that are values to folks like you all and other
11 counties in the northwest.
12 But what we have tried to do with this map
13 is to make a reasonable and biologically supportable
14 sort of baseline from which those conversations
15 could start.
16 CHAIRMAN MARTIN: And again I'll reiterate,
17 some people think this is the end product and that's
18 the way it's going to be. And everything that
19 applies in reference to managing the Grouse is what
20 this map is going to dictate.
21 And at that point you've got a real
22 conflict. And I think, yes, it's nice that you did
23 this as a biological map and what have you. It's
24 really nice.
25 But now we need to justify all the other

1 conversations we have and apply it to this map and
2 then come up with a working plan as we did before
3 and the buy-in with everybody that's involved,
4 knowing what's at stake. But that's lacking in this
5 map.
6 And again, it's tunnel vision by some that
7 wish to see it this way. And that's all they're
8 going to see. And our job is to explain all the
9 other details within this map.
10 And I think that's where the conversation
11 really needs to focus in now and how are we going to
12 be able to manage the bird and keep the bird alive,
13 et cetera, not just this is a biological map and
14 this is how it's going to be in the bird world.
15 MS. GRIFFIN: Then that should be the next
16 steps, should be with the BLM EIS process.
17 COMMISSIONER JANKOVSKY: (Inaudible) BLM
18 improved by the BLM, it becomes -- I don't care what
19 you're doing on the local level. It just becomes
20 the way it is.
21 That's just been my dealing with federal
22 government and federal agencies. Once the map is
23 there and it is, it just become --
24 UNIDENTIFIED SPEAKER: Cast in concrete.
25 MR. PETCH: Kathy alluded to something

earlier that may be helpful for this conversation, that the definitions that are portrayed on this map, priority habitat and general habitat, are different than the definitions we've used before. And they were developed by BLM for this national process.

As starting points for the analysis and, you know, to try to explain BLM's thinking on this -- I would do them an injustice, I'm sure.

But I think much of the purpose for these basement layers is to feed into the EIS analysis so that the kinds of assessments that I think you guys are all -- I mean, they're viable to this county and others, I think that's happened, that part of the assessment, part of the analysis that goes in any EIS document -- and I think there are many of these things, there will be conflicts that show up during the course of that that I think will at least lead down the direction that you're suggesting.

MR. PETCH: Brad, maybe this is an unfair question, is the Parks and Wildlife going to push for basically ground-truthing efforts in what alternatives are ultimately adopted within the EIS?

In other words, you talk about the value of going from the 50,000-foot view down to reality on the ground, which is what really I think the Board's

1 talking about and what it means for us in Garfield
2 County, that takes feet on the ground in really
3 determining this rather than adopting this -- if
4 it's red, then you're out.
5 Is the DOW (inaudible) going to try to push
6 in the BLM's process, look, we understand that
7 that's a view, but you really need to, whatever
8 alternative you're looking at, push for
9 ground-truthing so that it is further refined
10 because of what's at stake?
11 MR. PETCH: I think so. To the extend that
12 -- the caveat that I throw out there is that RMPs
13 are also 50,000-foot documents that are looking at
14 large scale allocations of resources.
15 And so many of the things that we do as a
16 matter of course in putting a sighting on the ground
17 or trying to minimize impacts on the ground are
18 things that happen at an administrative level that
19 is tiered many levels below what happens in the RMP.
20 And so that's a challenge with this
21 conversation is I sense a desire for some certainty
22 that those thing will happen at administrative kinds
23 of levels that they really don't have much
24 conversation and frankly no real place to hook them
25 in an RMP because of the scale of those documents.

1 And that is a challenge. It certainly has
2 been a challenge with the other RMPs, the existing
3 drafts as they move forward with how do you tie the
4 landscape scale allocation decisions to how it
5 actually happens (inaudible).
6 MR. JARMAN: On the ground, yeah.
7 CHAIRMAN MARTIN: And now you've identified
8 Mr. Cagney's problem, and that is he's got a
9 50,000-foot view and that's based upon a scientific
10 team that came and did exactly what you do and used
11 the maps and all the technology.
12 Now he has to go ahead and say, guys, you
13 did a real good job with your plan and everything
14 and yes, it takes in all these considerations, et
15 cetera, but we've got throw it out. And that's
16 where we heard the change.
17 And because of all of the efforts and what
18 are have you and the actual on-the-ground stuff,
19 that gives us concern because we're going to have a
20 plan that's at 50,000 feet based upon what we heard.
21 And we think it needs to be refined.
22 And I think you guys think it needs to be
23 refined. And it also goes down to the point how
24 much money is there to implement the requirement
25 plan? And we're going back to exactly what we were

1 saying. There's an out. And it's all voluntary on
2 these plans.
3 And the reason being is because there's no
4 money to make it mandatory. If you have a national
5 plan that's mandatory, how much money is that going
6 to take to enforce?
7 And so that's why we say we really need to
8 go ahead and to get support in reference to each and
9 every plan, make sure it's part of the national
10 plan, based upon on-the-ground stuff versus the
11 50,000-foot view. And the common goal is to save
12 the bird. And that's kind of where we're at.
13 COMMISSIONER JANKOVSKY: And it also goes
14 back to the PPR Plan and the amount of time this
15 County's put into sole Sage-Grouse issue with the
16 BLM and kind of looking at, well, it's 20,000 acres
17 of BLM land out of Garfield County. Really, how
18 much effort should we be putting into this because
19 it's 20,000 acres?
20 And then there's another 60 to 80,000 acres
21 that has federal private land, federal minerals
22 which will be affected.
23 But for this population, it's really the
24 private land that needs -- for this plan to work,
25 it's the private land, it's the PPR plans --

1 CHAIRMAN MARTIN: And that's where your
2 partnership (inaudible).
3 COMMISSIONER JANKOVSKY: Especially if your
4 population is down in the southern part of this
5 area.
6 So that really is what -- and so we look at
7 it, well, we're putting a lot of effort into this.
8 And we do need to put effort into it because if the
9 bird gets listed, then there's probably a billion
10 dollars worth of natural gas in the red there. And
11 there's probably out of that billion there's
12 hundreds of millions of dollars of money back to us
13 in property taxes.
14 So there's a huge socioeconomic side to
15 that. But again, we look at we're spending a lot of
16 resources and a lot of time into this and there's
17 20,000 acres of BLM land.
18 So I think for PPR, the plan that's there
19 is at least working to some extent and how do we get
20 more buy-in from private landholders because it is
21 -- most of the population is on private land.
22 MR. PETCH: Go ahead, Dan.
23 MR. NEUBAUM: I was just going to point
24 out, I mean, in some ways when I think about the
25 plan and I think about these maps, I mean, they're

1 tools. And you have to take them as that.
2 And you can turn to each of them to help
3 guide you through these processes. But I would hope
4 that neither of them would be the end-all, be-all.
5 COMMISSIONER JANKOVSKY: And I think we
6 lose sight. You know, I've never even seen the bird
7 but I'm sure starting to learn a lot about it.
8 CHAIRMAN MARTIN: It comes up underneath
9 your horse all of a sudden, too.
10 COMMISSIONER JANKOVSKY: If we do lose
11 sight of what's best for the bird.
12 CHAIRMAN MARTIN: Well, Tom, I know that
13 we've got another hour's worth of conversation.
14 However, we're already a half hour, well over 45
15 minute over our timeline.
16 Is there a way that we can continue a
17 conversation, have another work session devoted
18 strictly to this and the questions that you have or
19 answers or ability to work together before?
20 COMMISSIONER JANKOVSKY: And is there value
21 to it?
22 CHAIRMAN MARTIN: Yeah, is there value to
23 it?
24 COMMISSIONER JANKOVSKY: Is there value to
25 that? We're wrestling with this whole BLM EIS. We

1 feel it's very authoritarian and not being heard.
2 That's at least our viewpoint on it.
3 MR. PETCH: We're always happy to work with
4 this County and others to the extent that it helps
5 you guys get where you want to go. We're not in a
6 position to be confrontational with BLM --
7 CHAIRMAN MARTIN: We don't want you to be.
8 MR. PETCH: -- (inaudible) process. And so
9 in that sense, I think they're from a bringing more
10 -- hopefully more light than heat to conversations,
11 we're happy to do that.
12 We are considering putting a working group
13 meeting together to lay out some of the underlying
14 things that have happened in the last year or so, so
15 that the working group in general has some of that
16 sense as well.
17 There is one comment, and it goes back
18 actually to your comment, and Kathy has the slide up
19 on it, that there's been a perception I think -- and
20 again, I don't want to be putting words in BLM's
21 mouth -- but I think there's been a perception that
22 all of this EIS stuff is BLM 's idea. And it isn't.
23 All of this dims back to the Fish and
24 Wildlife Service and including the conversation
25 about local conservation plans, that the Fish and

1 Wildlife Service in 2010 pretty clearly said, that's
2 great. It's all voluntary. Everything in
3 Colorado's voluntary. Frankly everything else in
4 ten other western states is voluntary.
5 And essentially it's treated in the Fish
6 and Wildlife Service decision as that's great. That
7 gets you part of the way there, but it's not enough.
8 And so that's the place we find ourselves
9 as a state. And I think many counties also find
10 themselves is there's lots of investment in the
11 Plan. And in many places lots of implementation in
12 the Plan that the Service has said that's not far
13 enough, doesn't get us far enough.
14 And so how we close that gap or do we stand
15 on our laurels and not close the gap, that that
16 piece of it, regardless of what BLM ends up doing I
17 think is another piece of this conversation that
18 would be useful.
19 CHAIRMAN MARTIN: Yeah. I had a nice
20 conversation along that lines in reference to the
21 head of the U.S. Fish and Wildlife in Pittsburgh,
22 Pennsylvania just this year.
23 And he said just the opposite. It's very
24 important to include all local plans. And it's very
25 important to include the local governments and

1 understand what the socioeconomic impacts are. I
2 don't see it in that particular statement.
3 MR. PETCH: In the one that's on the
4 (inaudible).
5 CHAIRMAN MARTIN: That's right. And so at
6 that point, that's when we said, you really need to
7 live up to what you're saying at this particular
8 meeting. And that happened to be in front of the
9 National Association of Counties, which included all
10 of the western United States.
11 And at that point he said we will work with
12 everyone. We encourage our sisters, which are in
13 the BLM and the Interior, et cetera, to do the same.
14 And we expect to be able to do that.
15 Now, we also looked into the Land
16 Management Policy Act. And that says that everybody
17 under that department of Interior, which U.S. Fish
18 and Game -- will enter into agreements with local
19 governments. And it's called the Cooperating Agency
20 Status.
21 And that includes Forest Service, BLM, U.S.
22 Fish and Wildlife, the Army Corp, and all the other
23 things. Unfortunately, they were resisting that and
24 that's why that statement comes out.
25 So again, it's nice that you know and

1 understand that. And hopefully you'll be able to
2 support us when we say, guys, we need to work a
3 little closer together, as we do with the Division.
4 So that's kind of what we're working on.
5 COMMISSIONER JANKOVSKY: And what we told
6 BLM (inaudible) listened to that, but as a county we
7 have the ability to talk to the BLM, hopefully pull
8 the BLM in, bring in the private landowners and then
9 you guys as the (inaudible) taking care of
10 (inaudible) the bird itself, managing the bird and
11 hopefully have some common ground as opposed to
12 you've got BLM's managing the habitat. We've got
13 private guys that are doing this. And we at least
14 have some authority to try to bring people together
15 and come up with something that works.
16 CHAIRMAN MARTIN: Okay. Well, that's where
17 it is. Thank you. I think if Fred can get ahold of
18 you, we could go ahead and get a schedule of what we
19 need, an agenda and ask certain questions.
20 COMMISSIONER JANKOVSKY: How do we help you
21 guys?
22 CHAIRMAN MARTIN: And that's the exchange
23 that we need.
24 MR. PETCH: We appreciate that.
25 COMMISSIONER JANKOVSKY: And how do we work

1 with the State?

2 CHAIRMAN MARTIN: So we'll leave Fred as

3 our contact point. We'll put our questions

4 together. If he has some answers of what we've

5 asked or clarifications or if we're way out in left

6 field, please let us know.

7 And a good honest exchange of information

8 is what we're after. All right. Thank you very

9 much. We really appreciate it.

10 (This portion of the meeting concluded at

11 02:52:29.)

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1 REPORTER'S CERTIFICATE

2 STATE OF COLORADO)
) ss.
3 COUNTY OF ADAMS)

4 I, Geneva T. Hansen, do hereby certify that I am a Professional Shorthand Reporter and Notary
5 Public within the State of Colorado.

6 I further certify that the foregoing transcript constitutes a true and correct transcript
7 to the best of my ability to hear and understand the audio recording.
8
I further certify that I am not related to,
9 employed by, nor of counsel for any of the parties or attorneys herein, nor otherwise interested in the
10 result of the within action.

11 IN WITNESS WHEREOF, I have affixed my

12 signature and seal this 16th day of May, 2013.

13

14 My commission expires 11-18-15.

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GENEVA T. HANSEN

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John W. Hickenlooper
Governor

January 14, 2014

Mr. Jim Cagney
District Manager
Northwest District Office
U.S. Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

Dear Mr. Cagney:

Thank you for all of your hard work developing a Preliminary Resource Management Plan (PRMP) regarding the U.S. Bureau of Land Management's (BLM) conservation of the Greater Sage-Grouse (GrSG). We know that the Department of Natural Resources and Colorado Parks and Wildlife (CPW) have been working closely as Cooperating Agencies throughout the process, and we welcome the emphasis on science throughout the draft document.

Additionally, we appreciate your willingness to give the State of Colorado additional time to explore elements of GrSG conservation that might not have been adequately addressed in the PRMP. This letter serves as the Colorado state alternative, and we ask for your consideration as you move forward with developing a final plan. It is our hope that a management alternative can be developed that both safeguards the economic engine of northwestern Colorado and protects the GrSG sufficiently to preclude a listing under the Endangered Species Act by the U.S. Fish and Wildlife Service (USFWS).

Since 2000, the State of Colorado has spent over $40 million on GrSG conservation efforts for the species. These expenditures include conservation planning and implementation, land protection, population and habitat monitoring, habitat treatments, restoration, research, and communications. Since 2004, CPW state wildlife managers have protected more than 74,000 acres of GrSG habitat, primarily through conservation easements. About 24,000 additional acres are managed by other conservation interests such as The Nature Conservancy and Cattleman's Land Trust. More than 50,000 acres of GrSG habitat have been improved through treatment since 2000. Working closely with private landowners, CPW has contributed to the 273,000 acres now managed through Wildlife Mitigation Plans, Grazing Plans, Ranch Management Plans, and Habitat Suitability Plans. These public/private partnerships are essential for managing resources in our state, and we hope to maximize their potential in future conservation efforts.

In 2008, when the GrSG was designed "warranted but precluded" from listing under the Endangered Species Act, a diverse group of Colorado stakeholders developed the statewide Conservation Plan for Greater Sage Grouse. This detailed plan was updated just this year, and our results clearly demonstrate the broad scope of work that is underway for conservation. That

update, called the Colorado Package, was submitted to both the BLM and the USFWS. Regulatory certainty is evident for many of our existing provisions, and we feel confident in the effectiveness of these measures. We urge our federal agencies to consider the progress documented there on state and private lands in any approach to conservation on federal lands.

We must keep the local context for this conservation challenge foremost in our minds. The communities of northwestern Colorado rely on access and productivity associated with public lands for their livelihood. With that in mind, any plan that the BLM ultimately promotes must accurately assess the socio-economic values that link people to the land in that area. Ranching and energy development are the two most important economic drivers in the region; the final RMP should propose an adaptive management approach that will conserve habitat for the GrSG while continuing to allow those industries to thrive. Such an approach will favor site-specific review and the consistent incorporation of new science over a one-size-fits-all management regime.

Grazing has not been identified as a primary threat to the stability of the species, and we must be vigilant that none of the conservation measures have unintended negative consequences for agriculture. In many parts of the range, existing grazing practices are working in concert with conservation efforts, and we should stick with these successful tools whenever possible. Alternative A, the "no action" alternative, provides some useful management guidance on this issue, but only where existing plans have been updated. Areas that are still operating under decades-old grazing regimes can be updated to reflect successful practices embodied in more recent plans.

Loss of habitat is the primary threat facing the long term viability of the species. Oil and gas development is a contributor to that loss, but the energy industry also provides necessary economic stability for the region. Any provisions the BLM advances must consider both dimensions of this resource issue. We are prepared to support conservation measures necessary to preclude a listing, but we do not want to see overly restrictive measures that would irreparably harm the energy industry. Indeed, the industry has a vested interest in conserving GrSG habitat because nothing would do more harm to their future operations than a listing. With that in mind, we suggest an approach that favors consultation over prohibitions on occupancy; within the 4 mile buffer from a lek, energy companies should be required to consult with wildlife experts (either BLM or CPW) before beginning operations. If Best Management Practices have been identified that can minimize the impact of energy access, operators should be required to adopt those once a site visit has been conducted. Our existing wildlife consultation regulations are administered by the Colorado Oil and Gas Conservation Commission; we are currently conducting a review of those practices and anticipate fresh insight into their effectiveness in the first quarter of 2014.

One of the most troubling tools being proposed in the PRMP is the use of disturbance caps. This is an untested management approach, and it raises at least four implementation questions.

- First, what percentage will define the cap? It is our understanding that there is limited scientific evidence that supports either of the two numbers currently in play for anthropogenic disturbance (3% and 5%). With that in mind, we urge the BLM to pursue a flexible approach that allows managers to learn as they go. Imposing an arbitrary cap on the landscape could have catastrophic impacts on resource use.

- Second, how will the cap be measured and enforced? We've heard widespread concerns about lack of staffing at BLM. Developing and tracking a complex new management tool will require a consistent and long term investment of time and resources; if the BLM lacks these resources, perhaps another approach should be considered. We also understand that federal agencies do not have jurisdiction over private property, and this should be made explicit in the final RMP. Calculations of disturbance toward a cap should not include private property.

- Third, how will we know if the cap is working to conserve habitat? Already, we see that some of the management zones with the healthiest GrSG populations are the same zones with the highest disturbance percentage. We should learn from these circumstances and not seek to undermine them. Rigorous monitoring and a feedback loop will help us fine-tune implementation.

- Finally, will the establishment of a disturbance cap lead to a cascade of unintended consequences? For example, valid existing energy leases may be impacted, especially if buffer distances from leks are restricted and overlaid on disturbance cap limitations. This is a clear violation of private property rights; we can't support it, and we suspect the courts will share our view. Similarly, grazing lessees may find their permits changed when it comes time to renew.

Given the critical importance of these industries to the economic health of the region, we urge the BLM to reconsider the use of disturbance caps unless they can be implemented with site-specific flexibility.

Mitigation is a promising approach for allowing industrial access without compromising aggregate habitat quantity and quality. However, the existing plans for mitigation in the PRMP are incomplete. Without more detailed information about how this program would work, we are hard pressed to support it. Please work closely with the appropriate state agencies engaged in the development of the Colorado Habitat Exchange; this emerging program may be a good fit for the BLM.

Adaptive management is a widely accepted tool for managing resources. Rather than imposing a one-size-fits-all prescription, we urge the BLM to consider local conditions before, during, and after any tools are deployed. In places with healthy and thriving bird populations, restrictions should be more flexible; in locations with struggling bird populations, restrictions should be tighter. Those parameters should then be revisited regularly. Evolving science will help us better understand what the species needs to succeed. Our improved understanding can then inform future regulatory terms, and the cycle of adaptive management will allow us to be both responsive and proactive.

Lastly, we urge the BLM to maximize the benefits available through public-private partnerships. We believe opportunities exist to protect additional acres of private land, and are working closely with industry, landowners, and land trusts to secure new easements. The Colorado Habitat Exchange exemplifies the gains to be made by connecting private landowners, energy companies, and state and federal natural resource agencies. When industry and agriculture are key players in the development of a conservation plan, we all stand to benefit. Reconstituting and strengthening the role for local working groups in the northwestern region is one way we might guarantee a seat at the table for all stakeholders as this effort progresses.

The state has been, and will continue to be, an active partner through the Cooperating Agency process. We remain committed to the use of science in protecting imperiled species; this approach is central to who we are as Coloradoans. Attached are two documents that together comprise Colorado's best available science: a cover letter from CPW and a detailed matrix that parses each of the provisions in the PRMP. Throughout, CPW has tried to walk a narrow line, identifying parameters that are restrictive enough to preclude a listing, but not too restrictive for the socio-economic health of the region. Colorado has a long track record of success working across party lines to find cooperative agreement in how we manage our iconic natural resources.

We look forward to ongoing discussions as we build a final plan from this initial draft.

Sincerely,

John Hickenlooper
Governor

Enclosures

cc: Mr. John Mehlhoff, BLM Colorado Acting State Director

GARFIELD COUNTY

GREATER SAGE-GROUSE CONSERVATION PLAN

Adopted: March 18, 2013 (via Resolution 2013-23)

Garfield County Board of County Commissioners

John Martin, Chairman

Mike Samson

Tom Jankovsky

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CHAPTER 1 ADOPTION RESOLUTION

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STATE OF COLORADO)
)ss
County of Garfield)

At a regular meeting of the Board of County Commissioners for Garfield County, Colorado, held in the Commissioners' Meeting Room, Garfield County Administration Building in Glenwood Springs on Monday, the 18th day of March A.D. 2013, there were present:

John Martin, Commissioner Chairman
Mike Samson, Commissioner
Tom Jankovsky, Commissioner
Andrew Gorgey, County Manager
Frank Hutfless, County Attorney
Jean Alberico, Clerk of the Board

when the following proceedings, among others were had and done, to-wit:

RESOLUTION NO. 2013-23

A RESOLUTION APPROVING THE "GARFIELD COUNTY GREATER SAGE-GROUSE CONSERVATION PLAN"

Recitals

A. Portions of western Garfield County are currently managed for Greater Sage-Grouse (sage-grouse) and habitat protection as detailed in the ***Parachute - Piceance - Roan Sage-grouse Conservation Plan*** (PPR Plan) approved by Colorado Parks and Wildlife (CPW) in April, 2008 which was a multiple year planning effort with broad-base support from private land owners, state and federal agencies and special interest groups. The PPR Plan serves as the primary management framework for both public and private lands in Garfield County that have been identified as having suitable sage-grouse habitat by CPW.

B. To date, the PPR Plan has provided valuable guidance to private landowners and state and federal agencies in Garfield County since its completion in 2008. The Garfield County Greater Sage-Grouse Conservation Plan (the Plan) serves as a necessary refinement of the PPR Plan, which enhances the ability to effectively protect and manage key habitat components. This is achieved primarily through a high-resolution habitat identification and mapping effort, which utilizes the best available science. The Plan is designed to reflect the unique characteristics of the habitat in Garfield County and to acknowledge the latest research and technological advances in energy development.

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C. The U.S. Fish and Wildlife Service (the Service) listed the sage-grouse as a Candidate species (warranted but precluded) for Endangered status in 2010, with a pending decision for a final determination anticipated in September, 2015.

D. Garfield County has entered into a Memorandum of Understanding (MOU) with the Bureau of Land Management (BLM) as well as participated as a Cooperating Agency in the review of the Northwest Colorado Sage-grouse Fnvironmental Impact Analysis (EIS).

E. In addition to participating as a Cooperating Agency, on June 18, 2012 Garfield County adopted Resolution 2012-51, "Asserting Coordination Regarding the Sage-grouse with all Federal and State Agencies Maintaining Jurisdiction Over Lands and/or Resources Located within Garfield County, Colorado." As a result, the County has requested the BLM, through this Coordination process, to reconcile their planning efforts such as the Alternatives proposed in the BLM EIS with local planning efforts in Garfield County.

F. At the direction of the U.S. Department of Interior, a National Technical Team (NTT) was assembled which produced a set of conservation strategies, known as the NTT Report in December, 2011. While the NTT Report used the Wyoming region as the basis for the national habitat range characteristics and subsequent land use management recommendations, it does not address the unique landscape qualities, habitat characteristics or land uses found in western Garfield County.

G. As a result of an attempt to reproduce the Preliminary Priority Habitat mapping and the methodologies employed by CPW and adopted by the BLM, Garfield County was unable to reproduce that mapping due to the coarseness of the data. Because of this, much of the habitat mapping used to delineate populations and habitat had serious validity issues and inaccurately classified large areas of unsuitable habitat as potential grouse habitat. As a result, Garfield County commissioned a highly accurate mapping exercise of potential sage-grouse habitat in Garfield County using a much more sophisticated and robust model that ultimately revealed that suitable and effective habitat in the County exists in a significantly different pattern, which is considerably different to the habitat supported by and cited by the NTT Report.

H. The BLM has a statutory duty to manage lands under their direct or indirect jurisdiction for multiple uses of resources, and not for a single purpose. The implementation of the NTT recommendations across large areas of Garfield County through an amendment to the applicable Resource Management Plans would burden large areas of private lands that are not suitable sage-grouse habitats with severe land use restrictions.

I. Garfield County remains concerned that if NTT recommendations are adopted across all currently proposed Preliminary Priority Habitat, Preliminary General Habitat, and Linkage Areas as mapped by CPW without regard to local conditions and using accurate data,

then large swaths of non-habitat on public and private lands in the County would be encumbered and burdened with unnecessary regulations that would 1) significantly hurt local economies and 2) would misallocate resources which would not help recover the species.

J. As stated by CPW and the BLM through the Coordination process, the habitat maps for the Sage-grouse using CPW data is very inaccurate as it was gathered at very coarse resolution for broad-scale planning efforts, and no verification studies of habitats have been conducted for these mapped areas. As a result, much of the habitat described as Preliminary Primary Habitat and Preliminary General Habitat includes conifer forests, aspen stands, oakbrush, grasslands, steep slopes, cliffs and rocky outcrops, and contiguous areas of mixed mountain shrublands, all of which are not suitable for the sage-grouse.

K. The Service's Candidate notice identifies oil and gas development as a key impact leading to the reduction of sage-grouse habitat, while this impact is estimated to directly impact less than 1% of habitats, and indirectly impact 8% of habitats. This is a significantly smaller impact than other, larger impacts to habitats, but is consistently cited as a major impact. Further, the determinations regarding oil and gas impacts has been made relying on studies prepared from data collected in high density natural gas fields established in the 1980's – 1990's in the Pinedale and Powder River Basin areas in Wyoming. Such intensive pad density is no longer utilized by the industry in Wyoming or in Garfield County due to advances in technology and a shift in the BLM's fluid minerals policies, which are significantly reducing the industry's impact on the land and further minimizing impacts to the species.

L. Garfield County's primary source of revenue that supports the operations and welfare of the County and its citizens comes directly and indirectly from the oil and gas industry. Garfield County's ability to protect the health, safety and welfare of its citizens, as well as ensure continued protection for all wildlife and their habitats, and the productive use of lands depends on the continuation of balanced development by the oil and gas industry, agriculture and recreation interests.

M. The Board of County Commissioners held a public hearing on the 18th day of March, 2013 for consideration of whether the Plan should be approved, during which hearing the public and interested persons were given the opportunity to express their opinions regarding the request.

N. The Board of County Commissioners closed the public hearing on the 25th day of March, 2013 to make a final decision.

O. Based on substantial competent evidence produced at the aforementioned hearing, the Board of County Commissioners has made the following determinations:

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1. That proper public notice was provided as required for the hearing before the Board of County Commissioners.

2. The hearing before the Board of County Commissioners was extensive and complete, all pertinent facts, matters and issues were submitted and all interested parties were heard at that meeting.

3. For the above stated and other reasons the Plan is in the best interest of the health, safety, and welfare of the citizens of Garfield County.

4. That the Plan is in general conformance with the 2030 Comprehensive Plan, as amended.

5. Garfield County has the explicit authority to "plan for and regulate the use of land by regulating the use of land on the basis of the impact thereof on the community or surrounding areas . . . (and) planning for and regulating the use of land so as to provide planned and orderly use of land and protection of the environment in a manner consistent with constitutional rights." (C.R.S. § 29-20-104(1)(g) and (h)).

6. The Board of County Commissioners, pursuant to 43 U.S.C. § 1712, has formally enacted Coordination (via Resolution 2012-57) with all state and federal agencies acknowledging that federal law requires the BLM to (1) make its plans consistent with this Plan and related policies; (2) include this plan as an alternative pursuant to 43 U.S.C. § 4332(e); and, (3) in the event it cannot reach consistency, state why it cannot resolve the conflicts with Garfield County. Resolution 2012-57 also acknowledges that federal law requires the Service to take into account all local efforts to conserve species prior to making a listing determination and to coordinate with the County when determining critical habitat. The resolution also acknowledges the County's primary planning authority for lands and wildlife within its boundaries, which it exercises in part by coordinating with all other state agencies to ensure the policies set forth in this plan are consistently and uniformly applied.

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RESOLUTION

NOW THEREFORE, BE IT RESOLVED by the Board of County Commissioners of Garfield County, Colorado, that:

A. The forgoing Recitals are incorporated by this reference as part of this resolution.

B. Garfield County adopts the Plan (attached as Exhibit A) as a refinement of the existing Parachute-Piceance-Roan Plan. The Plan serves as an update to the PPR Plan with policies specific to the County based on the most current best available science and the unique landscape found in the County as depicted in the sage-grouse Habitat Map incorporated therein.

C. Garfield County recognizes the statutory obligation of the Bureau of Land Management to make its planning, inventory and management activities consistent with the policies of Garfield County and will continue to work to resolve the conflicts with the agency.

Dated this 19th day of March, A.D. 2013.

ATTEST:

GARFIELD COUNTY SEAL COLORADO

GARFIELD COUNTY BOARD OF COMMISSIONERS, GARFIELD COUNTY, COLORADO

Jean M Alberico
Clerk of the Board

Chairman

Upon motion duly made and seconded the foregoing Resolution was adopted by the following vote:

COMMISSIONER CHAIR JOHN F. MARTIN	Aye / Nay
COMMISSIONER MIKE SAMSON	Aye / Nay
COMMISSIONER TOM JANKOVSKY	Aye / Nay

CHAPTER 2 Purpose of the Plan

The purpose of the Garfield County Sage-Grouse Conservation Plan (the Plan) is to provide private and public land owners with land management principles, policies, incentives, and best management practices based on the best available science that are tailored to fit Garfield County's unique landscape and habitat characteristics for the betterment of the species.

Because of the County's unique landform, elevation, topography and vegetative cover that differ drastically from the rest of the national range, the Board of County Commissioners (the Board) commissioned an in-depth analysis, based on best available science, to determine what suitable habitat exists in the County at a refined level never before completed to obtain a very realistic and accurate picture of what suitable habitat exists.

The land located within the Plan Area is primarily held in private ownership with the Bureau of Land Management (BLM) representing the only public land. Coincidentally, most of the public lands and private property in this area contain significant oil and gas resources that are actively being developed or are intended for future development. By design, this Plan will continuously adapt as science expands for the species and habitat as well as acknowledging advances in energy exploration technology that continue to reduce the disturbance footprint. Ultimately, this will result in adaptive land management policies intended for the survival and success of the species.

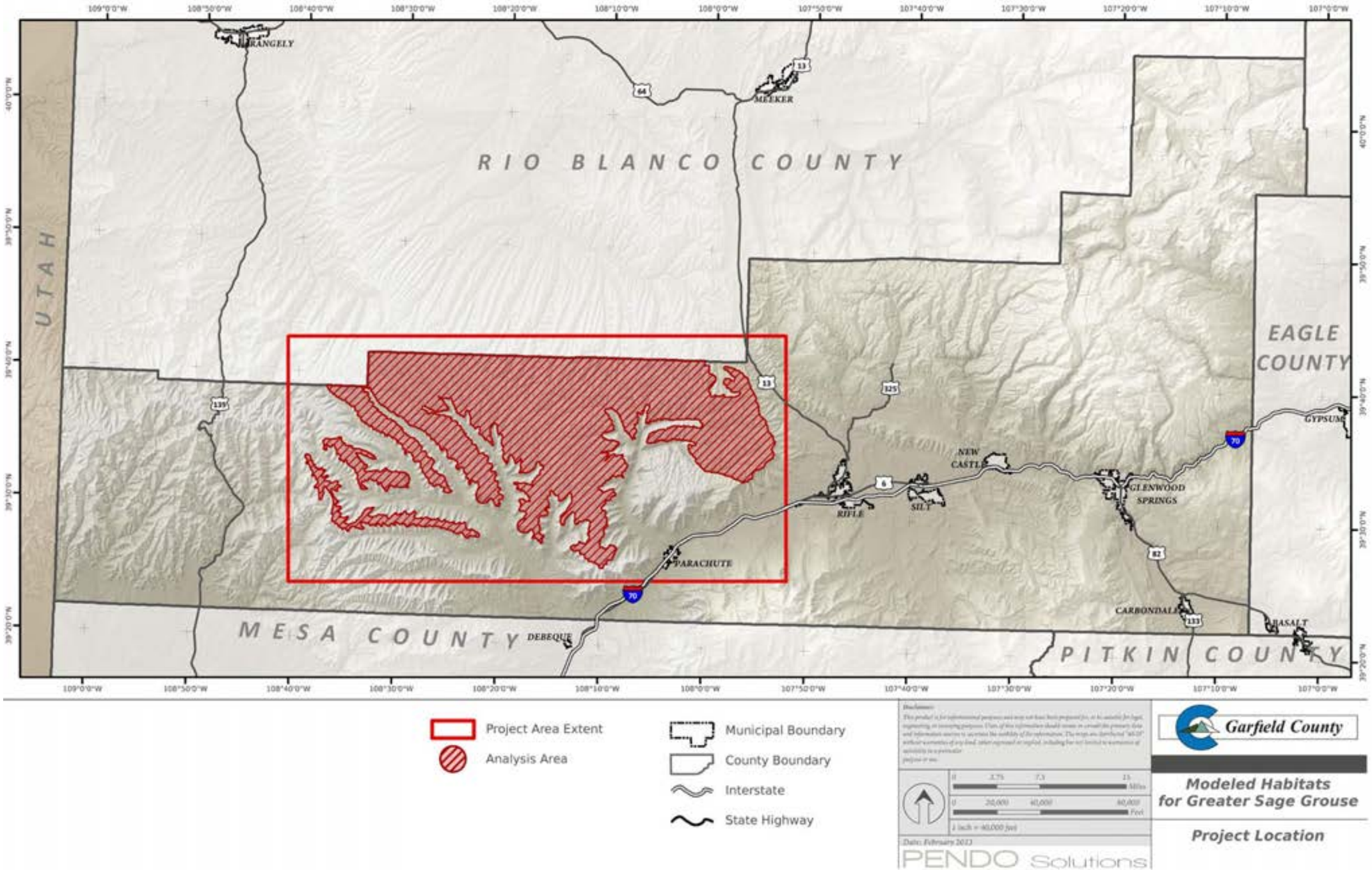
As implemented, this Plan shall require these policies and principles be applied on public lands as 'regulatory assurances' through Coordination and they will be applied on private lands as 'incentive-based assurances.' In this way, this Plan serves as a planning tool for private land owners by informing and improving their conservation efforts on a voluntary basis with the added opportunity to amend this Plan as a result of their stewardship successes.

Finally, because of the scientifically sound habitat modeling conducted to identify the suitable habitat in Garfield County which is the basis of this Plan, the County intends that this Plan may serve as a model for other counties located within the national range. Furthermore, this Plan explicitly relies on the Coordination process that requires federal and state agencies with sage-grouse management responsibilities in Garfield County to ensure that their plans are consistent with this Plan. Ultimately, the Coordination process will be the vehicle that brings disparate parties together with the same intent on making sound land management decisions that benefit the sage-grouse and its habitat recognizing that there are multiple uses being managed at the same time.

CHAPTER 3 Plan Area

The Plan Area includes the area where the suitable habitats are located within Garfield County and are primarily limited to the western region of the county in occupied habitats on the Roan Plateau (see **Figure 1**, below). Approximately 85% of the land within the Plan Area does not support habitat characteristics necessary to support the sage-grouse, but within this area there are small but important patches of suitable habitat. In order to ensure that habitat containing, or has the potential to contain, sage-grouse is properly managed; this Plan and the associated maps identify distinct habitat categories in the Plan Area including Suitable Habitat, Temporarily Disturbed, Unoccupied Suitable Habitat, and Lek No Surface Occupancy (NSO) Habitat.

Figure 1: Plan Area



Habitat Categories

Sage-grouse require somewhat different seasonal habitats distributed across sagebrush-dominated communities to complete their life cycle. All of these habitats consist of, are associated with, or are immediately adjacent to, sagebrush. The Plan utilizes the following habitat categories to define habitats in the Plan area, utilizing recent and pertinent research from the Plan area.

1. Suitable Habitat

Suitable Habitat includes all seasonal habitats (including lekking, nesting, brood rearing/summer and winter habitats) within the Plan area. Specifically, Suitable Habitat includes:

- Sagebrush cover is from 10 to 50%
- Cover of Mixed Mountain Shrubs is not more than 10%
- Distance to nearest Forest is over 100 meters
- Distance to Shrubby Woodlands is over 50 meters
- Grass/forb dominated habitats (with <10% sagebrush cover) within 30 meters of sagebrush habitat
- Contiguous habitats >3 acres in size, or part of a block of Suitable Habitats in close proximity

Sagebrush- includes all species and sub-species of the genus Artemisia except the mat-forming sub-shrub species *frigida.*

Mixed Mountain Shrubs- are shrublands dominated by Utah serviceberry (*Amelanchier utahensis*), Saskatoon serviceberry (*A. alnifolia*), mountain mahogany (*Cercocarpus montanus*), oakbrush (*Quercus gambelii*), bitterbrush (*Purshia tridentata*), and may have a sagebrush component. Mapped Mixed Mountain Shrublands have greater than 10% cover of these non-sagebrush shrub species, as this is the threshold at which sage-grouse show a strong avoidance of this community type.

Shrubby Woodlands- are vegetation communities dominated by oakbrush or pinyon (*Pinus edulis*) and Rocky Mountain juniper (*Sabina scopulorum*) or Utah juniper (*S. osteosperma*) types. Mapped Shrubby Woodlands have greater than 10% cover of pinyon-juniper, as this is the threshold at which sage-grouse show a strong avoidance of this community type.

Forests- in the Plan area include contiguous stands larger than 1/2 acre of aspen (*Populus tremuloides*), Douglas-fir (*Pseudotsuga menziesii*), mixed conifers (including, but not limited to Douglas-fir, Engelmann spruce [*Picea engelmannii*], subalpine fir [*Abies bifolia*] and ponderosa pine [*Pinus ponderosa*]), pinyon-juniper woodlands, and oakbrush.

2. Seasonal Habitats

While sage-grouse generally change their use of micro-scale habitats throughout the year, sage-grouse may be found within Suitable Habitat at any time of the year. The following definitions are used for seasonal habitats, and were utilized in the development of the Seasonal Habitats Maps.

Nesting- Nesting habitat is generally moderately sized patches of denser and taller sagebrush, further away from roads and other activity areas. Specifically:

- Sagebrush cover is from 20 to 50%
- Cover of Mixed Mountain Shrubs is not more than 10%
- Distance to nearest Forest is over 100 meters
- Distance to Shrubby Woodlands is over 50 meters

Brood Rearing- Brood rearing habitats are utilized after chicks have hatched, and are generally more mesic (moist) areas with a higher percentage of forbs and grasses which help provide higher densities of insects, plant material, and seeds for chicks, hens, as well as males during the summer and early fall months. Specifically:

- Sagebrush cover is from 10 to 30%
- Cover of Mixed Mountain Shrubs is not more than 10%
- Distance to nearest Forest is over 100 meters
- Distance to Shrubby Woodlands is over 50 meters

Winter Habitat- Winter habitat is generally utilized by sage-grouse from November through early April. It is primarily determined by the depth and persistence of snow cover. During more severe winters, snow can limit winter habitat to wind-swept ridges and patches of the tallest sage-brush. During the winter sage-grouse food is strictly limited to sage-brush. However, sage-grouse can do quite well on winter diets. Specifically:

- Sagebrush cover is >25%
- Cover of Mixed Mountain Shrubs is not more than 10%
- Distance to nearest Forest is over 100 meters
- Distance to Shrubby Woodlands is over 50 meters
- Specific areas where sage-grouse congregate should be mapped as information becomes available

3. Temporarily Disturbed

Temporarily disturbed areas have seen recent vegetation disturbance activities (such as pipeline corridors and wildfire events) and may not support sagebrush cover at a density or height suitable for sage-grouse use. If these areas occur within a block of Suitable Habitat, they will be considered Temporarily Disturbed, and still would be considered as long-term as Suitable Habitat. Temporarily Disturbed habitat will need to be tracked spatially within the Plan area.

4. Unoccupied Suitable Habitat

CPW, the BLM, and energy companies within the Plan area have conducted multiple research and investigation efforts to determine areas where sage-grouse currently occupy habitats and these areas are relatively well-known. There are also areas that support Suitable Habitat, but for which sage-grouse currently do not occupy these areas or the status of occupancy are unknown. These areas, for whatever reason, are deemed less-than-optimal by sage-grouse (e.g., due to predation

pressures, non-lethal disturbances, an ineffectively small area of suitable habitat, etc.) and thus sage-grouse prefer to utilize other areas. These areas may also be degraded with regards to habitat, and do not meet life-history requirements for sage-grouse, or (as an example) may have low levels of invasion by pinyon-juniper trees, and is therefore ineffective habitat.

5. Lek No Surface Occupancy Habitat

Lek No Surface Occupancy (NSO) Habitats are areas where an Active Lek has been cited (determined by the County to exist), which is not located in Temporarily Disturbed or Unoccupied Suitable Habitat.

CHAPTER 4 Habitat Mapping, Modeling & Methodology

This Chapter details the process by which Suitable Habitats for Greater Sage-Grouse were developed within the Plan Area.

Section 1 Goals and Objectives of Mapping Process

The habitat mapping provided by State and Federal agencies in 2012 for Greater Sage-Grouse in the Plan Area previously occurred at a landscape level that did not accurately address the unique topography of the Roan Plateau, or provide planning information at resolution accurate enough for County to use in the Plan, and for relevant land-use planning activities potentially occurring within the Plan area. Because of the significant implications on land use and ongoing land management, the most accurate delineation of habitat was deemed necessary by the County. This habitat mapping process followed the latest and most relevant peer-reviewed habitat mapping process available for mapping large and diverse areas.

The project objective was to locate and quantify the availability of suitable sage-grouse habitat on the Roan Plateau within Garfield County, independent of analyses already performed by State and Federal agencies, as well as independent of other habitat mapping efforts produced by energy companies, but still incorporating peer-reviewed and accepted habitat parameters for sage-grouse produced by the scientific community.

The process incorporated the following:

- Phase 1: Conducted a literature search and determined relevant criteria for identifying suitable habitat for the greater sage-grouse within northern Colorado. Built multi-criteria suitability spatial models incorporating all relevant criteria to model areas for general habitat suitability.

- Phase 2: Perform field verifications to validate accuracy of spatial data to on-the-ground habitat conditions (planned for spring 2013)

- Phase 3: Build multi-criteria suitability spatial models to delineate specific greater sage-grouse habitat types, including summer and winter habitats (e.g., Nesting, Brood Rearing, and Winter Habitat areas). Understanding the spatial locations of specific habitat types will help identify areas occupied by greater sage-grouse populations across the course of a typical year (planned for spring 2013)

The 220,969-acre Plan Area occurs on the Roan Plateau within Garfield County as shown in **Figure 1**. The spatial extent of the Plan Area represents all areas within the County currently indicated as Preliminary Priority Habitat (PPH) as mapped by CPW and adopted by the BLM. Of the

220,969-acre PPH analysis area, 61,338 acres (28%) are BLM Lands, while the remaining 159,631 acres (72%) are private and state lands.

Table 1: Literature References and Habitat Parameters Employed

Author	General Habitat	Lek/ Breeding	Nesting	Brood Rearing Summer	Summer-Fall	Winter
Apa 2010[1]						
Sagebrush	-	-	37%	30%	-	-
Total Shrub	-	-	68%	34%	-	-
Walker 2010						
Sage *dominance*	-	57-96% (100m)	-	50-92% (100m)	-	-
Sage+grass+MMS	-	90-98% (350m)	-	88-91% (350m)	-	-
Forest	-	0.5-6.5% (350m)	-	4.5-11.5% (740m)	-	-
MMS[2]	-	0-1.2% (740m)	-	0-1.3% (740m)	-	-
CO Sage-Grouse Consv. Plan 2008						
Sagebrush cover	-	20-30% around leks	15-38% avg. 27%	10-15% 20-25% for escape	>15%	>25%
NTT Report[3]						
Sagebrush cover	-	-	-	10-25%	-	-
Connelly et al. 2000						
Sagebrush cover	-	15-25%	-	10-25%	-	10-30%
Grass/forb cover	-	>25%	-	>15%	-	NA
Area with suitable habitat	-	>80%	-	>40%	-	>80%
Connelly et al. 2011						
Sagebrush cover	12-48%	Follow Connelly et al. 2000				
Grass/forb cover	-	Follow Connelly et al. 2000				
Garfield County Habitat Map						
Sagebrush cover	10-50%	Not limiting, not mapped	20-50%	10-30%		>25%
MMS cover	<10%		<10%	<10%		<10%
Slopes	<20%		<20%	<20%		<20%
Dist. To Forest	>100m		>100m	>100m		>100m
Dist. To Shrubby Woodlands	>50m		>50m	>50m		>100m

Section 2 Model Methodology

To model general greater sage-grouse habitats in the Roan Plateau PPH area in Garfield County, a multi-criteria suitability model was employed in a Geographic Information System (GIS) utilizing all relevant criteria. The relevant criteria are input in the suitability model in the form of individual spatial datasets that are weighted by importance in determining suitable habitat relative to all other criteria datasets. Furthermore, the values of each criteria dataset are ranked by a scale of 0 – 10, with higher values indicating increased habitat suitability for all criteria datasets.

While numerous criteria exist in determining seasonal habitat types (e.g., brood rearing, summer and winter ranges) for the greater sage-grouse, the Phase 1 General Habitat model attempts to capture the aggregate of all specific habitat types (i.e., overall habitat). As such, the Phase 1 Suitable Habitat model employs only those criteria common to all habitats.

Publicly available datasets depicting vegetation cover types across the project area were initially employed in the spatial models; the datasets include LANDFIRE vegetation cover, obtained from the USGS, and the Colorado Vegetation Classification Project (CVCP), obtained from CPW. However, review of the data revealed widespread inaccuracies in correctly identifying and classifying the vegetative cover types when compared to high-resolution aerial photography. In addition, the cell resolution of both the LANDFIRE and CVCP datasets, measured at 30-meters and 25-meters, respectively, and is too coarse to accurately delineate broader vegetation communities at the local scale. As a result, the spatial coarseness combined with the mistyped vegetative covers inherent to both datasets led to the conclusion that the datasets were inadequate in appropriately identifying suitable vegetative cover types at the local scale.

In an effort to increase the accuracy of the spatial data depicting existing vegetative cover types within the Plan Area, an unsupervised image classification process involving color-infrared aerial photography was performed to better represent vegetation communities. Image classification is achieved by first combining multiple bands from the same image to detect reflectance values, and subsequently clustering the reflectance values into separate classes based on a similar range in spectral values.

Color-infrared photography provides four bands that detect specific wavelength ranges of reflected solar radiation; three bands within the visible light spectrum (i.e., Red, Green and Blue), and a fourth near infrared band that measures reflected radiation beyond the visible light spectrum. The band combinations can yield a variety of properties and characteristics of the objects and vegetation interpreted in the aerial photography. For example, using the near infrared, red and green spectral bands to produce a 'false color' image (e.g., mapping the near infrared, red and green bands to RGB) provides high contrast between heavily vegetated areas (e.g., aspen, mixed conifer, mixed mountain shrubs), less vegetated areas (grasslands, shrublands, etc.) and barren areas. Furthermore, within forested areas, image combinations

utilizing the near infrared band help to distinguish between deciduous and coniferous tree species. Deciduous trees contain more chlorophyll and therefore reflect an intense bright red, while coniferous trees contain less chlorophyll and reflect lighter tones of red, magenta or pink. Within grassland and shrub communities, delineations were detected in a similar manner; the higher presence of chlorophyll present in grasses and forbs caused these communities to reflect much brighter as compared to adjacent sage communities.

The image classification for this project was performed on four-band, 1-meter resolution photography acquired in 2011 from the USDA as part of the National Agriculture Imagery Program (NAIP).

Table 2: Habitat Model Components

CRITERIA	Weight	Rank
Slope	25%	
0% – 10%		10
10% - 20%		9
35%+		0
Distance to Forest	25%	
>350 Meters		10
275 – 350 Meters		9
100 – 275 Meters		8
0 – 100 Meters		3
In Forest		0
Canopy Cover	10%	
Tree Cover > 10% & < 20%, Shrub & Herb Cover > 20% & < 40%		10
Herb Cover > 50% & < 60%		9
Shrub & Herb Cover > 10% & < 20%		8
Tree Cover > 20% & < 30%, Shrub Cover > 40% & < 50%		7
Tree Cover > 30% & < 40%, Shrub Cover > 50% & < 60%		5
Shrub Cover > 60% & < 70%		4
Agricultural, Shrub Cover > 70% & < 80%		3
Shrub Cover > 80% & < 90%		2
Barren		1
All Other		0
Vegetation	40%	
Sagebrush-Dominated		10
Sage-Dominated/Grass Mix		9
Grass-Dominated/Sage Mix		7
Sage-Dominated/Mixed Mtn Shrubs		6
Grasses & Barren areas w/in 20 Meters of Sage Community		5
Grass-Dominated/Mixed Mtn Shrubs w/in 20 Meters of Sage Community		3
Grasses & Barren areas over 20 Meters from Sage Community		0
Aspen, Mixed Conifer, Mixed Mtn Shrubs, Water		0

The Suitable Habitat model utilized the above-listed criteria, employing the data weights and ranks listed. A value of 0 would be completely unsuitable for sage-grouse, while a value of 10

would be the most valuable habitat for sage-grouse. In order to produce a meaningful model, we eliminated all vegetation polygons having areas less than one (1) hectare and buffered the resulting forested areas to delineate four distinct zones around forest perimeters; 0 – 100 meter, 100 – 275 meters, 275 – 350 meters, and more than 350 meters from forested vegetation.

Section 3 Habitat Model Results

The results of the multi-criteria suitability model are produced as a GRID dataset, containing cells with values ranging from 0 – 10, with higher values indicating higher levels of habitat suitability. The Suitable Habitat model results considered all cells with values of 9 or 10 as suitable habitat for sage-grouse.

The initial unmodified Suitable Habitat model results produced 13,945 polygons totaling 21,155 acres (~10% of the analysis area) of Suitable Habitat. The initial results were subsequently filtered to remove areas not meeting a defined area threshold (areas less than 1 hectare), as well as those areas depicted as long, linear features with minimal width that generally occur in deeply incised swales and valley bottoms where greater sage-grouse would generally not occur (i.e., areas with ineffective habitat due to the dominance of the area by unsuitable habitats and edge effects). As a result, the filtered results produced 1,140 polygons totaling 17,891 acres (~8% of the analysis area) of suitable habitat. Furthermore, of the 17,891 acres of filtered suitable habitat, 5,325 acres (~30% of modeled suitable habitat) occur on BLM Lands, while the remaining 12,566 acres (~70% of modeled suitable habitat) occurred on private lands.

The following Figures depict the data utilized in the model and the results of the initial habitat model.

Figure 2: Vegetation Community Types

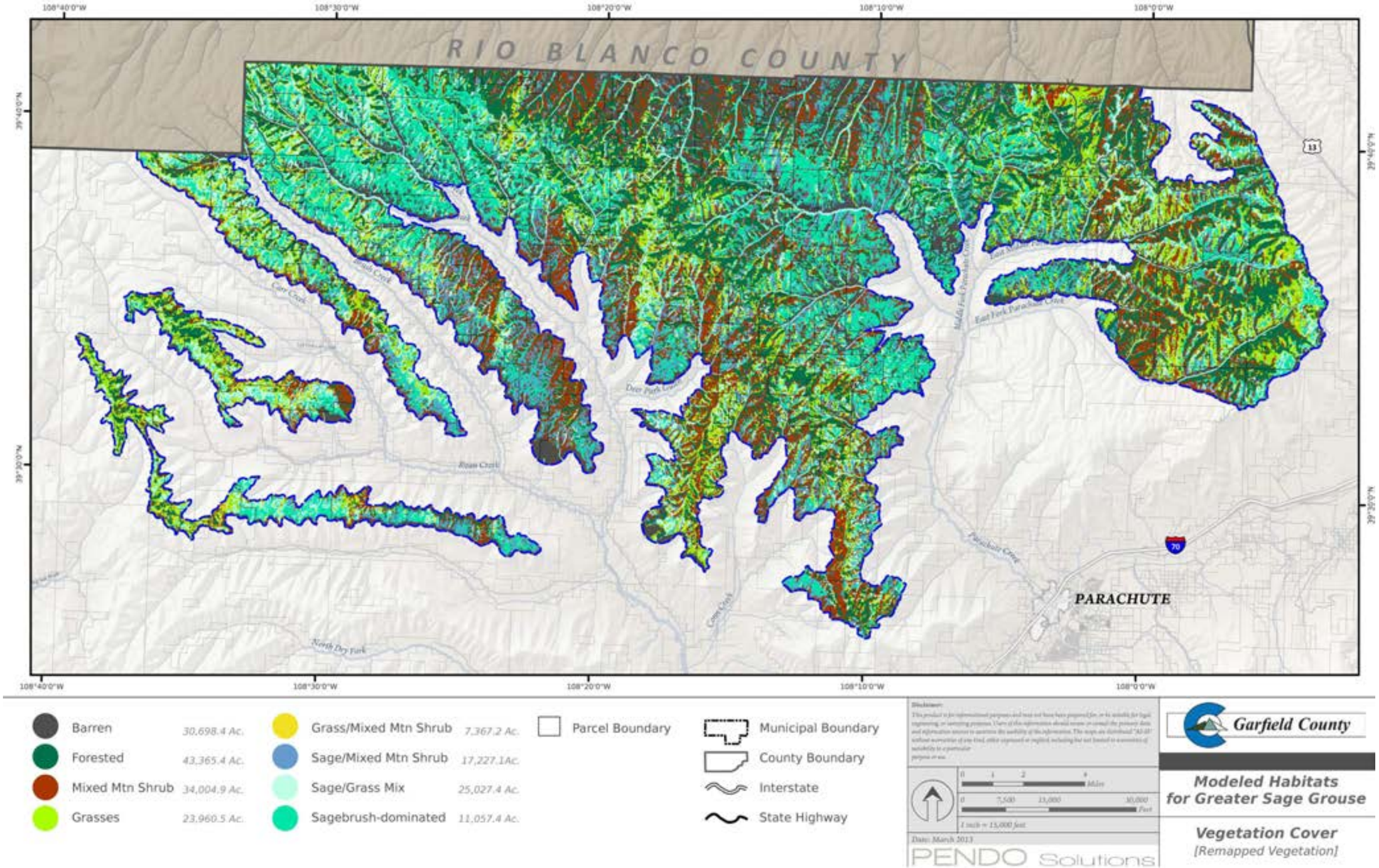


Figure 3: Forested Vegetation Community Types

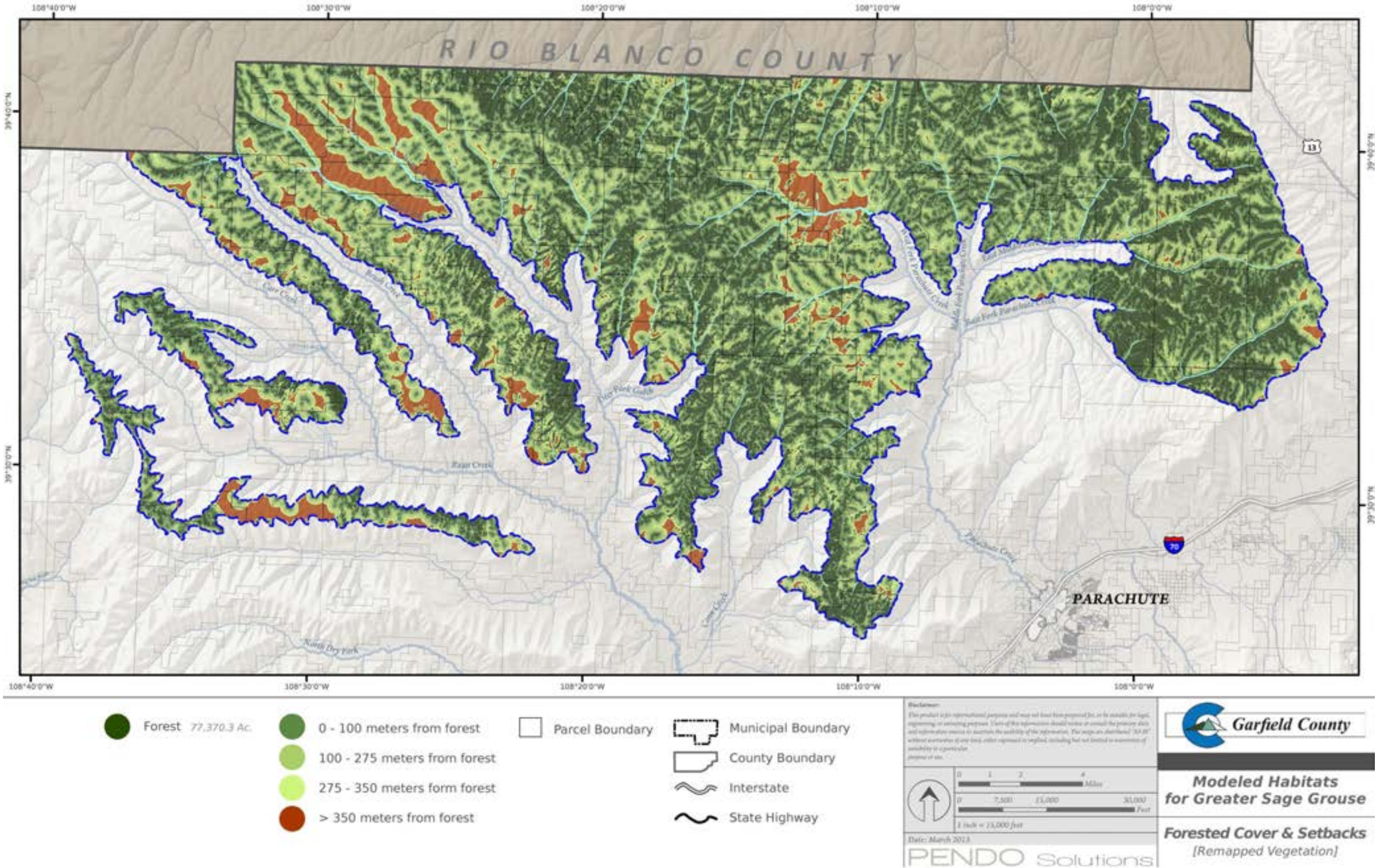


Figure 4: Sagebrush-Dominated Habitats

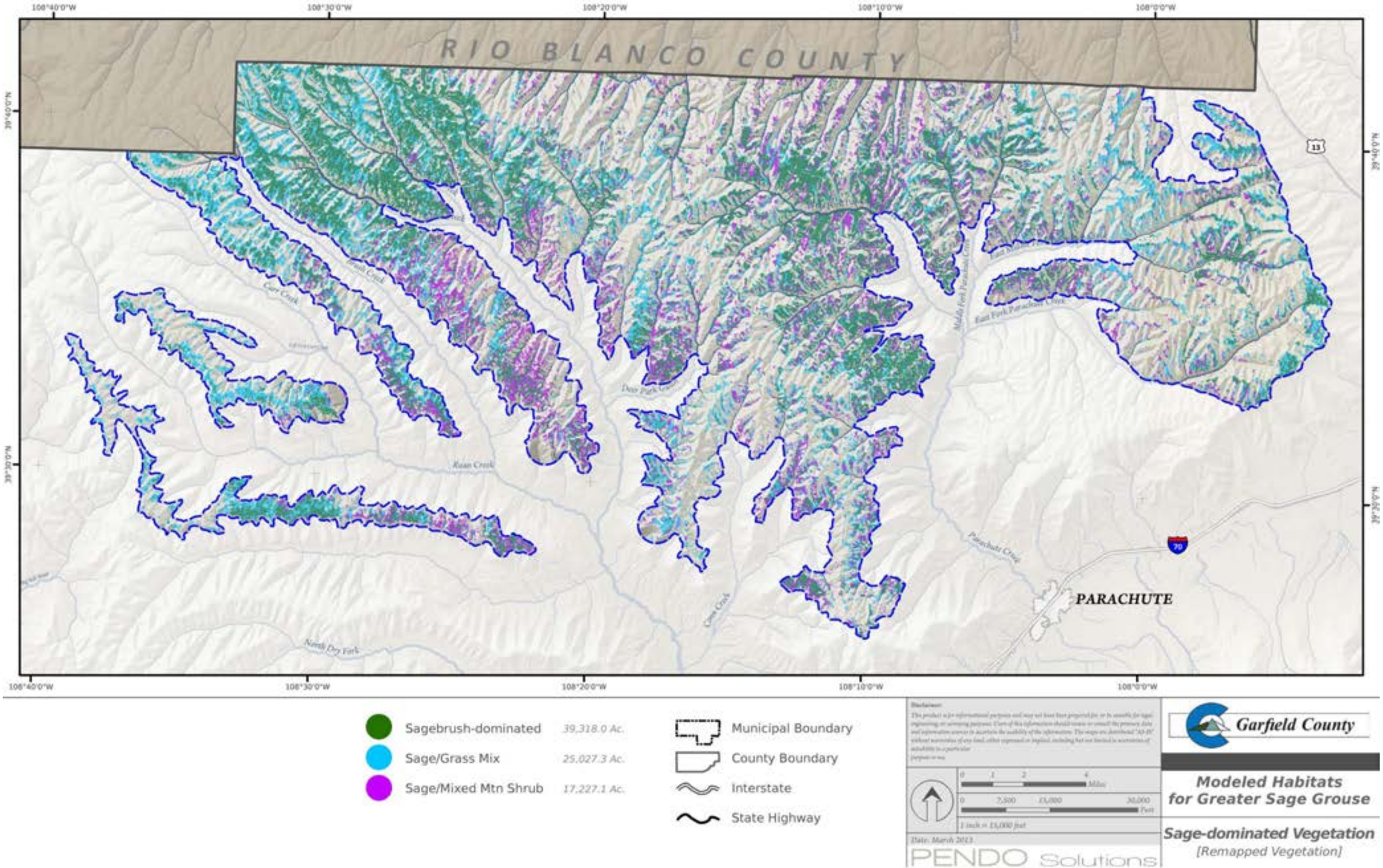


Figure 5: Steep Slope Areas

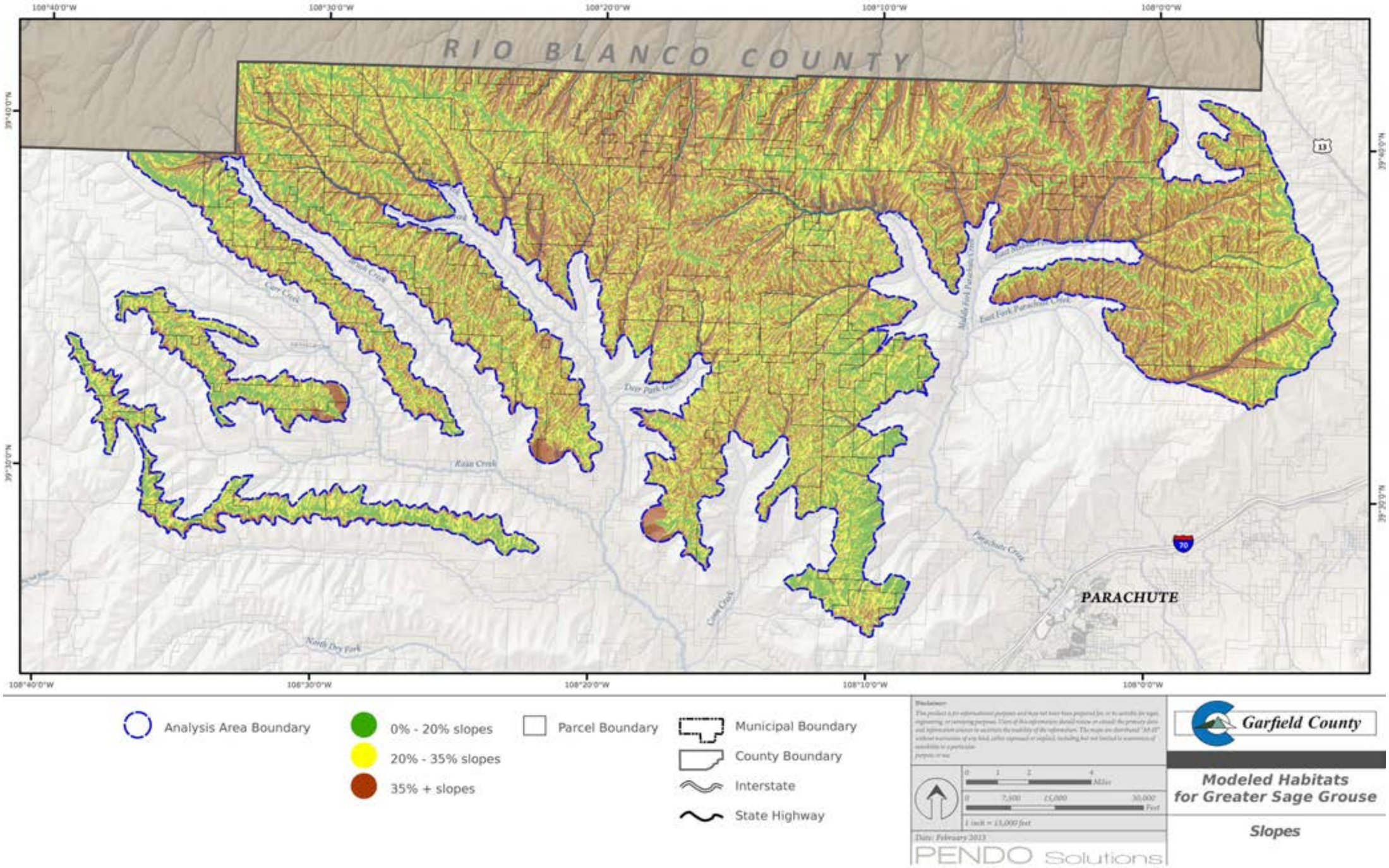
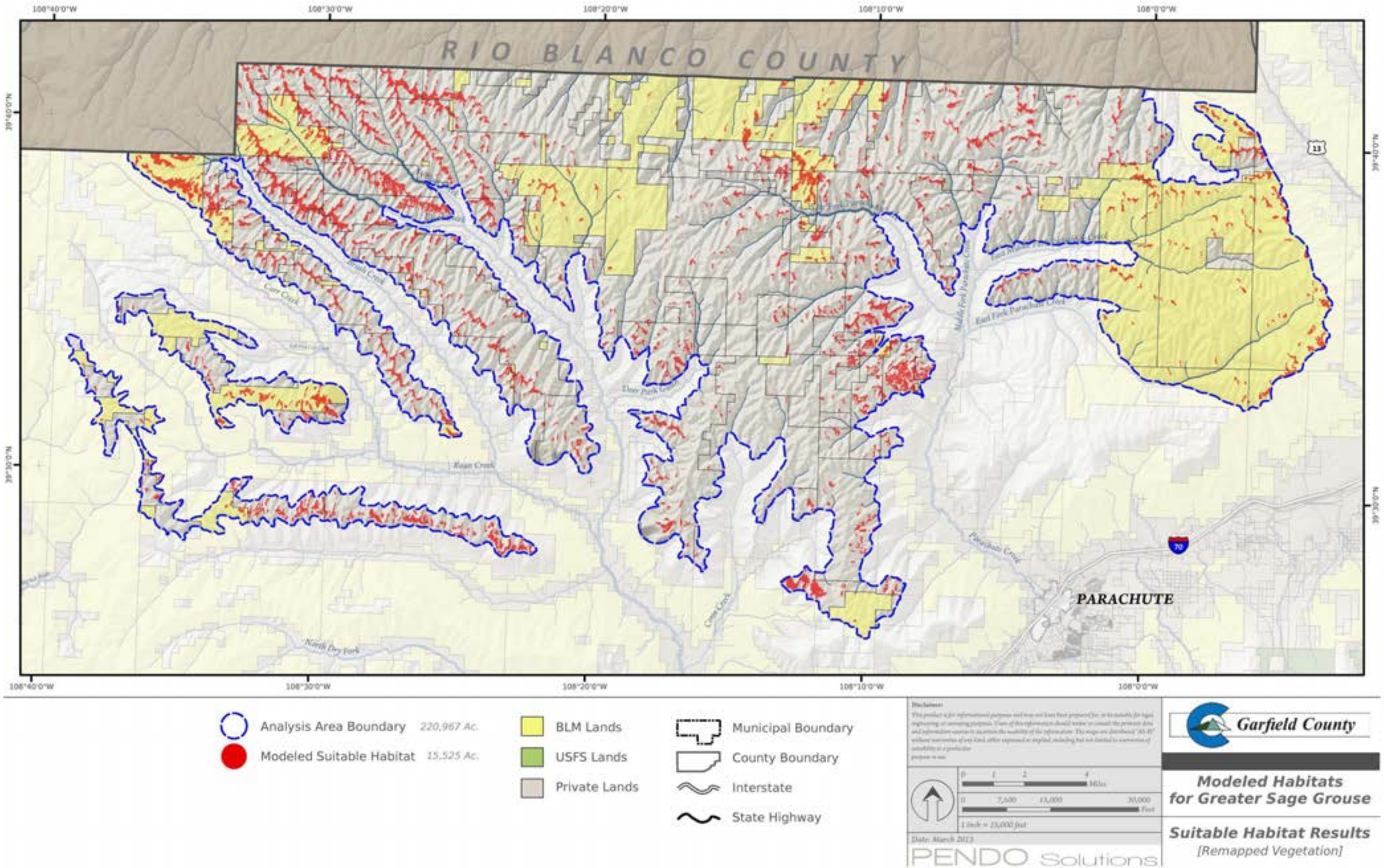


Figure 6: Resultant Suitable Habitat in Plan Area



Tabular Data on Suitable Habitat Model

The following table quantifies the results of vegetation mapping and applying restrictions to potential sagebrush community types.

Table 3: Suitable Habitat Vegetation

Remapped Vegetation				
Sage Cover (irrespective of size and slope)				
Value	*Type*	*Count*	*Acres*	*% of SA*
10	Pure Sage	6,328.0	39,318.0	18%
9	Sage-Dominated/Grass Mix	5,206.0	11,057.4	5%
7	Grass-Dominated/Sage Mix	6,715.0	13,969.9	6%
6	Sage/Mixed Mtn Shrub	7,481.0	17,227.1	8%
	Total	25,730.0	81,572.4	37%
Sage Cover on < 20% Slopes (irrespective of size)				
Value	*Type*	*Count*	*Acres*	*% of SA*
10	Pure Sage	5,257.0	16,695.9	8%
9	Sage-Dominated/Grass Mix	4,339.0	4,485.4	2%
7	Grass-Dominated/Sage Mix	5,330.0	4,626.3	2%
6	Sage/Mixed Mtn Shrub	5,602.0	4,523.9	2%
	Total	20,528.0	30,331.5	14%
Sage Cover > 3 Ac. on < 20% Slopes				
Value	*Type*	*Count*	*Acres*	*% of SA*
10	Pure Sage	2,674.0	14,200.8	6%
9	Sage-Dominated/Grass Mix	2,593.0	3,726.5	2%
7	Grass-Dominated/Sage Mix	2,485.0	3,188.7	1%
6	Sage/Mixed Mtn Shrub	2,855.0	3,237.6	1%
	Total	10,607.0	24,353.6	11%

The sagebrush cover types are a summary of all the cover types that have a sagebrush component, and therefore would likely be considered Suitable Habitat. This presents a good summary of vegetation conditions in the Plan Area potentially suitable for grouse use. To summarize, there are approximately 81k acres of sagebrush (or 37% of the Plan Area), but of that 30k acres are on slopes <20%, and of that, there are approximately 24k acres of sagebrush areas that are in polygons >3 acres.

The model builds in the additional criteria of canopy cover of sagebrush and the distance to Forests and Woody Shrublands. With the inclusion of buffering Forests and canopy cover, the final results are that approximately <u>15,525 acres or 7% of the PPR area is mapped as suitable habitat</u> (pending additional QA/QC procedures).

Section 4 Interpretations and Additional Information Regarding Suitable Habitat Mapping

Subsequent to data refinement, additional models specific to each seasonal habitat will be developed, incorporating criteria that uniquely identifies the distinct characteristics of each habitat. The seasonal habitat model results should predict suitable habitats available to greater sage-grouse populations across an annual timeframe. Lastly, a least-cost-path model will employ the locations of the resulting habitat zones, as well as a full list of criteria depicting friction to movement across the landscape, to determine linkage corridors to disconnected habitat zones and probable movements of the greater sage-grouse between seasonal habitats.

CHAPTER 5 Plan Implementation

The Garfield County Board of County Commissioners (the BOCC) shall be responsible for managing and implementing the Plan. The principles and policies contained within the Plan shall be used to address functional surface disturbance for the four sage-grouse habitat categories (see Chapter 3) in the Plan Area within the political boundaries of Garfield County (the County) as depicted on **Figure 1**.

A. Implementation on Public Lands

The principles and policies contained within this Plan shall be required for the management of sage-grouse and its habitat on public lands that contain suitable habitat as depicted in **Figure 6**.

B. Implementation on Private Lands

For private lands in the Plan Area, the principles and policies contained within this Plan are considered voluntary and are encouraged to be implemented through Best Management Practices (BMPs) and conservation measures for the management of sage-grouse and its habitat as defined as suitable habitat and depicted on **Figure 6.**

C. Implementation Process

This policy shall serve as the primary conservation policy for the sage-grouse in Garfield County. The BOCC has the unique authority to require federal and state agencies to coordinate their plans and policies with the County, therefore ensuring that all entities with responsibilities for the species and habitat are working together efficiently and effectively and not pursuing counter-productive measures. This Plan is designed to serve as the comprehensive planning document for the sage-grouse in Garfield County.

While recognizing that each agency has its own planning processes, federal agencies are required to not only consider the County's policies, but work to resolve conflicts and make federal plans consistent with the county's policies (43 USC 1712). Federal statues require that the County's policies are integrated into the federal conservation strategy for the sage-grouse on federal lands within the County's borders. The State of Colorado has given Garfield County planning authority over lands within the County's borders, ensuring the coordination of the County's sage-grouse policy with state agencies as well.

Implementation of this plan will be conducted through a formal coordination process with all agencies that have jurisdiction and/or responsibility for the sage-grouse and/or its habitat. The plan will serve as the unifying and primary planning document.

Specifically, the BOCC shall utilize this Plan as a tool to evaluate and provide comment regarding land management decisions on both public and private lands for which it has land management jurisdiction. More specifically, the BOCC shall utilize this Plan in evaluating land use / development applications submitted under the County's development regulations as well as ensuring that any federal or state land management action remains consistent with this Plan.

D. Plan Update / Amendment Process

This Plan is managed under adaptive management principles where it is understood that the scientific understanding of the species and its habitat in will be continually expanding. This requires that the policies, principles, and best management practices of this Plan be frequently evaluated and modified as warranted by the best available science appropriate for the unique Plan Area in Garfield County.

1. Annual Review

The BOCC will conduct an annual Coordination review, commencing one year from the date of enactment of this Plan with the federal and state agencies that have habitat or species responsibilities within the Plan Area. This review process will evaluate the availability and condition of habitats, direct and indirect impacts, conservation measures, policies and best management practices being implemented by each agency for their effectiveness and applicability to the Plan Area.

Also incorporated in this review is any new science and, if warranted, modifications to the best management practices, policies, and conservation incentives within the Plan. The Coordination review shall take place in government-to-government meetings between the different agencies and the BOCC.

The BOCC will also initiate meetings with entities that have private property interests in the Plan Area for the purpose of analyzing their conservation efforts and effectiveness, as well as any new science they may be able to contribute to the process to ensure Plan updates are also based on the best available science.

The consideration of changes to the Plan shall be discussed in these coordination meetings, followed up with a draft Plan update to be shared with all agencies through the Coordination process and private entities with private property interests for input. The input shall be considered and incorporated where appropriate into a formal written Plan update to be reviewed approved by the BOCC within 120 days of the submittal date of the requested change.

2. New Scientific Information

If at any time between the annual review period where federal or state agencies, or private entities with property interests in the Plan Area become aware of or acquire new science regarding the species or its habitat in the Plan Area within Garfield County that may warrant changes to the best management practices, conservation measures, or policies within this Plan, then they shall submit a written report to the County, including the scientific review and supporting data, for the County's consideration. If the BOCC finds changes to the Plan are warranted then it can initiate a formal review of the Plan in coordination with all entities.

3. Additional Coordination Meetings

Additional Coordination meetings are encouraged beyond the required annual review and new scientific information review for the purpose of keeping apprised of and working to resolve all issues impacting the sage-grouse.

CHAPTER 6 Principles

The Plan Principles are designed to inform and guide all decision making, regardless of specific issue or impact, as they relate to the well-being of the sage-grouse in Garfield County.

1. The sage-grouse habitat in Garfield County is naturally fragmented, as a result of topography and the patchy nature of sagebrush, non-sagebrush shrubs, meadows, aspen, and conifers in the Plan area. Expanses of contiguous sage-brush, necessary to support a large stable population (as described by the Service in their March 2010 candidate determination notice), do not exist in Garfield County. Additionally, the sage-grouse population inhabiting Garfield County is a peripheral population located on the far southeastern edge of the species range. As a result, the stewardship of the population requires detailed knowledge of local conditions, including the mapping of Suitable Habitat (as determined by Garfield County Geographic Information Systems (GIS) mapping and analysis).

2. Human disturbances to Suitable Habitat are minimal, generally temporary in nature, and can be avoided or successfully mitigated in most cases.

3. Sage-grouse management decisions shall be made based on the best available scientific information that is applicable to sage-grouse habitat in Garfield County. The scientific information used will be consistent with standards of the Information Quality Act (see definitions of Quality, Objectivity, Utility and Integrity), as determined by the County.

4. Land management plans of all government agencies that have ownership or management responsibilities for the lands or species within Garfield County shall be consistent with the policies set forth in this plan subject to valid existing rights.

5. For private lands, the polices set forth in this Plan are incentive-based to be encouraged through conservation incentives and best management practices that do not encumber private property rights of the landowners but do address long-term habitat needs of sage-grouse.

6. No policies shall infringe on the private property rights of any landowner within Garfield County. All species and land coverage information gathered on private property shall be treated as the property of the landowner and shall not be used by any private or government entity for any purpose unless express, written permission has been obtained by the landowner.

7. All sage-grouse habitat and species management programs that impact the County, administered by federal and state government agencies, shall be coordinated with Garfield County, and the data collected by state and federal agencies will be shared with the County in a

timely manner or be provided to the County regardless of completeness at the formal request of the County.

8. All Federal lands within the Plan Area containing suitable habitat for sage-grouse shall be managed to continue the multiple-uses of the lands as required by 43 U.S.C 1701(a)(7). No policies shall be implemented that prescribe the management of the land for a single purpose, but all functions of the land, including providing habitat for wildlife and supporting the productive uses of its resources, shall be considered with the objective of balancing and continuing all uses of the land. Unlike government owned land where there are many property interest holders and the multiple uses must be maintained, private land owners have more discretion to manage their property for the primary purpose of conserving sage-grouse, if so desired.

9. The ability of wildlife, including sage-grouse, to habituate to inanimate manmade structures and changes to the landscape shall be acknowledged.

10. All sage-grouse conservation measures enacted on federal land or through a federal nexus shall be for the purpose of directly benefiting the species and its verified habitats. These measures shall be scientifically defensible. All data and information used to produce conservation measures shall be made available to the public and the County and shall be coordinated with the County. Additionally, the balance of impacts to other species and to human welfare must be weighed prior to approval and implementation. All planning efforts shall be governed through adaptive management principles to ensure use of the latest scientific research on sage-grouse and their habitat, best management practices, technological advances, and incorporation of impact avoidance, minimization, and mitigation opportunities are vetted and utilized.

CHAPTER 7 Policies

The policies set forth in this chapter are for the purpose of providing specific conservation measures that are to be implemented in the Plan Area in order to eliminate or limit impacts that may affect the suitable, temporarily disturbed and unoccupied habitat of the sage-grouse.

Section 1 Travel and Transportation

Because the majority of roads in the Plan Area containing Suitable Habitat are private roads with controlled access that are used on a limited /seasonal basis, they do not measurably contribute to bird collisions. These roads do not produce barriers to movement for sage-grouse. These same roads provide necessary access to the area to ensure proper management of resources, infrastructure and assets, and accessibility in the event of emergencies. Very few roads support through traffic. Because of the nature of the terrain, company policies, road surfaces, and driving conditions, vehicles maintain low speeds and the risk of collision with the sage-grouse is minimal.

Policy

A. Limit motorized travel to existing roads, primitive roads, and trails, as verified by Garfield County, at a minimum in Suitable Habitats and in Lek NSO areas.

B. County roads, as determined by Garfield County and identified on County Maps (see Habitat Maps Chapter of the Plan), shall only be closed or restricted by Garfield County.

C. Allow no upgrading of existing routes, as verified by Garfield County, in Suitable Habitat or Lek NSO areas that would change route category (road, primitive road, or trail) or capacity unless the upgrading would have minimal impact on sage-grouse habitat, is necessary for motorist safety, or eliminates the need to construct a new road.

D. When reclaiming roads and trails, use locally native seed mixes as prescribed by a professional biologist and use transplanted or seeded sagebrush unless unfeasible.

Section 2 Recreation

Recreational use within the Plan Area is extremely limited because the majority of the land is privately held and access is strictly controlled. This significantly reduces potential direct or indirect impacts to sage-grouse or their habitats by the general public. Any plan for creating new or additional recreational opportunities on federal lands in Suitable Habitats must provide Garfield County a sage-grouse impact analysis for review.

Policy

A. Limit motorized recreational use to existing roads, primitive roads, and trails (as verified by Garfield County), in Suitable Habitat and Lek NSO areas.

B. Avoid all Suitable Habitat and Lek NSO areas as identified on Garfield County Habitat Maps.

Section 3 Lands and Realty Management

Habitats within the Plan Area are naturally fragmented and patchy; therefore, there are opportunities for new roads and energy development infrastructure to be placed outside Suitable Habitats. Further, any land acquisition shall be by mutual agreement between public and private entities.

Policy

A. Placement of new above-ground power lines in Suitable Habitat and Lek NSO areas is prohibited.

B. Bury new powerlines within Suitable Habitats and follow existing corridors unless there is a technical infeasibility, subject to valid existing rights. Anti-perch devices may be used where powerline burial is technically infeasible.

C. Private land ownership of sage-grouse Habitat areas should be continued and encouraged as private land conservation efforts have been the most effective methods to preserve diverse and healthy habitats for many species.

Section 4 Range Management

Garfield County continues to enjoy a long history of livestock grazing on both private and public lands. When properly managed, livestock can coexist with sage-grouse as well as help improve suitable habitat and decrease fire hazards.

Policy

A. Maintain sustainable grazing consistent with historic land use and ranching practices that are sustainable for both agricultural operations as well as sage-grouse habitats, as recommended by the U.S. Department of Agriculture, Natural Resources Conservation Service throughout the Plan Area.

B. Livestock grazing can be utilized as a tool to properly manage sage-grouse habitat, and should not be removed from the Plan Area.

C. Any grazing restrictions or conservation measures that are put in place through a grazing permit shall be based solely on the conditions and activities specific to that permitted grazing allotment.

Section 5 Predation

Predation of sage-grouse eggs, juveniles, and adults occurs naturally, but can increase in association with human development, unless precautions are undertaken.

Policy

Encourage use of anti-perch devices, burying of powerlines, closed rubbish bins, removal of road kill and dead livestock, and other methods to discourage predators on sage-grouse and limit excess predation. If predation on sage-grouse is documented to have a deleterious effect on the Roan Plateau sage-grouse population, then allow for appropriate mitigation of predation under USDA guidance.

Section 6 Wild Horse and Burro Management

Wild Horses and Burro's are not known to occur within the Plan Area and therefore do not presently impact sage grouse habitat.

Policy

Collaborate with appropriate agencies to discourage establishment of (feral) wild horse populations that could be detrimental to sage-grouse habitat.

Section 7 Mineral Development

The extraction of fluid minerals in Garfield County is accomplished using increasingly advanced technologies, more efficient operations, avoidance of critical habitats, impact minimization, mitigation, and habitat restoration than in the past. As a result, surface disturbances can be minimal and temporary. The fast pace of these technological developments has meant that the primary literature on the impacts of mineral extraction on sage-grouse in Wyoming, that is cited in government publications, is inconsistent with current practices used in Garfield County. It is anticipated that the advanced technologies currently in use, as well as future ones under development, will continue to allow the efficient extraction of resources while avoiding or minimizing impacts to sage-grouse and other species.

Policy

A. Close suitable habitat as determined by the County's GIS mapping to future mineral leasing surface disturbance unless the fluid resource cannot be extracted without minimal surface disturbance. In this case, the Best Management Practices will be followed and if necessary mitigation utilized to ensure a no net loss to sage grouse habitat and no deleterious demographic effect on the population.

B. All active Leks identified outside of suitable habitat shall have a 0.6 mile NSO for all non-functional surface disturbance as defined in the Colorado State Plan. Exceptions for allowing functional disturbance within the 0.6 mile NSO may be allowed for exceptional or unique topography or other non-contributing habitat aspects or circumstances that will not adversely impact sage-grouse. If the resources cannot be accessed without disturbing the active Lek NSO habitat, then Best Management Practices will be followed and necessary mitigation utilized to ensure a no net loss to sage grouse potential habitat and no deleterious demographic effect on the population.

C. No federal land mineral withdrawals shall be made in Suitable Habitat areas if the resources can be accessed and extracted without surface disturbance.

Section 8 Wildfire Suppression, Fuels Management and Fire Rehabilitation

A. Fuels Management Policy

1) Provide technical (GIS) support that can be used by landowners for voluntary fuels management that is consistent with sage-grouse habitat protection and enhancement.

2) Work with landowners to design fuels management projects in Suitable Habitat to strategically and effectively reduce wildfire threats.

3) During fuels management project design, consider the utility of using livestock to strategically reduce fine fuels (Diamond at al. 2009), and implement grazing management that will accomplish this objective (Davies et al. 2011 and Launchbaugh et al 2007). Consult with ecologists to minimize impacts to native perennial grasses consistent with the objectives and conservation measures of the range management policy.

B. Emergency Stabilization and Rehabilitation Policy

1) Follow the County's habitat restoration policy in developing an emergency rehabilitation plan for temporarily disturbed areas within suitable habitat.

2) Coordinate with appropriate agencies in developing and implementing rehabilitation plans.

3) Collaborate with private landowners and leaseholders to integrate their expertise and knowledge of local conditions into rehabilitation plans.

Section 9 Habitat Restoration

The naturally patchy habitat in the Plan Area requires that habitat restoration projects be planned accordingly and that creating large contiguous landscapes of sagebrush is not consistent with the plant communities in the Plan Area.

Policy

A. Encourage habitat restoration projects on private land. Request that private landowners report annually on the progress of restoration efforts (providing spatial data associated with an API number, date, and status of restoration), so the County may track disturbed vs. restored acreages in and near Suitable Habitat.

B. Recognizing that local conditions in the Plan Area differ from those range-wide for sage-grouse, the County's mapped Suitable Habitat will be used for quantifying habitat conservation objectives of no net loss of Suitable Habitat (excluding that resulting from wildfire and temporary disturbances, as permitted).

C. Require the use of native plant species for restoration based on availability, and probability of successful establishment.

D. Encourage local private landowners to share information among themselves and the County on restoration design and strategies to obtain favorable outcomes.

E. In former sagebrush habitat or in habitat to be converted to sagebrush: make re-establishment of sagebrush and desirable understory plant cover (relative to ecological site potential) the highest priority for restoration efforts.

Section 10 Monitoring and Habitat Category Changes

The primary objective of this plan is to ensure the long-term health and continued existence of Sage-grouse in Garfield County. Regular monitoring of the species and its habitat in Garfield County is essential to ensuring the policies and best management practices are updated and implemented within the Plan Area.

Policy

A. All federal and state agencies with management responsibilities in the plan area for the species and/or its habitat shall provide the County with an annual update of the monitoring programs they have in place, data collected and specifics about their collection protocols. These agencies will inform the County of proposed research projects and allow for the County's input and collaboration prior to implementation.

B. All data shall be collected and studies prepared using protocols that will ensure the quality, utility, objectivity and integrity of the information as required under the Information Quality Act.

C. All data that is gathered in the Plan Area shall be shared with the County in a timely manner, and supplied to the County regardless of its state of completion at the formal request of the County.

D. Private landowners are also encouraged to monitor and share data collected on private property with the County.

E. All data that is shared with the County that is not public information will be treated as confidential and used by the County only to help inform its policies and best management practices.

CHAPTER 8 BEST MANAGEMENT PRACTICES

1) West Nile Virus

Recommend pond designs based upon current recommendations of the CPW. "*Require treatment of waste water pits and any associated pit containing water that provides a medium for breeding mosquitoes with Bti (Bacillus thuringiensis v. israelensis) or take other effective action to control mosquito larvae." These actions will reduce the distribution and abundance of mosquitoes that vector West Nile virus and reduce the risk of West Nile virus transmission to sage grouse and other wildlife (Walker, B. 2008,* , before the Oil and Gas Commission of the State of Colorado on Draft Rule 1204, DOCKET NO. 0803-RM-02.

http://cogcc.state.co.us/rulemaking/StaffPreHearState/Exhibits/FINAL DOW TESTIMONY/B.Walker Testimony-041808 FINAL.pdf)

2) Fluid Mineral Development within Suitable Habitat

A. Establish speed limits on county roads near suitable sage grouse habitat that are appropriate to safety and reducing vehicle/wildlife collisions.

B. Encourage clustering / centralization of disturbances, operations (fracture stimulation, liquids gathering, etc.), and facilities.

C. Encourage use of directional and horizontal drilling to reduce surface disturbance, and adoption of new technologies.

D. Encourage placement of infrastructure in already disturbed locations where the habitat has not been restored.

E. Encourage use of oak (or other material) mats for drilling activities to reduce vegetation disturbance and for roads between closely spaced wells to reduce soil compaction and maintain soil structure to increase likelihood of vegetation reestablishment following drilling.

F. Encourage a phased development approach with concurrent reclamation.

G. Encourage placement liquid gathering facilities outside of priority areas. Have no tanks at well locations within priority areas (minimizes perching and nesting opportunities for

ravens and raptors and truck traffic). Pipelines must be under or immediately adjacent to the road (Bui et al. 2010).

H. Restrict the construction of tall facilities and fences to the minimum number and amount needed. To discourage avian predators, require installation of anti-perch devices on new fences and facilities within 4 miles of occupied suitable habitat where avian predation has been identified as a cause of mortality. Additionally, encourage retrofitting of existing fences and structures with anti-perch devices that are also located within 4 miles of occupied suitable habitat where avian predation has been identified as a cause of mortality.

I. Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats.

CHAPTER 9 GLOSSARY OF TERMS

Active Lek. Active leks are defined as locations where two or males have been observed and documented as actively courting females in the last two years the lek was surveyed (Doherty et al. 2011).

Adaptive Management. A scientific approach to adaptive management of wildlife populations requires that threats and management actions be treated as potentially falsifiable hypotheses, rather than certain knowledge. If the presumed threats to a population are ranked in order of importance (based on plausible cause and effect mechanisms), then even hypothetical threats can be prioritized and subsequently investigated in a scientific manner.

Best Management Practices (BMPs). A suite of techniques that guide or may be applied to management actions to aide in achieving desired outcomes. BMPs are often developed in conjunction with land use plans, but they are not considered a planning decision unless the plans specify that they are mandatory.

Brood Rearing Habitat. Brood rearing habitats are utilized after chicks have hatched, and are generally more mesic (moist) areas with a higher percentage of forbs and grasses which help provide higher densities of insects, plant material, and seeds for chicks, hens, as well as males during the summer and early fall months. Specifically:

- Sagebrush cover is from 10 to 30%
- Cover of Mixed Mountain Shrubs is not more than 10%
- Distance to nearest Forest is over 100 meters
- Distance to Shrubby Woodlands is over 50 meters

Consistent: possessing firmness or coherence; marked by harmony, regularity, or steady continuity: free from variation or contradiction. (Webster Revised Dictionary)

Coordinate. Equal in rank or order; not subordinate. (Webster's Revised Unabridged Dictionary)

Coordination. The act of coordinating; the act of putting in the same order, class, rank, dignity, etc.; as, the coordination of the executive, the legislative, and the judicial authority in forming a government; the act of regulating and combining so as to produce harmonious results; harmonious adjustment as, a coordination of functions. (Webster's Revised Unabridged Dictionary)

Coordination Process. A process mandated by federal law that requires federal agencies to coordinate their plans, programs and management activities with local governments. The minimum parameters of this process were defined by Congress at 43 USC 1712(c)(9) and prescribe that the agencies (1) keep apprised of State, local, and tribal land use plans; (2) assure that consideration is given to those State, local, and tribal plans that are germane in the development of land use plans for public lands; (3) assist in resolving, to the extent practical, inconsistencies between Federal and non-Federal Government plans; (4) provide for meaningful public involvement of State and local government officials, both elected and appointed, in the development of land use programs, land use regulations, and land use decisions for public lands, including early public notice of proposed decisions which may have a significant impact on non-Federal lands; and (5) make land use plans consistent with State and local plans to the maximum extent the Secretary finds consistent with Federal law. (Federal Land Policy and Management Act, 43 USC 1701)

Coordination Meeting. A government-to-government meeting between a government agency or agencies and the BOCC. These meetings are public meetings, publicly noticed with agenda provided in advance. While public comment is not received during the meeting, the public is encouraged to attend and provide comments during later regular BOCC meetings as the intent is for the coordination process to be open and transparent to the public. The discussion is between the agency and the BOCC and is for the purpose of fulfilling the coordination duty, informing the agencies and BOCC of relevant projects, plans, studies and management activities. It is also the forum for discussion towards the resolution of unresolved conflicts between the counties policies and plans and the agencies programs.

Cooperation. The act of cooperating, or operating together to one end; joint operation; concurrent effort or labor. (Webster's Revised Unabridged Dictionary)

Collaborate. To work together with another toward a common goal, especially in an intellectual endeavor; as, four chemists collaborated on the synthesis of the compound; three authors collaborated in writing the book. (Webster's Revised Unabridged Dictionary)

Conserve. To cause no degradation or loss of sage-grouse habitat. Conserve can also refer to maintaining intact sagebrush steppe by fine tuning livestock use, watching for and treating new invasive species and maintaining existing range improvements that benefit sage-grouse etc.

Development. Active drilling and production of natural gas and oil wells.

Development Area. Areas primarily leased with active drilling and wells capable of production in payable quantities.

Enhance. The improvement of habitat by increasing missing or modifying unsatisfactory components and/or attributes of the plant community to meet sage-grouse objectives. Examples include modifying livestock grazing systems to improve the quantity and vigor of desirable forbs, improving water flow in riparian areas by modifying existing spring developments to return more water to the riparian area below the development, or marking fences to minimize sage-grouse hits and mortality.

Exploration. Active drilling and geophysical operations to 1) determine the presence of the mineral resource; or 2) determine the extent of the reservoir.

Forests. Forests in the Plan area include contiguous stands larger than 1/2 acre of aspen (Populus tremuloides), Douglas-fir (Pseudotsuga menziesii), mixed conifers (including, but not limited to Douglas-fir, Engelmann spruce [Picea engelmannii], subalpine fir [Abies bifolia] and ponderosa pine [Pinus ponderosa]), pinyon-juniper woodlands, and oakbrush.

Inactive Lek. Any lek where sufficient data suggests that there was no strutting activity throughout a strutting season. Absence of strutting grouse during a single visit is insufficient documentation to establish that a lek is inactive. This designation requires documentation of either: 1) an absence of sage-grouses on the lek during at least 2 ground surveys separated by at least seven days. These surveys must be conducted under ideal conditions (April 1-May 7 (or other appropriate date based on local conditions), no precipitation, light or no wind, half-hour before sunrise to one hour after sunrise) or 2) a ground check of the exact known lek site late in the strutting season (after April 15) that fails to find any sign (tracks, droppings, feathers) of strutting activity. Data collected by aerial surveys should not be used to designate inactive status as the aerial survey may actually disrupt activities.

Late Brood Rearing Area. Habitat includes mesic sagebrush and mixed shrub communities, wet meadows, and riparian habitats as well as some agricultural lands (e.g. alfalfa fields, etc).

Lek Complex. A lek or group of leks within 2.5 km (1.5 mi) of each other between which male sage-grouse may interchange from one day to the next. Fidelity to leks has been well documented. Visits to multiple leks are most common among yearlings and less frequent for adult males, suggesting an age-related period of establishment (Connelly et al. 2004).

Lek. A traditional courtship display area attended by male sage-grouse in or adjacent to sagebrush dominated habitat. A lek is designated based on observations of two or more male sage-grouse engaged in courtship displays. Sub-dominant males may display on itinerant strutting areas during population peaks. Such areas usually fail to become established leks. Therefore, a site where less than five males are observed strutting should be confirmed active for two years before meeting the definition of a lek (Connelly et al 2000, Connelly et al. 2003, 2004).

Mitigation. Compensating for resource impacts by replacing or providing substitute resources or habitat.

Mixed Mountain Shrubs. Shrublands dominated by Utah serviceberry (Amelanchier utahensis), Saskatoon serviceberry (A. alnifolia), mountain mahogany (Cercocarpus montanus), oakbrush (Quercus gambelii), bitterbrush (Purshia tridentata), and may have a sagebrush component. Mapped Mixed Mountain Shrublands have greater than 10% cover of these non-sagebrush shrub species, as this is the threshold at which sage-grouse show a strong avoidance of this community type.

Multiple Use: The management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output. (Federal Land Policy and Management Act, 43 USC 1702(c)).

Nesting Habitat. Nesting habitat is generally moderately sized patches of denser and taller sagebrush, further away from roads and other activity areas. Specifically:

- Sagebrush cover is from 20 to 50%
- Cover of Mixed Mountain Shrubs is not more than 10%
- Distance to nearest Forest is over 100 meters
- Distance to Shrubby Woodlands is over 50 meters

Occupied Lek: A lek that has been active during at least one strutting season within the prior 10 years.

Offsite Mitigation. Compensating for resource impacts by replacing or providing substitute resources or habitat at a different location than the project area.

Range Improvement. Any activity, structure or program on or relating to rangelands which is designed to improve production of forage; change vegetative composition; control patterns of

use; provide water; stabilize soil and water conditions; and provide habitat for livestock and wildlife. The term includes, but is not limited to, structures, treatment projects, and use of mechanical means to accomplish the desired results.

Reclamation. Rehabilitation of a disturbed area to make it acceptable for designated uses. This normally involves reontouring, replacement of topsoil, re-vegetation, and other work necessary to ensure eventual restoration of the site.

Restoration. Implementation of a set of actions that promotes plant community diversity and structure that allows plant communities to be more resilient to disturbance and invasive species over the long term. The long-term goal is to create functional, high quality habitat that is occupied by sage-grouse. Short-term goal may be to restore the landform, soils and hydrology and increase the percentage of preferred vegetation, seeding of desired species, or treatment of undesired species.

Sagebrush. Includes all species and sub-species of the genus *Artemisia* except the mat-forming sub-shrub species *A. frigida.*

Shrubby Woodlands. Vegetation communities dominated by oakbrush or pinyon (Pinus edulis) and Rocky Mountain juniper (Sabina scopulorum) or Utah juniper (S. osteosperma) types. Mapped Shrubby Woodlands have greater than 10% cover of pinyon-juniper, as this is the threshold at which sage-grouse show a strong avoidance of this community type**.**

Suitable Habitat. Suitable Habitat includes all seasonal habitats (including lekking, nesting, brood rearing/summer and winter habitats) within the Plan area. Specifically, Suitable Habitat includes:

- Sagebrush cover is from 10 to 50%
- Cover of Mixed Mountain Shrubs is not more than 20%
- Distance to nearest Forest is over 100 meters
- Distance to Shrubby Woodlands is over 50 meters
- Grass/forb dominated habitats (with >10% sagebrush cover) within 20 meters of sagebrush habitat
- Contiguous habitats >3 acres in size, or part of a block of Suitable Habitats in close proximity

Temporarily Disturbed Areas. Areas that have seen recent vegetation disturbance activities (such as pipeline corridors and wildfire events) may not support sagebrush cover at a density or height suitable for sage-grouse use. If these areas occur within a block of Suitable Habitat, they will be considered Temporarily Disturbed, and still would be considered as long-term as

Suitable Habitat. Temporarily Disturbed habitat will need to be tracked spatially within the Plan area.

Unoccupied Lek. A lek that has either been "destroyed" or "abandoned."

Unoccupied Suitable Habitat. Areas that support Suitable Habitat, but for which sage-grouse currently do not occupy these areas or the status of occupancy are unknown. These areas, for whatever reason, are deemed less-than-optimal by sage-grouse (e.g., due to predation pressures, non-lethal disturbances, too small an area of suitable habitat, etc.) and thus sage-grouse prefer to utilize other areas.

Winter Habitat. Winter habitat is generally utilized by sage-grouse from November through early April. It is primarily determined by the depth and persistence of snow cover. During more severe winters, snow can limit winter habitat to wind-swept ridges and patches of the tallest sage-brush. During the winter sage-grouse food is strictly limited to sage-brush. However, sage-grouse can do quite well on winter diets. Specifically:

- Sagebrush cover is >25%
- Cover of Mixed Mountain Shrubs is not more than 10%
- Distance to nearest Forest is over 100 meters
- Distance to Shrubby Woodlands is over 50 meters

CHAPTER 10 APPENDIX

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ACKNOWLEDGEMENTS

This Plan was produced at the direction of the Garfield County Board of County Commissioners with the assistance from Dr. Rob Roy Ramey (*Wildlife Science International, Inc*.), Margaret Byfield (*American Stewards of Liberty*), Eric Petterson (*Rocky Mountain Ecological Services*), Zach Perdue (*Pendo Solutions*) and Fred A. Jarman (*Garfield County Community Development Department*).

Garfield County

March 21, 2013

Helen Hankins
Colorado State Director
Bureau of Land Management
2850 Youngfield Street
Lakewood, Colorado 80215-7093

Jim Cagney, NW District Manager
Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

RE: Garfield County Greater Sage-Grouse Conservation Plan

Dear Director Hankins and Mr. Cagney,

On Monday, March 18th, 2013, the Garfield County Board of County Commissioners (the Board) unanimously approved the Garfield County Greater-Sage Grouse Conservation Plan (the Plan) which is memorialized in Resolution 2013-23. This Plan is a refinement of the ***Parachute – Piceance – Roan Conservation Plan*** (PPR Plan) and now guides all plans, policies, conservation measures and best management practices for the Greater Sage-Grouse (sage-grouse) in Garfield County.

As is stated in the plan:

"The purpose of the Plan is to provide private and public land owners with land management principles, policies, incentives, and best management practices based on the best available science that are tailored to fit Garfield County's unique landscape and habitat characteristics for the betterment of the species."

The Board placed considerable time and resources in developing this Plan to ensure that the policies within are based on the best available science and are relevant to Garfield County's unique topography. An extensive and detailed mapping project was undertaken to ensure that all areas that have the characteristics of suitable habitat are clearly identified, and those that do not meet these requirements are also easily identified.

Having this detailed knowledge about the habitat allowed us to design specific and meaningful policies that will benefit our unique peripheral population of sage-grouse. More than that, a fundamental approach inherent in our Plan addresses the 'cause and effect' mechanisms that underlie each threat to sage-grouse, rather than relying on one-size-fits-all set of regulations and blanket setback distances. By this letter, we specifically ask that you 1) use this superior and locally appropriate data as you move forward in preparing the Northwest Colorado Greater Sage-Grouse Environmental Impact Statement (EIS) and 2) incorporate the sage-grouse conservation measures from the Plan into your Resource Management Plans as they apply in Garfield County.

Enclosed is a copy of the Plan for your review. We request that this be included as the preferred alternative for the Garfield County portion of the EIS because the policies within are best suited to manage the habitat in Garfield County. As has been discussed before, we understand that your obligation under the National Environmental Policy Act (NEPA) is to resolve conflicts between your plans and our policies, and if you are unable to do so then our position must be included in the analysis in the form of an alternative so that the public and decision makers can properly analyze and comment on ***all*** the reasonable alternatives.

To ensure inclusion of this alternative in the internal review of the Draft EIS, we have also inserted our policies into your alternatives table format (attached to this letter) to make it easier for you to incorporate our plan directly into your draft analysis before it is released to the public.

We are confident that the principles and policies within our Plan will sustain any challenge as they were developed relying on the latest advancements in technology and on the most relevant and best available science as applied to our unique terrain.

One of the Board's key concerns was to answer the question you raised at the last Coordination meeting, which was how does the BLM implement "voluntary" measures and still provide regulatory assurance? You indicated that while you agreed with many of the provisions of the PPR Plan, its voluntary implementation was problematic. This question, in part, caused the Board to develop this refinement to the PPR Plan. We have addressed this issue specifically in the Plan by making the policies and conservation measures mandatory on federal lands.

As you will see, once you review the detailed maps upon which this Plan is based, the actual suitable habitat is not 220,000+/- acres as identified on the coarser maps produced by Colorado Parks and Wildlife. Rather, suitable habitat is extremely patchy, non-contiguous and only totals

approximately 15,000 acres. Because of the unique nature of the suitable habitat, we find it to be reasonable to employ an avoidance policy of the surface areas of the suitable habitat on federal lands.

Another key concern for the Board was ensuring that this Plan could provide the "regulatory assurance" the U.S. Fish and Wildlife Service will be seeking as they determine whether or not the sage-grouse should come under the federal protection of the Endangered Species Act. To provide this assurance, the Plan will be implemented through the Coordination process and serve as the comprehensive plan that all other measures work to be consistent with. We recognize our unique position of being able to ensure that all the different managers of the species and its habitat coordinate with Garfield County. We have made our commitment to coordinate with your agency as well as the others clear. Coordination can provide the regulatory assurance as you and the other agencies involved in this issue fulfill your duties in accordance with the law.

We are available to answer any questions you may have about the Plan and will be happy to assist you as you consider how the Plan will be treated in your NEPA analysis. We are also looking forward to our April 4th Coordination meeting where we can discuss in greater detail the provisions within the Plan once you have had the opportunity to thoroughly review its contents.

Very truly yours,

John Martin, Chairman
Garfield County Board of County Commissioners

Cc *Board of County Commissioners*
Frank Hutfless, Garfield County Attorney
Andrew Gorgey, Garfield County Manager
Fred A. Jarman, Director, Garfield County Community Development Department

Attachment(s) *Garfield County Greater Sage-Grouse Conservation Plan*
EIS Alternatives Table including 'Garfield County Alternative'

AUDIOTAPED BOARD OF COUNTY COMMISSIONERS
OF GARFIELD COUNTY
SPECIAL MEETING
SAGE GROUSE - COORDINATING MEETING
108 8th Street, Room 100
Glenwood Springs, Colorado

April 4, 2013

Re: BLM SAGE GROUSE MEETING

1 APPEARANCES:
2 Commissioner John Martin, Chairman
3 Commissioner Tom Jankovsky
4 Commissioner Mike Samson
5 Commissioner Frank Hutfless
6
7 Fred Jarman, Director of Planning Community
8 Development
9 Brad Petch, Colorado Parks and Wildlife
10 Kathy Griffin, Colorado Parks and Wildlife
11 Perry Will, Colorado Parks and Wildlife
12 Jim Cagney, Bureau of Land Management
13 Eric Petterson, Rocky Mountain Ecological Services
14 David Boyd, Public Affairs Specialist
15 Patty Gelatt, American Stewards of Liberty
16 Margaret Byfield, American Stewards of Liberty
17 Dr. Rob Ramey, Wildlife Science International
18 Zack Perdue, Pendo Solutions
19 Commissioner John Hill, Rio Blanco
20
21
22
23
24
25

(Audio starts at 6 minutes, 11 seconds.)

(Already in progress.)

COMMISSIONER JANKOVSKY: -- it didn't have any regulatory assurance. It was voluntary. There were concerns from the BLM on that part. We also had a meeting right after our August meetings with Parks and Wildlife.

And Parks and Wildlife helped us get a better understanding of the mapping, how the mapping was done, also the work they're doing on the field in the PPR area.

One thing that came out of that meeting was from Kathy was we heard you say that your map was from a 50,000-foot level and that drew some concerns. It had some concerns for us because we feel once this map gets in place, it will be maybe a little bit more rigid than the 50,000-foot level.

So with that I want to turn it over to -- and from there we've been a while. We've been since August without a meeting. That's because we've been doing a lot of work ourselves.

We've been looking at mapping, looking at the PPR plan, how can we improve that.

And with that, I'll turn it over to Fred Jarman and let him lead us here through the

1 discussion.

2 CHAIRMAN MARTIN: Did everybody get one of

3 these? It's a handout and I'm hoping that we had

4 enough copies. If you didn't get one, please let us

5 know and we'll get one to you. Thank you. Fred.

6 MR. JARMAN: Okay, thank you, Chairman and

7 thank you, Commissioners.

8 And as we start out, I really do, on

9 behalf of the County, want to thank all of you for

10 coming. This is pure coordination. This is getting

11 together and working through these issues, which

12 we're eager to do. And we hope you're of the same

13 mindset.

14 So what you see on the screen here is a

15 breakout really of what we want to talk about in the

16 plan itself. So under Bullet 5 on the agenda, what

17 you should have, so it's a background.

18 We're going to work through the

19 implementation of this plan through coordination.

20 We're going to walk through the mapping methodology

21 with our team who's here.

22 Then back to the principles and policies

23 in our plan, and then ultimately have a

24 presentation on more of the science that goes into

25 the basis for our planning. So we're eager to share

1 this with you.
2 As you all have had it already, we sent
3 this, I guess -- right when it came out, we sent
4 this to all the agencies. So we hope you've had a
5 chance to look through it.
6 So as you understand and we stated in the
7 plan, we consider this really a refinement of the
8 PPR plan that CPW was tasked with completing which
9 they did in 2008. There were a wide variety of
10 stakeholders, perhaps 50 to 60 plus in that group.
11 And from 2008 to now, we believe that
12 we've made a refinement of all of that, particularly
13 in terms of mapping and the policy.
14 As you, of course, know, we are also
15 working as a cooperating agency in that status with
16 the BLM. And Tom already talked about that. But of
17 that discussion, there are two key pieces, the NTT
18 report and the CPW mapping which are both public
19 documents which we're going to talk in great detail
20 about today.
21 We also believe that our plan really does
22 incorporate the best available science at this
23 point. And I don't need to underscore that really
24 anymore, but that is a common theme we hope that
25 you'll see through this.

1 And one of the significant tenets of this
2 is that it contains both public and private land
3 management policies again that we believe are based
4 on best available science, and then implemented
5 through Coordination.
6 And this is Coordination with a capital C,
7 not a small c. This is a specific term that is
8 embedded within NEPA, and so that's why we're all
9 here today. This is federal law at play.
10 So purpose and need of the plan, Tom
11 covered this pretty well. I'm going to skip that
12 first bullet point.
13 But the pictures really illustrate what he
14 said, and that is the fact that we believe in
15 Garfield County we have a very, very unique and
16 different landscape than the rest of the national
17 range or at least primarily the national range. And
18 those photos sort of illustrate this.
19 We have a lot more about this later in the
20 presentation, but ultimately the purpose of the plan
21 is to provide private and public landowners with
22 land management principles, policies, incentives and
23 BMPs based on the best available science that are
24 tailored to fit -- and that's the key piece of this
25 -- tailored to fit Garfield County's unique

1 landscape and habitat characteristics for the
2 betterment of the species.
3 And I want to also underscore those last
4 four words, betterment of the species. That is
5 still the goal of what we are all really trying to
6 attempt to do here.
7 Of note you'll recognize -- some of you,
8 particularly CPW folks, Kathy and Brad -- will note
9 the map on the left on this screen is the habitat
10 map that was used within the PPR plan. And that was
11 completed in 2008.
12 And then we have what we're considering
13 the CPW red map now or the priority and general
14 habitat maps. And we did have a meeting with Kathy
15 and Brad, CPW, here in the fall, I think it was
16 September 5th, where we talked about this issue.
17 And it became very concerning to the Board
18 of County Commissioners that there was such a large
19 leap made from the map on the left -- so the black
20 speckles show you what the habitat is there -- to
21 the red map which is the priority. So it
22 encompasses the entire lower Piceance area.
23 And so we were very concerned about that.
24 And as Commissioner Jankovsky stated, that is why
25 primarily we have spent so much time since that

1 meeting really trying to better understand what the
2 science is behind that jump.
3 And so if you'll keep that as a major
4 theme for today, we are very eager to talk to
5 everybody about that and get some insight from you
6 again as to where we go -- or where you have gone.
7 So in light of that, we took a flight, a
8 helicopter flight, to really get up on the upper
9 deck or the Roan Plateau. And what this map is
10 showing -- and I apologize, the screen is yellow
11 here, I don't know what the issue is, but it is what
12 it is.
13 But here is Rifle to get you oriented,
14 here is the I-70 corridor as it drops into Mesa
15 County, and here is Parachute.
16 So we left Rifle and then flew along this
17 black line which is the flight path. This is the
18 exact GPS location of the flight path.
19 So up onto the upper deck here across
20 preliminary priority habitat up into Rio Blanco
21 County, which is this area here, then back down, and
22 then back into general habitat and took a left-hand
23 turn here and then came back down into Rifle.
24 So we really wanted to get up in the air
25 and fly it very closely to see, okay, how can we get

1 a better understanding. That's our closest, given
2 the snow, and what have you.
3 So from that, these were pictures taken
4 from that flight. And I think pictures are worth a
5 thousand words here. It gives you a very good sense
6 of what we saw, which is critical to reinforcing
7 what we believe is a very, very different landscape
8 in Garfield County as compared to Wyoming, by way of
9 example.
10 So the shot to the lower right, to be
11 clear, is not up on the Piceance. That's Pinedale,
12 Wyoming region. That's actually a photo from the
13 BLM.
14 But the photo in the upper left is
15 priority habitat as mapped in the red map by CPW.
16 So it gives you a sense of the difference.
17 So seeing this all from the air, we became
18 even more concerned. And we decided to launch
19 deeply into mapping with some fairly sophisticated
20 modeling and of the same area. We decided to use
21 the same plan area in the plan as the CPW outlined
22 within their map, and that's that red area there.
23 And the punch line of all of this, which
24 we'll get to, but wanted to give you a little bit up
25 front, you'll see the PPR map on the lower left.

1 And then after our modeling efforts, we have what is
2 up on the upper right.
3 And our team will get into great detail on
4 how we arrived at what that suitable habitat is.
5 That's the red in the upper right. So we believe
6 there's a major difference from 220 (sic) acres of
7 habitat down to about 15 -- anywhere from 15,000 to
8 28,000, but you get the sense here it's somewhere
9 between 7 and 13 percent of the entire 220,000
10 acres. So it's a remarkable difference.
11 So from that we decided to readjust and
12 implement, craft our plan and then choose a way to
13 implement that plan. So I'm going to turn it over
14 to Margaret here and have her walk you through
15 implementation.
16 MS. BYFIELD: Okay, one of the first
17 problems that we really identified is that there's a
18 lot of different pieces to the pie as it goes
19 towards managing the Sage Grouse. You have
20 different agencies that have different elements of
21 the management of the species.
22 So BLM has habitat management on the
23 federal lands. Of course, Colorado Parks and
24 Wildlife has species management. And then Fish and
25 Wildlife Service has to look at whether or not it

1 needs to put in a layer of federal management and
2 take over control of the species at the federal
3 level if it listed it as endangered.
4 So there's a lot of different hands in the
5 pie. And one of the things that we really wanted to
6 solve and in looking at all the approaches is the
7 approaches have been from a real broad-brush
8 approach.
9 In other words, Colorado is looking at it
10 from the Colorado perspective; BLM is looking at it
11 from the national perspective with the NTT report
12 direction; Fish and Wildlife Service, of course, at
13 the national level, as well.
14 And we wanted to bring it back to how the
15 Sage Grouse is managed in Garfield County comes from
16 a local perspective that takes into account the
17 local needs, the local landscapes, so that whatever
18 conservation measures are put in here are actually
19 going to work here and not harm the species. So
20 that's why we decided that the implementing element
21 of the plan was going to be through Coordination.
22 Because all of the agencies have a federal
23 directive to coordinate with the local governments
24 so -- particularly, specifically, and I'll just walk
25 through this, the Bureau of Land Management through

1 FLPMA primarily is required to keep apprised of the
2 plan, give consideration to the plan, meaningfully
3 involve the County in its planning activities, work
4 to resolve conflicts with the plan, and make its
5 plan and policies consistent with the local plan.
6 Fish and Wildlife Service has the
7 obligation under the Endangered Species Act to
8 consider all local efforts that are being made prior
9 to making a determination. So everything that
10 Garfield County is doing here is something that you
11 need to be aware of as well so that that can be
12 taken into account in the determination process.
13 And the state agencies, since Garfield
14 County has the land use authority, the coordination
15 with the state agencies is a natural fit to work
16 through a lot of these issues as well.
17 So we see the Garfield County plan serving
18 as the central plan that then is a basis for all the
19 other plans that are developed, conservation
20 measures that are developed. Everything else that's
21 developed from it look back to the Garfield plan as
22 really the comprehensive plan to be consistent with,
23 of course to give consideration to.
24 And if there is conflict between the
25 policies, we have, you know, a written document now

that we can start working through those conflicts to resolve those conflicts.

So a lot of the purpose of this meeting and kind of going through this plan for you guys is that one of the key things about the plan as to how it's going to be implemented is we're looking at doing an annual review each year with all of the agencies.

And we kind of see this meeting as our first meeting of that nature where we can take a look at and go through the impacts to the species here locally, what the habitat looks like, reassess if the conservation measures are working or are effective and being put in place, also take into account any new science.

It's an adaptive management plan, and that's critical to the implementation of it. And one of the great things about the County is that the County can move very quickly.

If a change needs to be made, it can make that change very quickly by really agreement of the Board and through resolution. And so if something major needs to change, it can be done quickly on the ground here in Garfield County.

And so going through the review process

1 looking at changing, if necessary, changing
2 conservation measures in the plan based on the
3 science and based on what we're learning from you
4 and also from the private landowners.
5 And then, you know, if changes are being
6 made, prepare a draft and get that out to all of you
7 to take a look at and consider and feedback comments
8 to the County. And then update those policies and
9 conservation measures as warranted.
10 The same kind of process is really what
11 the County plans do also with private landowners.
12 We really want private landowners engaged in this
13 process. They own most of the Sage Grouse habitat
14 and are just critical to the whole process.
15 And so the plan serves for the private
16 landowners to really support what they're already
17 doing and encourage and help them to put in the
18 conservation measures what we're seeing, after
19 looking at the science and everything, we find is to
20 be the best approach.
21 So that's kind of a summary of how we see
22 this coming together. An annual review with all of
23 the agencies, a science review can be done at any
24 time, and continual coordination.
25 In other words, it's not just one annual

1 review meeting but it's continual coordination with
2 the agencies so that the County is always apprised
3 of what is happening with the species on the ground.
4 So to kind of summarize really what we're
5 talking about, the plan is to inform all the
6 agencies -- and what we're really trying to do today
7 -- to inform all the agencies of the content of the
8 Garfield County Sage Grouse plan and answer the
9 questions that you may have, concerns you may have.
10 Begin the process of implementing this
11 plan, we see this as really the first step. And
12 hopefully today you guys can start pointing out any
13 concerns you have, any conflicts you have with the
14 policies, and we can start working through the
15 resolution of those.
16 And we also need to obtain an answer as to
17 whether the Garfield County plan will be included as
18 an alternative in the BLM EIS, which has been
19 requested.
20 And then discuss the key concerns we have
21 with the science that's being relied on through both
22 the NTT report and also the candidate determination
23 notice published by the Fish and Wildlife Service in
24 2010.
25 MR. JARMAN: Okay, thanks, Margaret.

1 So where we're going to head now is, I'm
2 going to have Zack Perdue from Pendo Solutions and
3 Eric Petterson from Rocky Mountain Ecological
4 Services come up and spend some time walking through
5 the methodology behind the mapping and some of the
6 science related to that, which is really the -- it's
7 one of the main foundations of our plan.
8 And so I'm going to turn it over to Zack
9 here and let him drive as he would like.
10 MR. PERDUE: All right, so Eric and I were
11 hired by Garfield County to perform an (inaudible)
12 assessment of the suitability of potential Greater
13 Sage Grouse habitat on the PPR.
14 So to do this, we decided to employ two
15 different methods of what's called a multi-criteria
16 overlay analyses, which included weighted overlay as
17 well as fuzzy overlay modeling.
18 Real briefly, a weighted overlay model is
19 something a lot of you are probably very familiar
20 with. They are commonly known as habitat
21 suitability indices. And they basically function by
22 scaling, weighting and then compositing diverse
23 spatial data sets to measure or gauge the level of
24 suitability at a particular location.
25 Likewise, a fuzzy overlay model applies

1 something that's called fuzzy logic to spatial data
2 to measure the suitability of an area. Fuzzy logic
3 is something that's based on set theory and it
4 provides a more flexible method for combining the
5 criteria data sets, and it provides a method also
6 for handling vagueness and imprecision in spatial
7 data.
8 So before we started the model
9 development, the first step was to develop all the
10 criteria that we were going to let influence the
11 selection of suitable habitat.
12 So Eric and I both performed a very
13 extensive literature review of all the available
14 published and peer-reviewed studies that are out
15 there right now that begin to describe habitat
16 characteristics of the Greater Sage Grouse.
17 A number of these were national studies.
18 Some of them occurred in Washington, Idaho, Nevada.
19 But we tiered heavily towards the three studies that
20 you see listed as items 1, 2 and 3 under the heading
21 No. 3 there, which were Walker's paper, Apa's paper
22 and Heather Sauls' paper.
23 Those were all relatively contemporary
24 studies that had been performed, and they were also
25 studies that were performed specific to the PPR

1 region. So it had a lot of really good information
2 that described the specific characteristics of the
3 PPR population.
4 So while we had an extensive list of
5 criteria to choose from, some of the information was
6 decades old, some of it was contradictory. And so
7 we tried to devise a method to kind of boil down the
8 most common criteria that would help us measure
9 general habitat, not looking at seasonal habitats.
10 So we wanted to capture where these birds
11 were in the summer, in the fall, in the spring, and
12 so on and so forth.
13 So from that, what we determined were that
14 the four major contributing criteria are listed
15 underneath No. 4 here, we determined slope, ranges,
16 canopy cover, vegetation types and distances to
17 forested areas as dominant criteria to feed in as
18 model inputs.
19 So real briefly, the data that we employed
20 in the models, the slope was derived from 10-meter
21 USGS net data. The canopy cover was acquired
22 directly from the Landfire data distribution site.
23 And then, of course, we had a variety of publicly
24 available vegetation data sets to look at and
25 possibly employ in the modeling.

1 We ultimately looked at four, again listed
2 under heading No. 3 here. The first two, Remap
3 (phonetic) and NLCD, we felt didn't break down the
4 vegetation classification intricately enough.
5 They seemed to be very broad
6 classifications. In fact, most of the shrubling
7 communities in there were simply typed as a
8 sagebrush community irrespective of the presence of
9 serviceberries, snowberries, so on and so forth.
10 So after kind of putting those to the
11 side, we looked at the CVCP and the Landfire data.
12 Both of these data sets were far more accurate in
13 defining the intricate nature of the veg communities
14 up there on the PPR study area.
15 And what we wanted to do initially was to
16 use the CVCP data because it seems to be the data
17 that's been most heavily employed in the models that
18 have been performed to date.
19 However, when we performed an assessment
20 of the data as compared to Landfire, we felt that
21 the delineations present in the Landfire data as
22 they pertained to sage communities as well as
23 forested areas had increased accuracy as compared to
24 the CVCP.
25 So ultimately we chose the Landfire data

1 as the primary publicly available vegetation data
2 source to employ in the models.
3 So at this point we had reviewed multiple
4 data sets and developed the criteria list. And from
5 that, we had established that, you know, through
6 observation we had noticed numerous issues with the
7 accuracy of the geometry and attribute typing of the
8 vegetation data. And it's also been observed and
9 noted in other relevant studies.
10 Another issue with the employment of the
11 CVCP data set was that it appears there's a
12 discrepancy between the data sets that were
13 employed. And the only thing I can assume is that a
14 previous CVCP data set was employed in the Walker,
15 Sauls models, and so on and so forth, and that's
16 subsequently been updated.
17 That conclusion is made simply by
18 comparing the cover types that are reported in those
19 reports as compared to what we have in our data
20 within the study area. And there's a very broad
21 discrepancy between the description of the cover
22 types.
23 Lastly, both the CVCP and the Landfire
24 data are relatively coarse data sets. CVCP is
25 25-meter resolution. Landfire is 30-meter

1 resolution data.
2 So with all this in mind, Garfield County
3 wanted to ensure that they had the most accurate
4 vegetation data set to work with, to not only model
5 with but also to employ in future exercises to
6 develop conservation measures within the PPR.
7 So to do that, we started a separate
8 process whereby we performed supervised image
9 classification process on color-infrared NAIP
10 photography that was acquired in 2011. We performed
11 this classification at a 2-meter resolution with the
12 intent of identifying the major vegetation
13 communities as they applied to the suitability of
14 the Greater Sage Grouse habitat.
15 So with that in mind, we made three big
16 pushes in this exercise which were to accurately
17 identify and delineate sagebrush and mixed mountain
18 shrub communities.
19 We also wanted to identify the areas of
20 encroachment from the woody shrublands and attempt
21 to quantify that to the extent possible in those
22 transition zones.
23 And, lastly, we wanted to accurately
24 delineate the forested zones given the fact that
25 it's indicated that it's a relatively dominant

1 criteria, influential criteria by Walker's model.
2 And so we wanted to ensure that given the
3 fragmentation of the habitat up there, and the
4 linear nature that these communities exist in that
5 the delineation of the forested canopy was accurate
6 so
7 as not to unduly constrain or pull back from
8 accurate results.
9 So at this moment -- I'm sorry, we're
10 missing a table here. This should have a table of
11 the vegetation summary on it.
12 But at this moment we are actually
13 reviewing -- we're performing a manual review of the
14 data results against high resolution 30-centimeter
15 photography as well as limited available transect
16 data that we have within the study area.
17 We're also employing species prediction
18 based on other baseline data sets including soils,
19 aspects, elevation. And then in the spring we're
20 going to perform additional transects and field
21 observations to try to tighten up and validate the
22 accuracy of the data.
23 The field efforts will largely concentrate
24 on looking at what we have mapped as mixed mountain
25 shrubland communities and the marginal habitats that

1 exist on the perimeters of the sage and grassland
2 communities.
3 So with all that said, we had our criteria
4 developed. We had compiled our data. We had even
5 created new vegetation data set to employ in the
6 modeling. And so we started the modeling process.
7 And at this point we've actually produced
8 numerous models and have the intent of completing
9 additional models in the future.
10 Ultimately, our goal is to continually
11 refine the parameters of the model and the criteria
12 that influence the model based on best available
13 science and expert opinion to try to really hone in
14 on what the suitability looks like on the PPR.
15 In the future we will be building more
16 robust, sophisticated models that incorporate
17 additional criteria to map and locate seasonal
18 habitat locations within the PPR.
19 But real briefly, the list that you see up
20 here on the slide, this simply illustrates the
21 models that have been completed to date, the
22 sequence in which they were performed, the
23 vegetation data source that was utilized in the
24 model as well as the model method. And to the
25 right, there's just a brief reason for why the model

1 was performed.
2 So moving through that real briefly,
3 models 1 and 2 employed the Landfire vegetation data
4 set. They were both products of a habitat
5 suitability index model.
6 The first one was run very early on, and
7 that was simply to establish a baseline for the
8 model results using a very generic set of criteria.
9 Again, No. 2 kind of built on the same
10 parameters of Model 1, but we did change some of the
11 criteria, specifically as it pertained to canopy
12 cover and slope. And that was based on some
13 information that we saw in the Apa paper from 2010.
14 Models 3 and 4 were performed on the exact
15 same criteria and framework that Model 2 was. The
16 only change in the model was the substitution of the
17 vegetation data sets.
18 And then, lastly, No. 5 was a model that
19 employed the fuzzy overlay process. We used the
20 Remap vegetation in that, and that was performed
21 because it's a different modeling technique, we
22 would expect different results.
23 And it has particular significance to this
24 habitat because of the vagueness and the imprecision
25 in the data and the fact that we know that this

1 population up here likes to get out to the perimeter
2 of these sage zones and move in marginally to some
3 of the woody shrublands that encroach on these
4 communities.
5 So before showing the results of the
6 models, real briefly the HSI model produced results
7 on a scale of zero to ten. The fuzzy overlay model
8 results were presented on a scale of zero to one.
9 On both of those indices, the higher values indicate
10 higher levels of suitability.
11 Real briefly, this is the criteria matrix
12 that was employed in the Model 1, in the HSI model.
13 I will let you guys just briefly look at that. As
14 you can see, it's fairly generic in its description
15 of canopy cover.
16 We allowed for a pretty conservative
17 estimate of slope ranges. And the distance to
18 forest and vegetation communities were established
19 almost directly from Walker's paper.
20 Models 2, 3 and 4, here is the criteria
21 that we employed in these models. As you can see,
22 the changes that we made were to tighten up slope
23 constraints based on information in Apa's paper as
24 well as Heather Sauls' model.
25 And we also better distinguished

1 differences in the canopy cover. And again this
2 came from specific information from the Apa paper.
3 And then No. 5, Model 5, was a fuzzy
4 overlay model. And a fuzzy overlay model doesn't
5 employ weights and rankings in a similar manner that
6 an HSI model does.
7 What it does is it assigns membership to
8 the data. And so real briefly, without getting into
9 a lot of technical explanation of this, the
10 membership functions that we used to assign to the
11 different criteria were we used a (inaudible) soil
12 membership function for slope whereby we
13 established that the 50 percent membership level was
14 at the 20 percent slope range and allowed higher
15 membership to assign to lower slope values.
16 Vegetation types and canopy cover were
17 largely employed almost in the same manner that they
18 were in the HSI models. The only difference was
19 that we performed nearest neighbor functions to
20 smooth transition zones between the vegetation
21 communities.
22 Distance to forest area was assigned a
23 linear membership function which basically increased
24 membership to that class as a function of distance
25 as you moved away from the forested areas.

1 And we did something similar with land
2 forms as well which it bears noting, I guess, that
3 that was one thing that we had changed with this
4 model was incorporating land form as a variable.
5 The previous models had utilized land form, but it
6 was utilized as a filter process. It was not
7 employed as a variable directly in the model.
8 But the land forms utilize topological
9 position indices values of zero to 75, again with a
10 linear membership function that assigns higher
11 membership to higher TPI values. At the point that
12 we exceeded 75, we assigned full membership which
13 basically indicated you are on the top of the ridge.
14 Real briefly, we have summarized the
15 results of each of the model iterations. To explain
16 the headings, as we move left to right, we have the
17 raw acres, filtered acres, private lands and BLM
18 lands. Each reports an acreage and a percentage.
19 Regarding the raw acres, those were the
20 native results of each model iteration unmodified.
21 So nothing was filtered or anything. That's the
22 direct return of the model.
23 To the right is the percent which is
24 expressed as an area of the broader study area,
25 which is approximately 221,000 acres.

1 To the right of that, we have filtered
2 acreages whereby -- as you can see in models 1
3 through 4, we performed some filtering that was
4 relatively arbitrary.
5 But the attempt was to eliminate some of
6 the smaller disconnected habitat patches that were
7 being returned in the model. As well as, as I just
8 said, the land form data was employed in models 1
9 through 4 as a filter technique to remove drainage
10 areas and swales as suitable habitat zones.
11 Moving further to the right, we report the
12 filtered result acreages as they pertain to private
13 lands and BLM lands. And the percentage to the
14 right of those are a percentage of the mapped
15 suitable habitat for that model result. So we'll
16 let you look at those for a moment.
17 So real briefly, we will cycle through
18 some maps of Model 1 results. After that, we have
19 Model 4. And then we also have Model 5, which is
20 the fuzzy model results.
21 Yeah, Model 4 is the model that is being
22 represented in the Garfield County plan at this
23 time.
24 So ultimately we went through and we
25 performed these different modeling exercises. And

1 we ultimately had five different results that were
2 showing the habitat as occurring -- or representing
3 anywhere from 7 to 13 percent of the project area
4 based on the models that have performed to date.
5 Ultimately what we wanted to do was
6 perform a comparison of these model results with the
7 result of Walker's study, Rice's study, as well as
8 Heather Sauls' model. Unfortunately, we didn't have
9 any spatial data to perform any kind of correlation
10 and quantify any kind of differences or correlation.
11 However, as you can see on the maps here,
12 this is similar to what Fred had up there earlier,
13 on the left we're representing the results of the
14 fine scale habitat mapping that was included in the
15 2008 PPR plan. And to the right is one of the model
16 results, and I believe that one is the fuzzy model
17 results.
18 And as you just visually compare those,
19 looking back and forth, you can see that there's a
20 high degree of correlation occurring in where these
21 areas are being mapped. And we also have this
22 occurrence with Walker's results as well.
23 His results are a little bit more coarse
24 than what you see on the left-hand side.
25 Nevertheless, there's still a high degree of

1 correlation between the results, or visually it
2 appears that there's a high degree of correlation.
3 We then sought to compare the results to
4 the Rice model results, as our understanding was
5 that was the data set that was primarily used to
6 drive the development of the PPH and PGH data sets.
7 Again we didn't have any data available to
8 perform any kind of a direct comparison, so we had
9 to perform a manual observation and review of the
10 data. And this was further hindered with her data
11 because the only images that we had were very small
12 images on the page that were pretty coarse
13 resolution, so it was difficult to see detail and
14 the results.
15 However, with that being said, based on
16 what we were able to see, our observations would
17 suggest that there was a marginal correlation
18 between our results and the results of her breeding
19 season model. But those results were further
20 reduced in terms of correlation when compared to the
21 results of her summer habitat modeling.
22 Ultimately we felt that the Rice model
23 results appeared pretty coarse and overstated by
24 comparison not only to our model results but some of
25 the other model results performed by CPW and BLM.

1 Now the difference in the contrast in
2 those results are likely fairly easily explained,
3 and that's likely because of the resolution of the
4 data that was employed in the model. Her model used
5 a 1-kilometer cell resolution (inaudible) data which
6 would begin to explain the coarseness in the
7 results.
8 But in addition, she also used different
9 modeling criteria than what we used and what Walker
10 used and Heather Sauls used. Her model seemed to
11 employ different variables that described percent
12 proportion of different vegetation communities, and
13 they were resampled at a 1-kilometer cell resolution
14 and aggregated against the CVCP data.
15 So with that review and those modeling
16 exercises in place, Garfield County basically said,
17 okay, so what's your assessment of the accuracy of
18 the PPH and the PGH data set, and can you follow the
19 methods that have been employed to reproduce it?
20 And so we started by looking at the data
21 citation for the data set obtained from CPW's
22 website. And the data citation basically lists
23 three sources as being used to develop the PPH and
24 PGH data set.
25 The first was the results of the Rice

1 model, which is quoted there to the right.
2 Secondarily, it indicates that production areas were
3 utilized, and they are defined as 4-mile buffers
4 around leks which have been active within the last
5 ten years.
6 And then, lastly, it would appear that the
7 broader perimeter is defined by a data layer that is
8 maintained by CPW called occupied range.
9 And in the citation it states that
10 occupied range is defined as areas of suitable
11 habitat known to be used by Sage Grouse within the
12 last ten years from the date of mapping.
13 Areas of suitable habitat contiguous with
14 areas of known use which do not have effective
15 barriers to Sage Grouse movement from known use
16 areas are mapped as occupied habitat unless specific
17 information exists that document the lack of Sage
18 Grouse use.
19 After reading the citation and looking at
20 the data that we had available, we were not able to
21 reproduce the results of the PPH and PGH
22 delineations. And so following are a few slides
23 that indicate some of our observations of the data
24 set.
25 First and foremost, we looked at the

1 priority habitat delineations. Those were primarily
2 driven by the location of the production zones which
3 are established by active lek locations.
4 What we noticed was that we had, based on
5 the available lek data that we currently have, we
6 noticed a spatial discrepancy in the perimeter of
7 those 4-mile buffer areas in the data.
8 In addition, we noticed that there were
9 exemptions that were allowed within the 4-mile
10 buffer priority areas that we didn't have a reason
11 for explaining the exemptions.
12 And, lastly, we also observed that there
13 were spatial discrepancies between the priority
14 habitat delineations and the PPH and PGH data set as
15 compared to the Greater Sage Grouse production area
16 data set that is maintained by CPW.
17 The second observation that we made was
18 that the PPH, PGH data set includes very expansive
19 areas that don't appear to meet the definition of
20 occupied range as it's reported in the data
21 citation.
22 So, as you can see, above we've got a
23 representation of the PPH and PGH areas. A
24 precondition of meeting the occupied range, as it
25 was stated in the definition, was that it must be

1 suitable habitat.
2 As we've mapped and as Walker and Sauls
3 have mapped in their report, there are enormous
4 expansive areas in here that are not returned as
5 suitable habitat under a variety of models that have
6 been run. However, the PGH and the PPH areas have
7 captured these interstitial areas and delineated
8 them as PPH and PGH habitat.
9 And by and large, these areas are --
10 particularly through the middle of the unit, there's
11 a pretty continuous patch of forested vegetation
12 with woody shrublands which has been observed in
13 multiple data sets, observed in the field, and so on
14 and so forth.
15 And then, lastly, an observation that we
16 made, again this was -- you know, the ability to
17 truly assess this was hindered by the image that we
18 had available of Rice's report.
19 But we did notice that there was a
20 discrepancy in the delineation of the area that she
21 had shown as Greater Sage Grouse estimated range as
22 compared to the delineation of the PPH and PGH data
23 set occurring in the southeast area of the study
24 area kind of shown in the circles there.
25 And my apologies, it is difficult to see

1 it on the left-hand side, but the area that we're
2 representing is shown better here on the right.
3 And I'm going to turn that back over to
4 Fred. Thank you.
5 MR. JARMAN: Okay, thanks, Zack. This is
6 the slide here. And the image to the left is
7 directly out of Mindy Rice's, Dr. Mindy Rice's
8 paper. I want to make sure everybody understood
9 that.
10 And so if you drill down into this, that's
11 where you get to those 1-kilometer grid cells versus
12 the further refined, much more refined analysis that
13 we have performed.
14 So with all that being said, ultimately to
15 draw some conclusions from where we are with the
16 mapping, we have in our opinion the best
17 reproducible scientific data consistent with the
18 results of the two previous CPW studies and the BLM
19 study.
20 And that's probably one of the most key
21 issues is the fact that it is reproducible, whereas
22 the others we have not been able to do that.
23 Secondly, we believe that the BLM EIS is
24 relying on a map supplied by CPW that is flawed in
25 its modeling. It contains large areas of

1 non-habitat and is not reproducible.
2 The third bullet here is critical in the
3 sense that under federal law, any EIS can only
4 contain information that is publicly available for
5 review.
6 So, by way of example, if the red map is
7 to be included in the draft EIS or whatever EIS that
8 does come out, any data that -- I should say all of
9 the data that's required to reproduce that map needs
10 to also be in the EIS. And right now, we believe
11 that's an enormous flaw and enormous hole in the
12 process that we've had to date.
13 And then, No. 4, we have asked Parks and
14 Wildlife for this data on numerous occasions and
15 then followed up even with a formal CORA request and
16 have been denied for that information. So CORA is
17 Colorado Open Records Act.
18 So we have tried to pursue that
19 information, and we've simply been refused.
20 So with that, we're going to jump into the
21 plans and principles. And we wanted -- this is by
22 design -- we wanted to make sure you understood all
23 of the science behind the mapping which is critical.
24 Because our whole approach is to say we
25 want to have very good sound conservation policies,

1 but they need to be based off of what we think is
2 the best available science. And so we're going to
3 work through that, which is why we went through the
4 mapping exercise first.
5 And as we do this, Margaret and I are
6 probably going to tag-team back and forth on this.
7 But critical, as she explained earlier, is to
8 identify the conflicts between our plan and policy
9 and what, by way of example, the NTT has out there.
10 And so by way of the first one -- this is
11 in the approved plan under the principles category,
12 but the first one is we have a naturally fragmented
13 habitat, and it's clearly a peripheral population.
14 And I'm not going to read all this white.
15 This is death by PowerPoint, so I apologize. But it
16 is in the handout and it's also in the plan
17 verbatim.
18 But ultimately we believe this conflicts
19 with the NTT objective which is to achieve the
20 following conditions in the priority and general
21 habitat which is, and I will quote this, to maintain
22 or increase current populations, manage and restore
23 priority areas so that at least 70 percent of the
24 land cover provides adequate sagebrush habitat to
25 meet Sage Grouse needs.

1 MS. BYFIELD: And I think the point, just
2 to emphasize the point, is that is just physically
3 impossible in Garfield County.
4 MR. JARMAN: So another example is the
5 principle for multiple use management. Of course,
6 as Jim and David will tell you, the mission of their
7 agency is to promote and enhance multiple uses for
8 the public.
9 And we believe that that conflicts with
10 the goal of the, quote, new paradigm that is talked
11 about in the NTT which is management priorities will
12 need to be shifted and balanced to maximize benefits
13 to Sage Grouse habitats and populations in priority
14 habitats.
15 So it's a direct intended left-hand turn
16 away from the very mission that the BLM has.
17 No. 3, no infringement on private property
18 rights. And so we believe this conflicts with the
19 NTT where they indicate manage priority Sage Grouse
20 habitat so that discrete anthropogenic disturbances,
21 human disturbances, cover less than 3 percent of the
22 total Sage Grouse habitat regardless of ownership.
23 MS. BYFIELD: I think the key point there
24 is that in doing the 3 percent disturbance, when you
25 take into account everything happening on private

1 land as well, you're really infringing on the
2 property rights.
3 That your management, particularly to the
4 BLM, management responsibility is on the federal
5 lands, but trying to use all the private lands in
6 order to get to your 3 percent disturbance infringes
7 on that. And so it's in conflict with the County's
8 policy.
9 MR. JARMAN: Which is a nice tangent
10 really to this next one, which is human disturbances
11 kept at a minimum.
12 And here we believe this conflicts with
13 NTT where it states the overall objective is to
14 protect priority Sage Grouse habitats from human
15 disturbances that will reduce distribution or
16 abundance of Sage Grouse. So along those same
17 lines.
18 And in the plan principles, we wanted to
19 point out a few key ones here. Certainly the area
20 we're talking about has, I would say, a significant
21 amount of active fluid mineral development and the
22 potential for certainly future fluid mineral
23 development.
24 And along those lines, we have a policy
25 really that is to close suitable habitats. So again

1 using our mapping again, if you go back to the red
2 speckled map, on federal lands, mandatory on federal
3 lands, as determined by our mapping to future
4 surface disturbance unless the fluid resource cannot
5 be extracted without minimal disturbance, surface
6 disturbance. That's key that it's surface.
7 So in this case, the BMPs would be
8 followed and, if necessary, mitigation used to
9 ensure a no net loss of Sage Grouse habitat and no
10 deleterious demographic effect on the population.
11 In addition to that closing of suitable
12 habitat, we have a .6 mile or 1-kilometer NSO around
13 active leks outside of those suitable habitat areas
14 in the event that those occur. So it's really a
15 two-pronged approach here with avoidance and the NSO
16 as compared to the NTT.
17 Continuing on, these are points that I
18 know that Dr. Ramey is going to speak to but, just
19 briefly, we believe that we are focusing this on a
20 cause-and-effect approach rather than a
21 one-size-fits-all. That cause and effect is from
22 the threat, a specific threat, again based on best
23 available science.
24 Rob, feel free to jump in when you like to
25 here.

1 Secondly, we recognize that there has been
2 a great deal of technological innovation and
3 efficiency reducing impacts that were previously
4 harmful to wildlife. Not only that, but we believe
5 a lot of these are temporary so they're not long
6 lasting forever. And that is a key component that
7 is important here.
8 Again, we believe we are relying on design
9 of mitigation that is tailored to the circumstances
10 that are unique here. Again, it's not the one size
11 fits all. It just simply doesn't work with the
12 terrain that Garfield County has.
13 And we believe that, frankly, the
14 incentive or conservation activities by the private
15 landowner work better than the purely regulatory
16 approach on those private lands.
17 Keep moving here and move into the
18 significance of the plan policies. Rob, do you want
19 to speak to these here?
20 DR. RAMEY: Having worked on endangered
21 species for 30-plus years, I can say that addressing
22 specific cause-and-effect mechanisms that underlie
23 each threat is imperative in order to be successful
24 in conserving any species.
25 And so that's one significant departure of

1 this plan versus some of the blanket prescriptions
2 that we're seeing in, for example, some of the BLM
3 and NTT planning prescriptions.
4 Another fundamental problem and something
5 that I'll talk a little bit more on in a moment is
6 that technological innovations have been continually
7 progressing.
8 So, for example, one of the primary
9 identified threats in the 2010 listing decision in
10 the National Technical Team report by the BLM and
11 the Conservation Objectives Team report recently
12 released is Oil and Gas development to Sage Grouse.
13 And one of the false perceptions that
14 seems to persist in the literature, and
15 unfortunately in some regulatory documents such as
16 those I just mentioned, is that the impacts today
17 are the same as at the time of some of the studies
18 that were done utilizing older technologies,
19 particularly those that were in use in the 1990s.
20 It has continually changed. There is
21 directional and horizontal drilling that reduces
22 surface impacts. There's liquid gathering systems
23 that reduce the overall level of activity.
24 Here in the Piceance Basin, Exxon reduced
25 by 65,000 trucks a year the traffic that is used.

1 The utilization of telemetry systems so that there
2 doesn't have to be as much traffic.
3 All of these combined, along with
4 electrification of fields and also trying to deal
5 with providing -- having predators such as ravens
6 near sights used by humans are all being dealt with,
7 and most of this is being dealt with voluntarily.
8 So we need to advance our knowledge based
9 on this newer information, that it's not the same
10 situation as the past.
11 MR. JARMAN: And, Rob, we kind of covered
12 up -- I apologize. That was very good. It's a
13 duplication, though, and in the interest of time we
14 want to keep moving because you're going to hit this
15 pretty hard here in a little bit.
16 So I just covered a few more of these so
17 I'm going to keep going here to our final punchlist
18 here, and then we'll turn it over to you so that you
19 can dive deeper into that.
20 So ultimately the key summary points for
21 policies, principles that are in this plan, we
22 believe that the NTT report takes a political
23 approach of narrowing policy options. And the
24 Garfield County plan takes a scientific approach
25 really expanding policy options.

1 And, secondly, the plan addresses the
2 cause-and-effect mechanisms, and Rob just touched on
3 that, as I did too, rather than this one-size-
4 fits-all blanket set of tools that don't do a good
5 job of understanding or applying to a local
6 circumstance.
7 And we believe again, you can't underscore
8 it any more, we have a very different local
9 circumstance that perhaps the majority of the rest
10 of the range.
11 No. 3, we also use an adaptive management
12 principle here. So as technology changes and
13 science changes, then we can adapt this plan to
14 those changes on a pretty rapid pace way with the
15 Board taking the lead on that.
16 And then, finally, the County's private
17 landowners are already doing conservation measures
18 now. And this plan really just reinforces those
19 private conservation efforts on the ground. So
20 there's a very strong correlation there.
21 So with that, unless, Margaret, anything
22 else you wanted to add to that piece, I'd like to
23 turn it over to Dr. Ramey.
24 DR. RAMEY: Sorry about that. When I was
25 invited to participate in this process and discuss

1 some of the scientific issues, I asked how many days
2 do we have to do this. So what you're seeing is an
3 abbreviation, a sort of Cliff Notes, if you will.
4 As an initial matter, I think it's
5 important to go back to the source documents of one
6 of the key studies that resulted in the 2010 Greater
7 Sage Grouse listing decision is warranted or
8 precluded. And is one that fundamentally affects
9 many different local areas because of its
10 implications.
11 And that is a study by Garton, et al.
12 This is a paper that was published in the Studies of
13 Avian Biology in 2011, and earlier a draft was
14 utilized to a disservice in its 2010 decision.
15 And this is a paper that utilized a lek
16 count data spanning 42 years to estimate population
17 trends in Sage Grouse and project them 30 to 100
18 years into the future, and then assigning risk of
19 populations based upon that.
20 Now it's a central fundamental tenet of
21 the scientific method that one should be able to
22 reproduce the results of a study, that one should be
23 able to go back to the data and obtain those data
24 and move forward with an analysis to validate those
25 results.

1 Another important part is that it is free
2 of bias and it's free of error. In this particular
3 case, this Garton, et al, study, utilized lek count
4 data just for males, as if females don't matter, and
5 it utilized data gathered by different individuals
6 from different agencies frequently using different
7 methods spanning 42 years.
8 It was gathered non-randomly. Initially
9 there were very few leks counted, and now we're
10 counting quite a few. So over time the amount of
11 efforts increased, also the number of males counted
12 per lek has decreased largely as an artifact of
13 that.
14 This analysis utilized lek count data to
15 estimate what population trends were going over time
16 and fit models to them and then project those into
17 the future. I'm not going too far into detail so I
18 won't lose you.
19 It then applied a metric, the 5500 rule of
20 thumb to these population predictions to ask, okay,
21 so for example in the PPR population here, if it
22 falls below 50, we have a high probability of it
23 going extinct.
24 If a Meta (phonetic) population, a Sage
25 Grouse management zone, for example, relevant here,

1 Colorado management zone applied to a management
2 zone 7, if it falls below 500 individuals, that this
3 whole region is likely to go extinct.
4 So it's fundamental at the basis of the
5 listing decision, and it also trickles down to local
6 management plans.
7 However, there's some problems with this,
8 and they're fundamental. First of all, there are
9 errors. So in this Garton, et al, paper, they
10 utilized Sewell (phonetic) rights 1938 population
11 genetic equation, the top one, to estimate the total
12 population size based on the number of males in
13 there.
14 And, as you can see, there's a four in the
15 enumerator of the top equation for estimating
16 effective population size based on the number of
17 males and females. That four was left out of the
18 Garton, et al, study. And this ended up in the
19 final published version.
20 And it's not just myself that discovered
21 this. There were six peer reviewers commissioned by
22 the Colorado Division of Wildlife, many of whom
23 discovered the same error independently.
24 The Council for the Endangered Species Act
25 Liability, Judge Manson, former Assistant Secretary

1 of Interior's group, discovered the same issue. I'm
2 publishing a paper about it.
3 This greatly overestimates the probability
4 of extinction for any one of these populations in
5 Sage Grouse management zones and the species as
6 well.
7 Another fundamental problem is that I
8 wasn't able to reproduce how he was going between
9 the number of males counted at a lek. He said that
10 there had to be 20 males counted at a lek, in a
11 population, in order to end up with a total
12 effective population size of 50 using that same
13 equation.
14 You can't get there from here. Actually
15 the correct number is 17 1/2. So once again, he's
16 setting a higher bar and overestimating the
17 extinction rates.
18 I can go into the issues and, like I said,
19 I could have days on this. One of the peer
20 reviewers, Rung (phonetic) in here for the USGS, had
21 pointed out that there's these and other fundamental
22 problems in there.
23 Conroy had found that if one takes the
24 algorithms that were used in estimating these
25 population trends and takes simulated random data

1 which has no trend, one ends up getting negative
2 trends about 40 percent of the time. That's a bias.
3 Perhaps most fundamentally and most
4 disturbing to me is the fact that those data that
5 are used as the basis of that pivotal, influential,
6 highly influential scientific paper are not publicly
7 available. I personally wrote to Garton four times
8 requesting those data and never received a response.
9 A colleague of mine recently wrote to
10 Garton and was told that he couldn't have the data.
11 He'd have to go separately to each state. And if
12 any one state said that you couldn't have the data,
13 you couldn't have the data.
14 This violates information quality
15 guidelines including those of the Department of
16 Interior. One has to be able to go back to the
17 original data.
18 I believe that a number of federal
19 decisions probably EISs have to rely on information,
20 and that has to be reproducible, it has to be
21 publicly available. And these are not.
22 Let me go on to another set of issues.
23 So, as I mentioned earlier, this 4-mile buffer zone
24 and 3 percent no surface occupancy restriction, for
25 example, on Oil and Gas, these blanket prescriptions

1 are flawed because they don't address the
2 fundamental threats.
3 The Fish and Wildlife Service identified
4 in the 2010 decision basically six key threats
5 affecting Sage Grouse. However, these blanket
6 prescriptions don't tackle the specific underlying
7 cause-and-effect mechanisms for each one of those
8 threats.
9 In 2011, we published a paper titled "Oil
10 and Gas Development and Greater Sage Grouse Review
11 of Threats and Mitigation Measures." This paper was
12 -- I personally handed it to Director Abby and
13 Assistant Director Poule at the BLM on September
14 16th of 2011. That paper outlines, in Table 1,
15 specific threats cause-and-effect mechanisms.
16 So one significant departure of the
17 Garfield County plan is that it plans to address
18 those specific cause-and-effect mechanisms and work
19 with landowners to mitigate any of those, instead of
20 relying on blanket NSO restrictions.
21 And let me just say from personal
22 experience, I worked on California condors,
23 Peregrine falcons early on, if we had kept with some
24 of the blanket prescriptions that were recommended
25 at the time for human disturbance, condors would be

1 extinct, Peregrines would still be listed.
2 Instead, what we did was to tackle the
3 cause-and-effect mechanisms underlying each threat,
4 and we were able to deal with the problems.
5 Peregrines were delisted. Condors now are over 450.
6 When I started, there were only 27.
7 Those blanket prescriptions are largely
8 based on Corliff (phonetic) studies from
9 Pinedale and Jonah Fields, some from the Poudre
10 River Basin. Significantly different technology
11 than is in use today.
12 They were basically putting vertical
13 straws in the ground in about a ten-acre spacing in
14 the Jonah Field, very industrial kind of place.
15 Poudre River Basin, similar sort of issues.
16 Substantially different here too is that
17 Garfield County, as we've seen, the topography, the
18 vegetation, and the types of disturbances are
19 substantially different from what those studies were
20 based upon.
21 However, probably most importantly is that
22 the number of these Corliff studies have not found a
23 population level effect. So a minor amount of
24 temporary avoidance by birds does not necessarily
25 correlate with a population decline or loss.

1 These prescriptions were also based on
2 some of the older technologies, as I just mentioned.
3 I won't belabor that point too much. However, there
4 really needs to be the acknowledgement of many of
5 these newer methods and technologies that I had
6 mentioned just earlier.
7 And that's going to be absolutely
8 fundamental for conserving the species we're all
9 discussing today.
10 Let me step back because we missed a point
11 there. That Garton, et al study had a number of
12 flaws and issues with it. It has population
13 predictions that are in a constant rate of decline
14 but yet populations actually fluctuate greatly.
15 Another central issue that we see
16 constantly coming up in both the 2010 listing
17 decision, the NTT document, and the Conservation
18 Objectives Team report is that of connectivity.
19 And, in fact, 18 kilometers is typically used as a
20 dispersal distance for describing what's a Sage
21 Grouse population.
22 However, more recent papers, and we'll
23 provide copies of those to you, including Christi
24 Bush in 2009 and Bush, et al, 2011, Tact 2011, Lyon
25 2003, have found the Sage Grouse dispersed over

1 larger distances and more frequently than thought.
2 Bush had found from genetic data males out
3 to 300 kilometers, females out to 150. Tact, males
4 out to 150 kilometers, females out to 120 kilometers
5 based on GPS tracking data.
6 Now obviously long distance dispersals are
7 not the norm, but these are significant because it
8 takes very few individuals from a genetic
9 perspective to move between populations to prevent
10 the loss of genetic diversity and the extinction as
11 a result of that.
12 The Conservation Objectives Team report
13 which was just released has a threats analysis and
14 has a ranking of the threats to those populations.
15 However, there's no justification of how those
16 rankings were arrived at.
17 It went from being a vote count of members
18 in the draft report to having a simple ranking which
19 appears to be subjective and is not quantitative.
20 So we're going to seek an explanation from the COT
21 regarding that.
22 An additional issue that I've seen here is
23 that, and one that is fundamental to this plan, is
24 how key private land conservation is. So 75 percent
25 of listed species on the Endangered Species Act

1 occur on private land. About 50 percent are
2 dependent upon private land almost exclusively.
3 Major scholars of Endangered Species Act
4 and conservation, including the present Deputy
5 Assistant Secretary of Interior, Michael Bean
6 Pollock, who published in the Stanford University
7 Journal of Law and Policy, Jonathan Adler, who
8 published in The Boston Law Journal, have all
9 pointed to the necessity, imperative necessity of
10 private land conservation, particularly voluntary
11 private land conservation and incentives to produce
12 that.
13 So there is a number of studies that have
14 shown that this is more effective than blanket
15 prescriptions and a command control type of
16 approach.
17 And then a final central issue I found and
18 one that we've discussed here is this narrowing of
19 policy options. And let me read you a quote
20 briefly. This comes from Professor Roger Pelkey,
21 Jr., at CU Boulder:
22 Addressing the significance of science for
23 decision making requires an ability to clearly
24 distinguish policy from politics. For science, a
25 policy perspective implies increasing or elucidating

1 the range of alternatives available to decision
2 makers and by clearly associating the existing state
3 of scientific knowledge with a range of choices.
4 The goal is to enhance the freedom of
5 choice. By contrast, the political perspective
6 seeks to decrease the range of alternatives
7 available to policy makers, i.e., to limit the scope
8 of choice.
9 Garfield County plan seeks to increase
10 those. And it's a fundamental difference that I've
11 seen concerning conflicts with some of the
12 regulatory documents that I've seen.
13 And I also have a number of documents to
14 provide the agency members. Some of those are still
15 being printed off.
16 DR. RAMEY: I think that Tom is going to
17 raise that.
18 COMMISSIONER JANKOVSKY: I think we've
19 shown what we found in the mapping. And then once
20 we started digging further into NTT, and this is for
21 the Service primarily, we started finding flaws in
22 the science.
23 And it's not just some of the things such
24 as Dr. Ramey has talked about as far as Garton's
25 population persistence reports, but we've found

1 documents that are field documents that we can't
2 even -- we don't even know what they mean. But
3 these are cited in NTT.
4 And so we are -- I mean not only are we
5 talking about questions we have with habitat, but I
6 think we're starting to look at some of the science
7 questions that are out there as far as the listing
8 itself and is it -- or if there's going to be a
9 potential listing.
10 So with that, we do have this document
11 that was sent on to us, and we cannot follow that.
12 Maybe I'll ask Dr. Ramey to --
13 DR. RAMEY: This was cited in the 2010
14 decision as Garton personal communication, and it
15 was obtained quite by accident. And so I challenge
16 anybody to decipher what it says.
17 However, this was cited in the document.
18 And what this supposedly says is that population
19 fluctuations in Sage Grouse are being eliminated
20 because of threats, Oil and Gas in particular, and
21 that's going to drive the populations into
22 extinction.
23 However, the available data from Wyoming,
24 for example, shows that these population
25 fluctuations are actually very alive and active

1 going on over the years. And, in fact, they all
2 tend to track each other.
3 A recently released dissertation out of
4 the University of Montana proposes an explanation
5 for this phenomena of population fluctuation as
6 being driven by precipitation and summertime
7 temperatures affecting survival. So we do have
8 fluctuations.
9 So not only does this Garton, et al study
10 from the past have a number of errors and biases and
11 the data is not released, some of the
12 recommendations that have come to the surface
13 regrettably are in error themselves.
14 And here's a very interesting slide. So
15 this is a comparison of the state average on the
16 lower level of male attendance per lek. And Wyoming
17 has some of the best data and the greater -- largest
18 Sage Grouse density. So it's worthwhile to look at
19 this.
20 And then comparing it to the Papa Joe
21 area, which is the Pinedale, Anticline, and Jonah
22 Field populations, both the core area average and
23 then the effective populations in the Papa Joe area,
24 Sage Grouse are still there. And, in fact, they're
25 doing better than the state average presently.

1 And they're tracking approximately --
2 obviously lek count data has a lot of, let's see,
3 there's error that come with it, but you see these
4 overall trends persisting.
5 There was a 2010 paper and a recent update
6 produced by a colleague, Renee Taylor. Those were
7 provided to decision-makers at both the BLM and Fish
8 and Wildlife Service in Washington, D.C. We're
9 having copies printed off for you to see that the
10 threat is overstated from Oil and Gas.
11 And particularly because the technology
12 has changed, the mitigation has changed, and there
13 were a lot of false perceptions that were set early
14 on.
15 And I would like to note the Colorado
16 Division of Wildlife's recently released comments on
17 the Gunnison Sage Grouse, those are very important
18 because they also stated a number of these threats
19 were overstated on the Gunnison Sage Grouse.
20 Some of those same arguments can be
21 applied here and refute some of the assertions made
22 in the NTT and Conservation Objectives Team report.
23 Thank you.
24 MR. JARMAN: Okay, thank you, Rob.
25 COMMISSIONER JANKOVSKY: I just would like

1 to go back to the 4-mile buffer. If we could touch
2 on that just a little bit more, I would appreciate
3 that.
4 DR. RAMEY: So once again this is based on
5 correlative studies in the Pinedale and Jonah
6 Fields. And it's based on what's the probability of
7 some level of avoidance of birds from those areas.
8 So again, to reiterate, different
9 technologies applied, different kinds of densities
10 applied to those. For example, even in the Poudre
11 River Basin, there was produced water as being
12 sprayed out on the ground. I mean large differences
13 with how things are done there versus how things are
14 done here.
15 Fundamentally, though, this 4-mile buffer
16 has persisted in the literature. And it doesn't
17 deal with any of the specific issues that are cause
18 and effect and local in nature and can be mitigated.
19 It is not directly applicable to the
20 situation here. This is a naturally fragmented
21 population, southern end of the range, and it is a
22 different level of development and technology there.
23 COMMISSIONER JANKOVSKY: Thank you.
24 MR. JARMAN: And thanks, Commissioners.
25 And we're just about done here. We saved a couple

1 of video clips to show and really illustrate I think
2 the difference. I think it will be very helpful to
3 have you understand why we've taken such a close
4 look at this.
5 This first video clip, if I can get it to
6 run here, is again from the helicopter flight we
7 took when we went up on top of the plateau. And,
8 let's see if this will play. I may have to do it
9 this way. Let's do it this way.
10 But this gives us -- Dr. Ramey took this
11 -- hopefully this will play. Here we go. So this
12 is priority habitat as mapped by CPW.
13 DR. RAMEY: Notice the large aspen stands,
14 forested areas. It's a very patchy habitat, as Eric
15 and Zack pointed out.
16 MR. JARMAN: All right. So then to
17 reinforce the comparison, this is a separate video
18 shot of the Jonah Field in Wyoming.
19 DR. RAMEY: It resembles an industrial
20 zone.
21 MR. JARMAN: Okay, so that's it. I'd like
22 to thank the Commission and all the agency staff and
23 everybody for sitting through that.
24 COMMISSIONER JANKOVSKY: I would really
25 like to thank Fred and our team for putting this

1 together.
2 As you can see, we have concerns. We've
3 talked about that from the get-go. Primarily
4 started out with topography mapping, geography and
5 the differences that are coming out of the NTT
6 report.
7 And then going further into that, we
8 started getting into some of the questions on
9 science. And I know you guys here are going to have
10 a lot of questions for us, and we want to hear
11 those.
12 But, you know, bottom line when we end up,
13 we just really want to know why our -- not why, we
14 want to have our report as one of the alternatives
15 in the EIS. That's really where we're headed. And
16 we feel that coordination process and FLPMA has laws
17 there that it should be included.
18 CHAIRMAN MARTIN: I didn't want to sit in
19 front of the projecting screen there so that you
20 could all be concentrating on it instead of watching
21 my head bobbing back and forth.
22 So what we're going to do is take a small
23 break, and then we're going to come back and follow
24 again the agenda and do some discussion and
25 interaction and see what we can come up with.

(Recess was taken.)

(Back on the record.)

CHAIRMAN MARTIN: I hope the TV didn't set in. I hope everybody was okay.

Once Mr. Samson enters the room, we'll all stand and salute. Yeah, it could be like break out in spontaneous applause for Mr. Samson, yes, unrehearsed. Perry was hogging the conversation.

You have permission to rise. All rise. Mr. Samson has arrived.

(Applause.)

CHAIRMAN MARTIN: Our next item is the discussion on habitat mapping by CPW for Garfield County. Did we do all that, Fred? Don't we want to do a little discussion on that particular issue?

MR. JARMAN: Thank you, Chairman. So we've gone through -- and thank you for sitting through that presentation. There's a lot of information there obviously.

But we wanted to dedicate the rest of today really to have a discussion on the mapping and everything that we presented, knowing that you've had it in advance and seen where we are. We would love to hear your thoughts and have a discussion here.

1 And, of course, our team is here and
2 available to talk about the mapping. I mean
3 obviously that's very important to us and the basis
4 for our plan.
5 So I'd turn it back to the Chairman at
6 this point, but to start it open for discussion.
7 CHAIRMAN MARTIN: Right. And this is a
8 coordinating effort. So the coordinating partners
9 are the ones that are probably going to speak.
10 I probably won't take any comment from the
11 public, simply because this is a meeting between
12 government to government. Trying to have a
13 discussion, an open discussion, honest discussion on
14 the mapping and where we're headed as Garfield
15 County.
16 Jim, you're looking at your pen, man. Do
17 you want to start it out? Do you want to break the
18 ice, buddy? Come on.
19 MR. CAGNEY: No, I thought we were
20 going --
21 CHAIRMAN MARTIN: We will, we will.
22 MR. CAGNEY: I was planning to make a
23 couple points in the NEPA segment.
24 CHAIRMAN MARTIN: Okay, very good. That's
25 cool. All righty. CPW.

1 MR. PETCH: Several things that we would
2 like to discuss with you. And I don't know how you
3 want to frame this, Fred.
4 MR. JARMAN: Go for it.
5 MR. PETCH: Let me start with the priority
6 habitat map. Priority habitat and general habitat
7 designations are definitions that we have not
8 traditionally mapped to in Colorado. And I don't
9 know that other states have mapped to them as well.
10 Those definitions arise from the BLM NTT
11 report and from surrounding BLM instructional
12 memoranda that describe those as the map layers that
13 BLM would use in their EIS.
14 So the priority habitat map that has been
15 somewhat discussed tonight or today and has been
16 prevalent in the BLM Sage Grouse EIS discussions was
17 produced for BLM's use in that effort.
18 It was done on a statewide basis. It was
19 done using whatever information we had from all six
20 of our populations in Colorado, but brought to a
21 statewide framework.
22 That said, some of what occurs in Moffat
23 County with Sage Grouse, what occurs in North Park,
24 influenced how that map looks in Piceance. Some of
25 what happens in Piceance influences how that map

1 looks in Moffat County and Routt County and in Eagle
2 County, for instance. So it is a statewide map.
3 The other thing that -- well, I guess I'll
4 leave the priority habitat map there for now unless
5 there are questions. And maybe there will be as we
6 get into this a little further.
7 MS. BYFIELD: Can I interrupt you?
8 MR. PETCH: Yes, ma'am.
9 MS. BYFIELD: That brings up I think a
10 really good question. So if I understand this
11 right, it's your data, Colorado Parks and Wildlife's
12 data, but you did it based on parameters given to
13 you by the BLM. Am I stating that correctly or
14 understanding that correctly?
15 MR. PETCH: No, the definition is
16 established that it should include those seasonal
17 habitats that are used by Sage Grouse, breeding
18 season, the brooding season in the summertime and
19 winter.
20 Additionally, although this wasn't in the
21 original definition, it's in the instructional
22 memoranda, but also connective areas between those
23 areas of habitat as well. So you see linkage areas
24 identified between populations in the Colorado map.
25 You also see areas of less suitable and

1 sometimes unsuitable habitat within populations that
2 we have evidence or strong suggestion that birds
3 move across in accordance with their seasonal or
4 sometimes even daily behavioral patterns.
5 So, anyway, produced a definition to
6 include those habitat types. We generally have
7 mapped by seasonal habitats in our other mapping
8 with the exception of our overall range boundary
9 which is our best guess of where the majority of
10 Sage Grouse are located in Colorado.
11 There are flyers outside that, but that's
12 the area that we believe is Sage Grouse habitat that
13 could and should be managed for the continued
14 persistence of Sage Grouse.
15 The occupied range map adjusts
16 periodically. We remap our wildlife habitat layers
17 on about a 4-year cycle. We just redid the occupied
18 habitat map prior to going into this priority
19 habitat mapping, so we were working from the most
20 current sense of where Sage Grouse occurred going
21 into that process.
22 In the general habitat is those things
23 that aren't, you know, the most important, the most
24 crucial for maintaining populations but are other
25 areas that are occupied by Sage Grouse. And for

1 Colorado we used our occupied range map as that
2 outside perimeter.
3 There was a slide earlier. And maybe
4 actually this might be a good time to deal with it,
5 Fred, the slide that shows the difference between
6 the Mindy Rice model map and priority habitat.
7 MR. JARMAN: You'll have it for 42
8 seconds.
9 MR. PETCH: And then you are done. I'm
10 not sure I'm that fast.
11 MR. JARMAN: I apologize, we'll be able to
12 reboot this soon.
13 MR. PETCH: No problem.
14 MR. JARMAN: I'm sorry.
15 MR. PETCH: Not a problem, Fred.
16 MR. JARMAN: It kind of gives you a sense
17 -- well, actually this is the 2008 mapping. Oh, I
18 know what the map you're talking about is. I'm
19 sorry. Yeah, the Mindy Rice stuff, yeah. Okay,
20 here we go.
21 Okay, Brad, talk about it.
22 MR. PETCH: All right. My sense of the
23 discussion when this was presented earlier is the
24 fact that it shows red on the right and green on the
25 left is a discrepancy in our model process in

1 developing habitat.
2 The discussion earlier was we used three
3 layers in developing that priority habitat map, or
4 three processes, if you will. We used the seasonal
5 habitat maps that were developed and are reported in
6 Mindy Rice's paper that's now been accepted for
7 publication in the Journal of Wildlife Management.
8 Those seasonal habitat maps then were
9 aggregated across those three seasons. So the area
10 that was a high probability of use for breeding and
11 an area that was high probability in winter and in
12 the summer period, all those high probability areas
13 were aggregated because the priority habitat
14 definition is the aggregate of those seasonal
15 habitat types.
16 As you noted in that screen shot of one of
17 Mindy's maps, those are extensive areas, more
18 extensive than we were comfortable saying those were
19 areas that met the definition of priority habitat
20 which is essentially that it's key to the long-term
21 persistence of those Sage Grouse populations.
22 And so we used the other two layers that
23 you referenced. One of them is production areas
24 which we have defined as a 4-mile radius around lek
25 sites as an index of distribution of Sage Grouse,

1 not as an impact assessment, but an index of
2 distribution.
3 We used that to clip what we called
4 priority habitat back. So we reduced priority
5 habitat based on 4-mile radius, so areas that are
6 demonstrated throughout Colorado and throughout much
7 of the West to contain about 80 percent of nesting
8 Sage Grouse nests centered around a lek of capture.
9 MS. GRIFFIN: So I think you need to point
10 out the difference between their 4-mile buffer and
11 ours.
12 MR. PETCH: Right. The other clip is the
13 occupied range clip that we also clipped back
14 anything in Sage Grouse habitat that fell -- or
15 anything in Mindy's models that did not fall within
16 our occupied range map, we clipped out.
17 May show based on vegetative assessments
18 or based on comparison to areas that were used by
19 telemetry birds as being suitable for Sage Grouse,
20 we removed those areas if they were outside our map
21 of occupied range as not being an area that we were
22 intending to manage for Sage Grouse or believed had
23 a viable opportunity to be managed for Sage Grouse.
24 So you see those restrictions in areas
25 that show red on Mindy's models down to what we show

1 as priority habitat. And the specific thing that
2 was shown in that slide earlier was a reduction of
3 an area that shows in Mindy's models as being pretty
4 suitable based on comparison to other locations of
5 telemetry birds in the underlying vegetation
6 character.
7 Because it was such a long distance from
8 any known concentration of birds and we used lek
9 locations as that index of concentration, we clipped
10 those out and said that that's not a place we're
11 going to call priority habitat.
12 Is it occupied? Yes. We have evidence
13 that there are birds there. Is it suitable? In our
14 belief it is. Certainly there's a discrepancy
15 between your map of suitable and ours that we want
16 to talk about yet this morning.
17 So, anyway, that's where you see some of
18 those differences between the seasonal habitat
19 models in the Rice paper and what shows up as
20 priority habitat.
21 The question of 4-mile radii came up a
22 minute ago. And there are several uses for 4-mile
23 radius circles in the Sage Grouse world right now.
24 The underlying one, and the one we use in
25 Colorado, at least Colorado Parks and Wildlife, is a

1 4-mile radius -- we've use the term production area
2 for it in other contexts -- as an index of where
3 nesting Sage Grouse are distributed.
4 That throughout a variety of studies
5 totaling hundreds of nests, there's a very
6 dependable distribution curve of how Sage Grouse
7 nests are oriented around leks where those birds
8 were originally captured.
9 And at 4 miles in Wyoming, in Colorado
10 studies, in other studies around the intermountain
11 West, a high prevalence of studies show that at 4
12 miles you're at about -- 80 percent of the nesting
13 sites are within that 4-mile circle.
14 So as an index of distribution, we think
15 it has good scientific validity and it is pretty
16 well proven in literature in Colorado and elsewhere.
17 That concentration of birds then is used
18 in a number of other context. In the NTT report
19 it's used as an NSO area, for instance. That's
20 moving beyond the data that suggests how the birds
21 are distributed to an assumption that if you
22 protected that, then you're going to protect 80
23 percent of the birds by extension.
24 That's a very different use of the 4-mile
25 radius than the one we used in building the priority

1 habitat map, which is using it only as an index of
2 distribution, of where birds are most likely to be
3 located.
4 CHAIRMAN MARTIN: Let me get that straight
5 now. It's not that you're recommending no surface
6 occupation in that 4-mile which is actually an
7 eight-mile range as a circle. You're only using it
8 as potential of the habitat and the nesting areas,
9 et cetera, but yet there can be human activity
10 within there.
11 Because looking at the map at 221,000
12 acres, 70 plus percent is privately owned land
13 that's already under either agricultural or other
14 developments. And taking the goal of 3 percent
15 human disturbance within the priority habitat is
16 physically impossible to reach within this area.
17 Are you agreeing with me on that?
18 MR. PETCH: Yes and no. In the context of
19 yes, from a Division of Wildlife standpoint --
20 sorry, that happens to me every day almost. From a
21 Parks and Wildlife standpoint, we are very
22 comfortable with the assessment that birds are
23 distributed across that distribution curve.
24 And in our comments on activities,
25 activity level planning at BLM and elsewhere, we

1 routinely refer to that as evidence that birds are
2 likely to be there. And so management practices
3 that are suitable for maintaining Sage Grouse ought
4 to be applied there.
5 The specifics of the NTT report and how
6 that applies in an alternative for the future draft
7 environmental impact statement, we're still
8 evaluating, as are the other cooperators. And
9 that's my yes and no part is we haven't come to
10 grips with that yet.
11 CHAIRMAN MARTIN: Okay, let's go back to
12 the yes part of that particular issue. In reference
13 to the private land, you also offer incentives and
14 not a mandatory requirement under Division of
15 Wildlife. But you incentivize the approach for
16 conservation issues.
17 MR. PETCH: We do. And that falls short
18 of -- I mean the word "incentive" often carries with
19 it the connotation of some monetary benefit.
20 CHAIRMAN MARTIN: Not necessarily.
21 MR. PETCH: We aren't participating in
22 that very often. But certainly from all of our
23 management plans, the PPR management plan that was
24 referenced earlier, our state management plan, are
25 all voluntary conservation plans.

1 And, you know, the 2010 decision was
2 referenced earlier. That's one of the places the
3 Service has raised an issue, that they are concerned
4 about the validity of those conservation plans in
5 demonstrating conservation efforts on the ground.
6 CHAIRMAN MARTIN: And that's the paradigm
7 shift in reference to the new approach versus what
8 has been practiced for so many years?
9 MR. PETCH: Absolutely.
10 CHAIRMAN MARTIN: Okay.
11 COMMISSIONER JANKOVSKY: Concerning the
12 4-mile buffer, I mean we don't have a problem with
13 that as long as there's Sage Grouse habitat. But
14 when there is valley floors, there's black timber,
15 there is PJ, there's aspen, they're not in that
16 habitat. They may fly over it.
17 I mean definitely these birds are going
18 from one -- they have to be going from one area of
19 habitat to another. And that's where we have a real
20 problem with that. And that's what Dr. Ramey was
21 getting at.
22 I mean, you know, you start talking about
23 conductivity, but because a bird flies over aspen or
24 flies over conifer doesn't mean that it's priority
25 habitat. And that's really what we're getting at

1 with our mapping.
2 MR. PETCH: And let me address that
3 specifically, if I may. The slide you had up a
4 minute ago, Fred, that showed the priority habitat
5 map right at the top of your pick list.
6 The red areas in the lower left-hand
7 corner are mapped as priority habitat based on the
8 vegetative characteristics and similarity to places
9 we know we have telemetry bird locations.
10 They are clipped to the shape they're in
11 because of their proximity to a strutting ground
12 being four miles away. That strutting ground is up
13 on, for some of them Skinner Ridge, for some of them
14 up on the ridge between Brush Creek and Clear Creek.
15 But you'll notice we don't include the
16 valley floors in those 4-mile radii. So the
17 perimeter that brought those areas down onto the
18 very southwestern portion of the map up there got
19 there by a 4-mile radius, but they are not
20 continuous 4-mile radii.
21 Now there are a couple of examples of
22 that. Topography is the easiest one to deal with
23 and the most obvious in the Piceance, that a
24 600-foot vertical drop is not Sage Grouse habitat.
25 And, frankly, even if it is likely to be

1 Sage Grouse habitat at the bottom or would be in
2 some other place, they don't use those in the
3 Piceance, those riparian meadows at the bottom of
4 say Roan Creek or Clear Creek or some of those on
5 the south side of the divide here.
6 COMMISSIONER JANKOVSKY: When you get into
7 that red area there, you will see these types of --
8 this topography. I mean what you carved out there
9 was like Parachute Creek and Roan Creek which are
10 huge -- I mean 2,000-foot vertical drops.
11 MR. PETCH: Right.
12 COMMISSIONER JANKOVSKY: But there are
13 ridges and 600, 800-foot drops throughout this
14 entire red area. And that is why we went back with
15 the mapping we did to come up with --
16 MR. PETCH: There are. And that really
17 brings us to the criteria that were used in the
18 vegetative map. The mapping process that you all
19 used in your plan is not terribly distinct in
20 concept from other mapping processes we have used in
21 the past.
22 The difference, and where there's a
23 significant break in technique, is between say the
24 Heather Sauls' map that was referenced earlier and
25 that I want to come back and talk about this morning

1 and the resource selection functions that Brett
2 Walker is working on and the priority habitat map,
3 where those are built as much based on telemetry
4 points as they are on habitat associations.
5 The model in the Garfield County plan is a
6 very traditional approach using newer data, newer
7 vegetation classification but a similar approach of
8 making assumptions about where birds are going to
9 use, what habitats are going to be suitable, and
10 looking for those places in the landscape.
11 And in that sense, those assumptions are
12 critical. That dictates where the model maps as
13 suitable and where it does not.
14 And those are the hardest things to come
15 to grips with. And in many cases, there is not a
16 right and wrong answer there.
17 Some of the photos that have been flashed
18 up on the screen here in a little bit, or in the
19 last few minutes, some of those are, we think,
20 probably barriers to Grouse use.
21 They're not using those valley bottoms.
22 Even in things that are 100 feet maybe in elevation
23 difference. But in many of them, they are.
24 And some of that is based on vegetative
25 character, some of that is based on subsurface soil

1 and the ability of moisture to get to the surface
2 and produce wet meadows.
3 And that's where some of the interest has
4 come from in really letting the telemetry birds
5 begin to tell us where they're choosing to go, not
6 using our assessments of what's suitable, which is
7 always based on, you know, some reference to
8 scientific data collection but also an awful lot of
9 assumption and assessment of what is suitable. And
10 we're not always right on that.
11 DR. RAMEY: Brad, if I could just
12 interrupt just a second.
13 MR. PETCH: Please.
14 DR. RAMEY: This notion that a couple of
15 hundred foot difference in topography is a barrier
16 to Grouse, I mean that flies in the face of your own
17 data.
18 Because the lek data we have been able to
19 obtain shows some birds that are out on little
20 fingers of habitat that are separated by gaps of a
21 thousand feet and a half a mile or more.
22 So the birds obviously go across those,
23 and then also the genetic and GPS tracking studies
24 that I cited, so again Bush 2009, Bush, et al 2011,
25 Tact, et al 2011, and the old collaring study by

1 Lyon showed that birds do disperse over long
2 distances and over and around what is considered to
3 be unsuitable habitat, including agriculture, oil
4 and gas, rivers, roads, et cetera.
5 MR. PETCH: That's absolutely correct.
6 And, frankly, that's part of the reason our priority
7 map looks the way it does is our assumption that
8 they're not going to use that canyon bottom is an
9 assumption, until we can verify that based on actual
10 bird behavior or bird locations or something like
11 that.
12 And so as you get into the more -- the
13 less definitive kinds of breaks, not a Clear Creek
14 drainage, although they fly over that routinely, not
15 a Parachute Creek drainage, although again they fly
16 over that pretty routinely, but the kind of swale
17 that's shown in the upper photograph here, how do
18 birds use that habitat?
19 Our assumption in 2006, 2007, 2008, the
20 time that the Heather Sauls' model was built, the
21 time the PPR plan was completed, and based to some
22 extent on a very small telemetry data set from a
23 Master's project that occurred in the Piceance, was
24 that birds were using these ridge-top habitats,
25 essentially what is showing white in that photo on

1 top or the most pale color, you know, the most open,
2 snowiest area, and that they were doing most of that
3 movement by foot.
4 Well, birds don't have wings unless they
5 intend to use them, in general sense.
6 But much of the telemetry data from early
7 on, again very small sample size, very short
8 duration, only collected in the summertime, or by
9 and large collected in the summertime, was
10 indicating a very concentrated use of those
11 ridge-top areas.
12 And with slope parameters very similar to
13 the ones that are included in the Garfield model,
14 with vegetation parameters, an almost absolute
15 reliance on where sagebrush is distributed as an
16 index of where Sage Grouse are going to be.
17 That's why the Heather Sauls' model looks
18 so similar to some of the models that have been
19 shown out of the Garfield model as well, because the
20 underlying assumptions that went into those were
21 very similar.
22 I want to come back to the assumptions in
23 a minute.
24 DR. RAMEY: But hold on a second, if I
25 could. So explain then how the Sage Grouse got out

1 to Lek No. 247020021 separated by these large gaps
2 that are basically islands.
3 MR. PETCH: They flew is my guess.
4 CHAIRMAN MARTIN: They can.
5 MR. PETCH: Absolutely. Now in 2006, '07,
6 '08, we didn't believe there was as much overland
7 travel as there clearly is.
8 And in GPS, birds have shown that more
9 clearly than any VHF birds ever have is that even on
10 a daily basis, we're seeing significant movements
11 across large areas of -- well, sometimes large areas
12 of suitable habitat, but often large areas of
13 unsuitable habitat as well.
14 They do move to a greater extent than we
15 believed certainly five, six years ago.
16 But as you build those into the
17 assumptions of very small patches of habitat, then
18 we were headed very much in the same direction in
19 this hypothetical model that is contained in the
20 appendices in the PPR plan.
21 But I would also like to draw your
22 attention to the maps of occupied range that are
23 included in the body of the PPR plan. That focusing
24 on the appendix is not always necessarily the best
25 approach or the best description of what was

1 intended in that plan.
2 The map that's included in the body of the
3 plan, and I'll reference the occupied range map on
4 page 50 of the PPR plan, looks very much -- actually
5 it's larger than the priority habitat map that we're
6 currently working with in the PPR.
7 Is that accurate at a 2-meter scale? No.
8 Is it accurate on a where are birds generally
9 distributed in the Piceance Basin? Much more so.
10 And so that's one of the things you run
11 into with maps is the purpose the map is derived for
12 makes a huge difference in what it's going to look
13 like.
14 MR. JARMAN: Hey, Brad, let me interrupt
15 you for a second. I couldn't agree with you more on
16 that last statement.
17 The question that we're trying to get to,
18 though, is reproducibility. And sort of a core
19 issue.
20 And so I hear a lot of what you're saying
21 using words like assumption and professional opinion
22 and in the field and all those things that are all
23 well and good, but they're not cited literature
24 either.
25 And when it comes to reproducibility,

1 wouldn't you agree that that's absolutely critical
2 in creating a map that's going to be used for
3 federal policy?
4 MR. PETCH: Yes, in the context, the
5 repeatability is generally discussed in scientific
6 circles. That's different than the context we're
7 discussing it in today.
8 MR. JARMAN: Say that again. It's
9 different than what?
10 MR. PETCH: That's different than the
11 context we're talking about today. The
12 repeatability in the context of scientific --
13 MR. JARMAN: Reproducibility.
14 MR. PETCH: I'm sorry, reproducibility is
15 generally -- this is not in a policy standpoint,
16 this is in a scientific paper standpoint -- is
17 nobody even starts to look at trying to reproduce or
18 replicate a study until it has been peer reviewed
19 and published in a journal.
20 And that's really where we are now. We
21 have evidence that is showing us things.
22 We have a management time frame that is
23 requiring us to do things on an accelerated
24 schedule, and we have data that's not complete yet
25 in a scientific scale of peer reviewed, completed

1 project, and published in a peer-reviewed
2 literature.
3 So some of this goes around to the issue
4 of the CORA request and why Parks and Wildlife
5 denied Garfield County's request for the telemetry
6 data. And I assume you guys would like to address
7 that. I would.
8 MR. JARMAN: No, I appreciate that. What
9 I'm hearing from you is that you cannot -- you would
10 agree that you can't reproduce the map that you've
11 produced.
12 MR. PETCH: We certainly can reproduce the
13 map that we've produced.
14 MR. JARMAN: So is that information --
15 DR. RAMEY: But can we reproduce your map?
16 MR. PETCH: Can somebody else reproduce
17 that based on the data that we are releasing at this
18 point? Because it is based on telemetry data that,
19 in the Piceance anyway, is still part of an ongoing
20 research project, no.
21 MR. JARMAN: All right, stop there for a
22 second. So now you've got enter into the picture
23 the BLM who's using your map now getting ready to
24 release a draft EIS based on that map. And under
25 federal law you've got to be able to disclose the

1 data that supports that map.
2 So how can you sit here on the verge of
3 the draft release saying none of that data is
4 available?
5 MR. PETCH: The primary issue -- let me
6 address the CORA issue, and then we can come back to
7 that. The primary issue with our release of interim
8 data is that we have a large fiduciary
9 responsibility in that data to make sure that we get
10 the best science out of it that we can.
11 And in the Piceance, for instance, we have
12 several hundred thousand dollars invested in that
13 study, most of it provided by industry partners who
14 also have an interest in us driving that project to
15 completion, being able to publish it.
16 The issue with prior release of data is
17 that it gets out, gets analyzed by someone else,
18 gets published by someone else. And our investment
19 in that research data is no longer usable by us
20 because we can't get it published. We've been Paul
21 Revere'd once that data is out there.
22 So that's the reason that clause is in the
23 CORA statute for universities, for researchers in
24 state agencies, is to maintain the integrity of
25 ongoing scientific research until it reaches the

1 point where normal scientific processes would carry
2 on.
3 So in that sense, that's why we have not
4 released that data and why that clause is present in
5 the CORA statute that protects that data until it
6 has been peer reviewed and published.
7 DR. RAMEY: However, you've already
8 published.
9 MR. PETCH: Beg your pardon?
10 DR. RAMEY: You've already published.
11 MR. PETCH: We've published the seasonal
12 habitat maps including a portion of that data set,
13 data up through -- we cut it off in 2010, Kathy?
14 MS. GRIFFIN: Uh-huh.
15 MR. PETCH: It also includes thousands of
16 data points from other counties in Colorado, from
17 Moffat County, data that was collected in Eagle
18 County, and in Southern Routt County, and then
19 Piceance data points as well.
20 We have released to you those data points
21 that are no longer part of an ongoing research
22 project consistent with the CORA request. But we
23 have not, and at this point do not intend to,
24 release those ongoing research projects that are
25 specifically protected by the CORA statute.

1 CHAIRMAN MARTIN: Therefore, that's our
2 conflict with the NTT report and also the
3 mapping process, et cetera.
4 MR. PETCH: I understand your conflict
5 there.
6 MS. BYFIELD: Let me interrupt you.
7 Because the problem here is that you put the BLM in
8 a pretty big box because they're under a different
9 requirement with NEPA, CEQ regulations, and the
10 Information Quality Act.
11 They're under a completely different
12 requirement which means they can't release anything,
13 disseminate anything to the public unless they can
14 produce the data behind it.
15 So you produced a map that they are trying
16 to rely on, that they cannot rely on. So when they
17 come out with their draft, they're in a real box.
18 CHAIRMAN MARTIN: Not a desirable
19 situation.
20 DR. RAMEY: Could I just address the
21 scientific issue here? You just heard from me about
22 this one study that had numerous issues, and it was
23 peer reviewed and published and relied upon.
24 So peer review is not necessarily the gold
25 standard. It is, at best, an imperfect filter on

1 information.
2 But let me read to you the Office of
3 Management and Budget Guidelines on information
4 quality. Prior peer review and publication is not
5 by itself sufficient grounds for determining that no
6 further peer review is necessary and that the
7 adequacy of peer review for highly influential
8 scientific documents, so this cuts to the agency, is
9 a rebuttable presumption.
10 MR. PETCH: Right. The difference, I
11 believe, in this case -- and my guess is we'll get
12 to the end of this conversation and have to agree to
13 disagree on this -- but my assumption on the
14 specific issue of BLM is that the priority map is
15 not a BLM product.
16 The priority map was produced by the State
17 of Colorado and the State of Wyoming, the State of
18 Utah, the State of Idaho, as a description of what
19 priority habitat is or what general habitat is in
20 the State of Colorado.
21 MS. BYFIELD: Okay, but BLM is relying on
22 it.
23 MR. CAGNEY: Can I inject a point?
24 CHAIRMAN MARTIN: Go ahead, Jim.
25 MR. CAGNEY: Talking about the box I'm in,

1 the BLM has relied on State Game Agency maps since
2 the beginning of the existence of the Bureau of Land
3 Management.
4 It's a process that I think has served the
5 public pretty doggone well, which is not to suggest
6 that I've always agreed with everything on that map.
7 You know, what we've done, and be it Wyoming and
8 Colorado, the two states that I'm familiar with, is
9 use those maps.
10 If we were to choose to not use State Game
11 and Fish Agency maps, then we would be required to
12 essentially make our own and defend our own.
13 And I'm just horrified by that prospect
14 because the Bureau of Land Management simply does
15 not have the resources or the capability or any kind
16 of ability whatsoever to duplicate that effort.
17 I'm kind of a little bit horrified by some
18 of this proceeding here in that we're just going to
19 usher in a new era where any project proponent will
20 do a study and make their own map.
21 And if the BLM is in a situation where we
22 have to accept that as the new norm and take the
23 responsibility to come up with the scientific basis
24 to refute that on a project-specific basis, we're
25 out of business. I mean, that's a leap into the

1 void that I just can't see the Bureau of Land
2 Management surviving.
3 MS. BYFIELD: Mr. Cagney?
4 CHAIRMAN MARTIN: Hold on. Jim, finish
5 your conversation.
6 MR. CAGNEY: So, you know, there's really
7 nothing about the entire idea of Sage Grouse being
8 listed that I think is a good thing. I mean, nobody
9 likes this. But I don't see myself in a box because
10 of the Colorado Parks and Wildlife.
11 CHAIRMAN MARTIN: Okay. Well, we'll
12 defend you. It's great to have those maps and what
13 have you in reference to relying upon your policy
14 overall, management plans, et cetera. But if those
15 are faulty, and you're making that policy statement
16 based upon errors, then your policy is in error.
17 What we're trying to do is to make sure
18 that the CPW -- I hate to say that, I like Division
19 of Wildlife -- maps, but we feel that there are a
20 lot of errors in there, and that's what we're trying
21 to say.
22 And we do not -- and we're trying to
23 actually defend you, in that you're getting some
24 faulty information you're making an entire policy
25 statement on which is a leap beyond past practices.

1 I mean you look at your policy that you're
2 saying 3 percent of human disturbance in the prime
3 habitat is physically impossibly when 70 percent is
4 private land and has already been developed.
5 So we say, wait a minute, there has to be
6 a different way, Jim. So we're working with these
7 guys to find out what is real on the ground and why
8 six plans within the state are better than one
9 national policy.
10 And so that's what our goal is. We're
11 trying to also preserve the bird and do the right
12 thing for each agency. That's why we wish to be
13 coordinators and to have this exchange, instead of
14 just having one federal policy for 11 states and two
15 Canadian provinces. So that's what we're after.
16 So, Margaret, do you have any comments?
17 MS. BYFIELD: Yeah, and just as a point of
18 clarification, I just want to clarify that Garfield
19 County is not creating this situation.
20 That the Information Quality Act which is
21 a congressional act is what is requiring that the
22 data be looked at closer. And I believe that came
23 out in 2000, so it's been more recent that it's been
24 utilized, but it was prepared because it was
25 recognized that the quality of the science needed to

1 be verified, needed to be double-checked.
2 So the burden -- I mean I understand your
3 concerns, how is the BLM going to do this. But the
4 burden was not placed on you by Garfield County. It
5 was placed on you by Congress.
6 DR. RAMEY: And let me just add, this
7 transparency and openness is consistent with
8 President Obama's Freedom of Information Act
9 directive, and as well as John Holder, science
10 adviser to President Obama's Scientific Integrity
11 Guidelines that were released, that when in doubt
12 release the information, and to make sure that it
13 utilizes best available scientific information
14 through this process we've been discussing.
15 CHAIRMAN MARTIN: Okay, we're going to have
16 a timeline. I know that this can go on forever,
17 Brad. But we're going to try and close this
18 particular discussion out in about nine minutes.
19 Can we do it?
20 MR. PETCH: I believe so.
21 CHAIRMAN MARTIN: All right, thank you.
22 MR. PETCH: There really is only one
23 remaining issue I wanted to raise from a mapping
24 standpoint. And that is to address the Heather
25 Sauls' model.

1 It's interesting to me that it looks so
2 much like the Garfield models. But it's not a
3 surprise to me that it looks so much like the
4 Garfield models because it's based on very similar
5 thought processes behind it.
6 There's a statement in the plan, and it's
7 been referenced a couple of times today, about
8 Piceance is different than other places. And I
9 could not agree more, it is different than other
10 places.
11 The challenge that comes into the modeling
12 process, and it's something we faced in Heather's
13 issue, is that the data that's used to build those
14 conceptual models came from somewhere else. And
15 that's as true in the Garfield model, albeit some
16 use of preliminary reports from some of our own
17 researchers in the Piceance Basin.
18 But the national guidelines, those things
19 that suggest that birds avoid tall shrubs, that
20 birds avoid trees, that birds only use wet meadows a
21 certain distance from sagebrush, are largely derived
22 in the Great Basin, in Idaho, in the Wyoming Basin.
23 They are not necessarily applicable to the
24 Piceance Basin. And I don't mean to throw stones by
25 saying that because we use the same kinds of

1 assessment in the Sauls' model that we contracted
2 for as an example of how we might proceed in the
3 future in the PPR plan.
4 That said, we know now since 2006 that
5 those characters are not -- they don't adequately
6 represent the distribution of the birds. And again
7 this is stuff from telemetry points that is ongoing
8 research development.
9 But there are two things that, and forgive
10 me if I'm wrong, correct me if I'm wrong, but the
11 two things that really the Garfield model and the
12 Sauls' model show in great clarity are those areas
13 that are flat and those areas that are dominated by
14 sagebrush canopy cover.
15 Are those good Sage Grouse habitat?
16 Absolutely. And if you were going to go out on the
17 landscape and look for Sage Grouse, would you start
18 there? Absolutely.
19 Are those the only places in the Piceance
20 that are used by Sage Grouse? Absolutely not.
21 What we have seen in the last six years in
22 the Piceance Basin is a much higher use of mountain
23 shrub communities than is represented in the
24 literature, especially the range-wide literature. A
25 much higher use, especially at the ecotone scale.

1 And as you're looking at a -- and this is
2 where sometimes higher resolution vegetation becomes
3 much more challenging because at a Grouse's
4 standpoint, those may be real differences if you're
5 looking at a vegetation map at a very fine scale.
6 To Grouse, those may not be represented.
7 And in a broader scale thing like the
8 basin-wide land cover, the CVCP land cover may not
9 even be represented as a difference. And they may
10 not represent a difference to Sage Grouse.
11 So we see a higher use of mountain shrub.
12 We see a higher use of slopes. We see a little bit
13 more tolerance of other vegetation types, oak brush
14 for instance, serviceberry for sure, aspen to some
15 extent, snowberry communities.
16 So we see the two things that the Garfield
17 map really represents very well, flat and sagebrush
18 dominated, are much less significant for Sage Grouse
19 in the Piceance than they are in Moffat County, in
20 the Wyoming Basin, and in southern Idaho.
21 So your contention that the Piceance is
22 different is, I think, correct. But the model still
23 represents a large component of data from somewhere
24 else that is giving you an artificially small and an
25 artificially ridge-top restricted look at what is

1 Sage Grouse habitat in the Piceance Basin.
2 CHAIRMAN MARTIN: Which brings up two
3 questions. Number one, the birds are adaptable to
4 just about any environment throughout. And the
5 other one is the encumbrances or the hazards to
6 these birds are mislabeled or, shall we say,
7 identified incorrectly.
8 Because what are the hazards to these
9 birds within this particular area if they can travel
10 great distances, they use tops, they use everything
11 else under the sun that we have in Garfield County,
12 what is the real danger of the extinction of these
13 birds if that is so true?
14 MR. PETCH: They don't use everything.
15 And I think that's an oversimplification of --
16 CHAIRMAN MARTIN: Well, the things that
17 you just described from timber to serviceberries to
18 all of the other things, and that they have been
19 able to adapt and travel great distances, what is
20 the real hazard of extinction if they have been able
21 to adapt to different environments?
22 MR. PETCH: They don't use it to the
23 extent they use sagebrush. And I want to be clear
24 about that.
25 They use it more frequently than they use

1 it in -- let's say, in the bottom picture up there,
2 if you had data from that place, the likelihood that
3 they use an area under serviceberry is zero because
4 there isn't any serviceberry.
5 In the Piceance, that's a different
6 scenario. And we see it in the Piceance, we see it
7 with Gunnison Sage Grouse on Pinon Mesa, we see it
8 with Gunnison Sage Grouse in the Dove Creek area.
9 They use the edges at least of habitats because they
10 are available to them there.
11 Does that mean that they can live in the
12 middle of an oak brush stand or a serviceberry
13 stand? Absolutely not. They're still a
14 sagebrush-dominated species.
15 So they do have limitations. And one of
16 the limitations, other than all the potentially
17 anthropogenic stuff going on out there, is that
18 habitat changes over time.
19 And those other vegetation types are more
20 prevalent than they were in the 1930s, '50s, '60s,
21 and Sage Grouse have suffered as a result. They are
22 concentrated more onto those sagebrush areas and
23 those bordering environmental types.
24 But at a scale where you neck that down to
25 a very small, very refined scale, I think the

1 opportunity to miss things that are used by Sage
2 Grouse, perhaps not a preference, but used by Sage
3 Grouse in the Piceance is very, very high.
4 And it gives you, both in the Sauls effort
5 in the PPR plan and I think for similar reasons in
6 the Garfield model, a pretty substantial
7 under-representation of where Grouse can be found
8 today in the Piceance Basin.
9 CHAIRMAN MARTIN: Yeah, and we're still
10 talking two different things. What is the hazard to
11 them from extinction then? Because they have been
12 able to adapt. They're different than Gunnison.
13 Gunnison Sage Grouse have adapted to their
14 environment. The Jackson County, they've adapted to
15 a different environment. Moffat County, they're a
16 totally different environment. They've adapted to
17 that or they're very at home at it.
18 They seem to be distributed throughout
19 this particular area based on yours. What is their
20 hazard of extinction?
21 MR. PETCH: In the Piceance it's actually,
22 I believe, quite high. The Piceance Basin of all
23 populations in Colorado -- and we have less perfect
24 lek data in the Piceance than anywhere.
25 For the same reasons that you guys didn't

1 do this trip around the Piceance in a vehicle,
2 that's the same reason we don't have very good lek
3 counts in the Piceance. It's difficult country to
4 get into.
5 But we have seen significant contractions
6 in population, in range in the Piceance, especially
7 at the northern end of the range, much of that in
8 Rio Blanco County. We have seen a significant
9 contraction of the sagebrush vegetation types that
10 are represented in your model in the last 30 years
11 as well.
12 MR. CAGNEY: And some of those contractions
13 occurred before the Oil and Gas.
14 MR. PETCH: Absolutely.
15 CHAIRMAN MARTIN: Well, yeah, but 70
16 percent of it is agricultural purposes and the
17 irrigation practices that kill sagebrush and that
18 has been again for existence of human use of the
19 land. That's private land and it also happens to be
20 70 plus percent of this habitat.
21 And going back to the goal, based upon
22 your mapping and your science, et cetera, 3 percent
23 of human disturbance within the prime habitat is the
24 desired effect. It's impossible when 70 percent of
25 it is already private land and developed.

1 MR. PETCH: But I'm not arguing for or
2 against the 3 percent limitation in the NTT report,
3 or for or against use of the 4-mile radius as an
4 NSO. Not arguing for or against that.
5 But as a description of whatever
6 management prescriptions we want to apply to the
7 landscape, of where those should be applied to
8 maintain Sage Grouse, I don't think the model that
9 you've currently proposed is sufficient.
10 MR. JARMAN: Chairman, I have four points,
11 if I could.
12 COMMISSIONER JANKOVSKY: Okay, then I have
13 some things.
14 CHAIRMAN MARTIN: We're running over.
15 COMMISSIONER JANKOVSKY: I want to state
16 that, you know, you talk about the Sauls report and
17 her mapping, but we also used Apa and Walker when we
18 did ours, and we looked at 2010 papers when we did
19 that. And those are all your guys, all three of
20 them are your guys.
21 MR. PETCH: Yes, they are.
22 COMMISSIONER JANKOVSKY: And the next
23 thing is, you know, this is fringe habitat. We are
24 on the southern edge, probably been fringe habitat
25 for as long as that population has been there. I

1 mean it's not good Sage Grouse habitat.
2 MR. PETCH: Certainly not like the bottom
3 photo.
4 COMMISSIONER JANKOVSKY: And these birds
5 have, as Commissioner Martin said, these birds have
6 adapted. And they're getting from one pocket to
7 another pocket primarily by flying. And you say
8 they may be walking to some of those pockets.
9 But right now this is the best available
10 science. It's not just the Sauls report that we're
11 using. We're using three of your guys to come up
12 with this mapping.
13 MR. PETCH: Right. And I do need to
14 respond to that a little bit, Commissioner
15 Jankovsky, that Dr. Ramey is correct that a
16 peer-reviewed system is not a perfect filter. But a
17 peer-reviewed system is a better filter than
18 incomplete progress reports.
19 And while I appreciate the use of the data
20 that is Piceance specific, that's valuable, and
21 certainly it does you all credit to look for that
22 most current data, each of those documents is a
23 preliminary interim progress report.
24 None of those documents have been
25 finalized. You know, none of that has been peer

1 reviewed, none of it's been completed. In many
2 cases the kinds of analysis that would give you the
3 answers you want for your model are not done either.
4 So, yes, I acknowledge that those are,
5 one, our people and, two, working in the Piceance.
6 But those are not completed works, any of the three
7 of them.
8 COMMISSIONER JANKOVSKY: But Walker is the
9 most reputable scientist right now in the Piceance.
10 And his work is at least verbally cited continually.
11 MR. PETCH: Certainly.
12 COMMISSIONER JANKOVSKY: When we go and
13 listen to information from Parks and Wildlife, we're
14 usually listening to Walker.
15 MR. PETCH: Certainly. But the map that
16 you've put on the table does not line up with the
17 state of Walker's current work.
18 CHAIRMAN MARTIN: All right, thank you.
19 Fred, four points, and then we need to move on.
20 MR. JARMAN: Okay. I'm going to defer one
21 to Dr. Ramey, but I'd like to start here very
22 quickly.
23 Along those lines just to reiterate, as
24 you can see, and what should be I think incredibly
25 alarming to the Fish and Wildlife Service, is the

1 fact that there isn't data that is available that
2 supports what you're saying.
3 And so that's a fundamental breakdown on a
4 number of federal levels. But here we're trying to
5 craft policy, as you are, as Jim is with the BLM,
6 craft policy, federal policy, broad-reaching policy,
7 based on unfounded science.
8 So this should be incredibly alarming for
9 anybody listening to this discussion. And I think
10 frankly it's a left-hand turn for the EIS.
11 But if there is data that you are willing
12 to let anybody else see in terms of transparency, we
13 really would like to see that data if you are
14 relying on it rather than opinion.
15 Because opinion only gets you so far,
16 unfortunately, when it comes to a listing action
17 because it has to be done on credible, literature-
18 based, peer-reviewed science and not some person's
19 field impression from one day to the next on where
20 Sage Grouse may or may not be. So that's how
21 important all of this is.
22 I have a question for Jim Cagney on this
23 very issue of the map. We've spent, and I'll try to
24 be very careful here, and you tell me where I go off
25 the rails, but in the cooperating agency meetings we

1 are a cooperating agency, we have that status as
2 many others do in this room. We spent probably the
3 better part of the last year walking through policy.
4 My question is, and I know the answer to
5 this question, but my question is: How many of
6 those meetings were dedicated to the evaluation of
7 the map?
8 MR. CAGNEY: None.
9 MR. JARMAN: Okay, thank you. Secondly,
10 are you going to include the Garfield County plan as
11 an alternative in the EIS?
12 CHAIRMAN MARTIN: That's not putting you
13 on the spot, is it?
14 MR. CAGNEY: I had a couple of points I'd
15 like to make. Is there any way we can do that?
16 CHAIRMAN MARTIN: Sure, Jim. This is an
17 open dialogue. We're not trying to single you out
18 or beat anybody up. We're just expressing points of
19 view.
20 MR. CAGNEY: If we could finish that and
21 then I could make a couple of points in synchrony
22 here, then I'd be happy to finish with the answer to
23 that. That's a pretty loaded question.
24 CHAIRMAN MARTIN: Okay, thank you. Any
25 other points that you wish to bring out, Doctor,

1 Zack?
2 MR. PERDUE: I'd like to just some things
3 about the mapping real quickly. And, number one, I
4 think there's a misunderstanding of the coarsity of
5 the data that we did.
6 Brad was referencing the fine scale of the
7 2-meter data. But the data wasn't supplied to the
8 model at a 2-meter resolution. The data was
9 classified at a 2-meter resolution which means
10 something entirely different.
11 The reason that we classified at the
12 2-meter level were to, number one, achieve high
13 horizontal delineations in terms of precision,
14 particularly for the forested and woody shrubland
15 areas.
16 But secondary to that was we wanted to see
17 the mix of species that were occurring in these
18 broader communities. So ultimately the data got
19 boiled back out.
20 Once it was classified, we then aggregated
21 the data to turn it into polygons, and we enforced a
22 minimum mapping unit of a half acre. So there's no
23 polygons in there representing vegetation
24 communities that exist on the ground that are
25 smaller than half an acre.

1 In addition, with respect to the
2 transition zones, that was something that we were
3 getting active feedback from in discussions and
4 e-mails with some of the CPW and BLM staff was that
5 there was a recognition that some of these perimeter
6 areas are being utilized by the Grouse.
7 And so that's one of the inherent
8 limitations to the publicly available data sources
9 is that they're very discrete and they're very
10 coarse.
11 And as such, for CVCP, for example, we've
12 got a 25-meter, square meter, that represents one
13 area. And that stops with a hard edge, you know, at
14 the transition, wherever that delineation occurs.
15 One of the things that we were able to do
16 with our data in the fact that we classified it at
17 the 2 meter was we were able to sample and
18 subsequently delineate these transition zones by
19 finding areas that had a certain measure of PJ,
20 Gambel oak, the various woody shrublands
21 encroachment into these areas.
22 And so what we did was we tried to carve
23 out and assess areas where we've got an upper
24 threshold of 20 percent encroachment of these woody
25 shrublands moving into sagebrush and grassland

1 habitat.
2 Which the entire intent of that was to
3 address specifically what we were just discussing a
4 moment ago, which was the recent observation of
5 occupying these fringe habitats around the higher
6 quality of sage communities.
7 But, in addition, that was also why we
8 employed the fuzzy model logic. As you can see,
9 that returned the largest results in terms of area
10 which is expected.
11 Basically what it does is it starts to
12 take the results and push it out, make it more
13 contiguous, and so on and so forth.
14 MR. JARMAN: All right, thanks, Zack.
15 CHAIRMAN MARTIN: Doctor, you had one more
16 comment?
17 DR. RAMEY: A couple of more comments.
18 Briefly, this progress report, this habitat mapping
19 exercise is reproducible. However, a number of the
20 opinions you just stated are not.
21 And where are the data that these opinions
22 are based upon? Those have been requested
23 repeatedly by the County.
24 I think that the BLM is in a box. I think
25 the County is in revision with its plans. Neither

1 of those can really wait for your publications to
2 come out years later.
3 And, most importantly, the Sage Grouse
4 can't wait for you to get around to publication of
5 that before you release any of the data. So we
6 respectfully request that those data requests be
7 followed through with.
8 Additionally, another point. Peer review
9 is not all it is cracked up to be. Some of the
10 major landmark papers published in physics are
11 published in arXiv, which is an open source journal
12 for which comments come in and revisions are
13 produced. It's a different model. It's considered
14 to be some of the finest science in the field.
15 So this reliance on that you'll only
16 decide based on peer-reviewed information, as we've
17 all admitted and discussed here is frequently flawed
18 or can be flawed, is I think a dated opinion.
19 But, finally, and I think probably most
20 importantly, our best guess for determining occupied
21 range map, as you said, the hypothetical models and
22 such, those are not based on data. And those end up
23 capturing large areas of non-habitat.
24 And that was one of the key points in this
25 mapping exercise is to determine the priority areas

1 for the birds. And, most importantly, the courts do
2 not agree with opinion-based information.
3 Judicial deference is not afforded to
4 arbitrary, capricious agency actions or scientific
5 information. And that's what opinion and hearsay
6 are.
7 And that's been repeated in Aqua Caliente
8 versus Scarlett, on the Peninsula Range as critical
9 habitat. It was remanded for rule-making based on
10 these same arguments we're discussing today at 47
11 percent reduction. Similar, the Cactus Pigmy for
12 Critical Habitat was remanded and eliminated on the
13 basis of it was on guesswork.
14 So the courts do not agree with that
15 viewpoint. And I, as a scientist, don't.
16 CHAIRMAN MARTIN: Okay, now, we're still
17 all friends here. Relax. Take a deep breath.
18 Jim, you have the floor and the final on
19 this particular level of discussion.
20 MR. CAGNEY: Thank you, Mr. Chairman, both
21 for giving me the floor and that good advice to
22 relax.
23 CHAIRMAN MARTIN: Listen, an old
24 rock-and-roller should be able to relax at any place
25 and in any setting. Go for it, man.

1 MR. CAGNEY: I told you, I can't even play
2 guitar anymore. I got too much Sage-Grouse jelly in
3 my head.
4 So, first of all, I mean it's plain to see
5 why Garfield County is unhappy with this. Everyone's
6 unhappy with this. I'm still waiting for the first
7 person to tell me. Golly, I really appreciate the
8 way this Sage Grouse thing is going down, you know.
9 The next person that tells me that will be the
10 first.
11 Okay, so, you know, the idea that you guys
12 are doing something tangible instead of just being
13 unhappy, I say good on you.
14 But I want to talk about my assignment in
15 relation to some of the things that I've heard
16 today.
17 A lot of the issues, like the threat is
18 overstated and the public policy type of issue here
19 with regard to whether Sage Grouse really are
20 adaptive or whether they really need to be
21 endangered on that, I'm going to tell you what my
22 exact assignment is.
23 My assignment is to revise the five land
24 use plans in the northwest Colorado, analyze the NTT
25 alternative as one of the alternatives, and to do so

1 on a timeline that will be completed in time to
2 inform the court-ordered listing decision.
3 Okay, so if you're successful in those
4 types of arguments about, you know, whether or not
5 this process should be done that way, again good on
6 you.
7 And I just want to make it clear that if I
8 don't respond to that, it's not because I'm ignoring
9 you. It's because that's not my assignment.
10 And my intention is to play out my
11 assignment as it's been given to me. So that's a
12 key point.
13 One thing that -- I'm going to move on to
14 my next point is that we are not infringing on
15 private property rights in any way. The Bureau of
16 Land Management is doing a round of land use
17 planning for public lands.
18 I'm aware that the NTT caps relate to all
19 lands. Private landowners are perfectly able to do
20 whatever they want on their private lands, and then
21 the BLM will be obligated to adapt what we authorize
22 to meet those caps.
23 So under no circumstances are we
24 attempting to tell any private landowners what they
25 can or cannot do on their private lands. Okay?

1 I want to talk for a second about
2 something that I think is very important. There's a
3 disconnect between the decision-making authority,
4 you know, and the responsibility for winning
5 appeals.
6 And, you know, I like to communicate with
7 the locals for a couple different reasons. You
8 know, they tend to know the most. It's just good
9 policy.
10 But I'm talking about this whole
11 cooperating coordinating issue, and I'm going to
12 read something: We are recognizing that each agency
13 has its own planning process and federal agencies
14 are required not only to consider the County's
15 policies but work to resolve conflicts and federal
16 plans consistent with the County's policies. And
17 then it's 43 U.S.C. 17.12.
18 And I'm all for that. I want to do that.
19 But something that needs to be made, and this is
20 really critical, is what's not quoted from that same
21 passage is it's to the extent consistent with the
22 laws governing the administration of the public
23 lands.
24 So I'm not authorized to blow this process
25 and lose an Endangered Species Act appeal on the

1 basis of the Coordination process. Now if we can
2 work together and get something put together that
3 eliminates that possibility, that's great. But I
4 have to win these appeals or break my pick trying.
5 One of the issues from NEPA, and this is
6 why I was hesitant to answer your question straight
7 up, Fred, is that you asked a different question
8 than what was written in the document.
9 Okay, the question that you wrote in the
10 document is we request that this be included as the
11 preferred alternative for the Garfield County
12 portion of the EIS.
13 And if I said yes or no to that right now,
14 that would be a NEPA violation. Because I'm not
15 authorized to make managerial decisions independent
16 of the NEPA analysis.
17 And, you know, no better case law on that
18 is more than the judge ruling that the Bush
19 Administration overrode the Fish and Wildlife
20 Service's non-listing rule and put this whole thing
21 in motion.
22 Just on the whole question of winning
23 appeals, one of the appeals that we'll certainly
24 get -- and these appeals are going to be vicious. I
25 used to be the field manager in Lander, Wyoming, and

1 I just released that document that I worked so hard
2 on when I still lived back there.
3 And it's like there was this giant backlog
4 of hostility to Governor Freudenthal's plan that
5 they were just waiting for the first document to say
6 that the Wyoming approach is so woefully inadequate,
7 you know. And the Governor's approach is pretty
8 restrictive compared to what just got laid out in
9 the Garfield County approach.
10 So we have to anticipate some vivid
11 appeals on that subject. And one of them will be
12 that Garfield County is the southern fringe of that
13 habitat.
14 And, you know, plan on an assumption that
15 this will be depicted as the most important piece of
16 the whole thing. Someone will make that point. I
17 mean I don't want to lead someone to that point in
18 this proceeding, but it's just guaranteed.
19 The big issue here is the habitat
20 fragmentation issue, the habitat connectivity issue.
21 I don't want to represent myself as a Grouse
22 biologist, especially when there's people that
23 really are Grouse biologists in this room.
24 But I've been around this piece of ground
25 for 35 years now. And I've seen Sage Grouse in

1 places that wouldn't meet the Garfield County map
2 model over and over again. So that's an issue, is
3 that habitat has got to be connected.
4 So in terms of will I include that in the
5 decision, I mean I certainly have to recognize it.
6 It's a NEPA requirement to do so. But I got some
7 concerns, and I'm going to have to deal with them.
8 CHAIRMAN MARTIN: You followed all the
9 guidelines laid out by NEPA as well as your
10 department policy. You did a good job, Jim.
11 MR. CAGNEY: This is my job, John.
12 CHAIRMAN MARTIN: I know it is. I know it
13 is.
14 MR. CAGNEY: I will get smacked sharply if
15 I'm not.
16 CHAIRMAN MARTIN: I know it is, and we'll
17 talk over a beer. But, anyway, thank you for that.
18 Now, Margaret, you had another comment?
19 Okay, but we have one more subject, and that's going
20 to be the NEPA process.
21 MS. BYFIELD: Okay, I'll wait, I'll wait.
22 CHAIRMAN MARTIN: Okay. We have about 11
23 minutes to do that.
24 COMMISSIONER JANKOVSKY: I would just like
25 to respond a little bit to Jim. You know, with our

1 plan with our habitat, we are at NSO in priority
2 habitat because the habitat is, you know --
3 So we're not at a one percent cap or 3
4 percent cap. We're at NSO, and there's still room
5 in there to move a little bit, but we are in
6 priority habitat and at NSO. So we are more
7 restrictive in our plan than what NTT is or what the
8 PPR was.
9 And again it all goes back to the mapping.
10 But I just wanted to bring that up.
11 MS. BYFIELD: Okay, so we start talking
12 about NEPA?
13 CHAIRMAN MARTIN: We wanted to talk about
14 the NEPA process.
15 MS. BYFIELD: Mr. Cagney, who is going to
16 make the decision on what alternatives are selected,
17 are included in the draft? Who makes that decision?
18 MR. CAGNEY: I think from a technical
19 perspective, the precise decision-making authority
20 lays with the State Director. Is that true, Erin,
21 the State Director has got that? The State Director
22 has got that.
23 I mean I would like to point out, though,
24 if we do a magnificent job of putting this together,
25 we can make that decision because the State Director

1 will approve it. But if we put something on the
2 table that is inadequate, then we don't get to make
3 that decision.
4 MS. BYFIELD: Can I go ahead and just read
5 from your planning rules? These are your BLM
6 planning rules.
7 It says: At the direction of the field
8 manager in collaboration with cooperative agencies,
9 BLM will consider all reasonable resource management
10 alternatives and develop several complete
11 alternatives for detailed study.
12 Now as I've read these, you make the
13 decision on the alternatives. The State Director
14 selects the preferred.
15 MR. CAGNEY: Uh-huh.
16 MS. BYFIELD: So you will be making the
17 decision on what alternatives go in?
18 MR. CAGNEY: Fair enough.
19 MS. BYFIELD: The question in the letter
20 that was directed to you was the request of the
21 Board that this plan be the preferred alternative in
22 this area because we believe it's based on the best
23 science and it's the best policies that fit this
24 area.
25 And I understand how you can't come out

1 and say what's going to be a preferred alternative
2 because that's a completely different question. Are
3 you precluded from saying whether or not it's going
4 to be included as an alternative?
5 MR. CAGNEY: No.
6 MS. BYFIELD: Okay. So the question then
7 is: Will this be included as an alternative when
8 the draft comes out?
9 MR. CAGNEY: We will certainly acknowledge
10 that this alternative exists and take a hard look at
11 it.
12 MS. BYFIELD: Is it going to have a
13 side-by-side comparison with the other alternatives
14 and rigorously explored, rigorously analyzed?
15 MR. CAGNEY: I don't know.
16 MS. BYFIELD: When are you going to make
17 that decision?
18 MR. CAGNEY: I don't know.
19 MS. BYFIELD: When are you expecting the
20 draft to come out?
21 MR. CAGNEY: July.
22 MS. BYFIELD: Is the draft now in review
23 with other agencies and counties?
24 MR. CAGNEY: Cooperating agencies?
25 MS. BYFIELD: Yes.

1 MR. CAGNEY: Yes.
2 MS. BYFIELD: Okay, so already really
3 comments are being taken internally, I understand,
4 internally on the draft, but nobody has the
5 opportunity to lay this plan side by side with it to
6 see how that compares.
7 I mean and I'll just back up, really the
8 -- as I'm sure you know, the alternative section of
9 NEPA of an EIS is the heart of the section.
10 And the whole purpose for having
11 reasonable alternatives and making sure all of the
12 different perspectives is included is so that the
13 public and decision-makers have the opportunity to
14 look at all of the options side by side for the
15 ultimate goal of making the best decision.
16 And when one viewpoint is precluded from
17 that, that should be considered, that's very
18 damaging to the outcome of the actual process.
19 MR. CAGNEY: Let me answer this line of
20 questioning this way. I have done what I think is a
21 very professional, very fair job of organizing these
22 alternatives in conjunction with the cooperating
23 agencies. And I'm not going to apologize for the
24 process I've run.
25 MS. BYFIELD: Well, I'm not asking you to

1 do that. And I'm not questioning your
2 professionalism. You know, in my book that's not
3 even an issue.
4 The issue is whether or not what Garfield
5 County knows has to happen here for the sake of
6 these Sage Grouse persisting and improving and being
7 here till the end of time, whether or not that is
8 going to be considered in the whole EIS process as
9 an alternative.
10 MR. CAGNEY: Which is a question I've
11 answered.
12 MS. BYFIELD: Which is at this point you
13 really don't know?
14 MR. CAGNEY: Right. You know, anyone
15 familiar with the Roan Plateau case law is very
16 familiar with my requirement to consider
17 alternatives. And I will abide by that.
18 MS. BYFIELD: Would it be instructive for
19 us to actually communicate with the State Director
20 and impress on her this request? Would that help
21 you in the decision?
22 MR. CAGNEY: I would invite you to do
23 anything that you think is wise along those lines.
24 CHAIRMAN MARTIN: But still following the
25 NEPA process and the EIS process. Okay.

1 Other questions on the NEPA process?
2 COMMISSIONER JANKOVSKY: I just have some
3 questions on -- you know, we have requests out to
4 CPW for data. We've gone through CORA on those, and
5 we'd like to have that information.
6 The same thing with Fish and Wildlife
7 Service, we'd like to get Garton, et al, all that
8 information as well just because it is referred to
9 so many times. And we can't get our hands on it in
10 the NTT report.
11 CHAIRMAN MARTIN: I think you've received
12 your answer, that it's a work in progress, that
13 they're not going to jeopardize that particular
14 issue.
15 COMMISSIONER JANKOVSKY: Yeah, but I don't
16 know that Garton is a work in progress.
17 Then just the peer reviews, internal and
18 external peer reviews from the Department of
19 Interior on Sage Grouse, I mean do we have to do a
20 FOIA request to get that information, or how do we
21 go about that?
22 MS. GELATT: Rob, have you had problems
23 getting information from us?
24 DR. RAMEY: Well, I've gone directly to
25 Garton, as I've said, to try and get the data. And

1 so I think the question here is: Can the Service
2 aid the County in obtaining the underlying data used
3 in the analysis by Garton, et al, both the final
4 raw data that is used and also the input data that
5 was culled to produce the final data set?
6 And then the peer review issue is a very
7 interesting one. And we discussed this amongst the
8 group how best to get -- to evaluate for ourselves,
9 for the public, the adequacy of peer review on that
10 landmark study.
11 And so since that study was funded by the
12 Department of Interior and since the publication was
13 edited by a member of the Department of Interior,
14 Steven Kinek, as well as many other of the
15 publications in the Sage Grouse monograph.
16 And I understand that the agency, and the
17 USGS, in particular, has their own internal peer
18 review process before papers go out written by
19 members, by agency staff, we discussed the need to
20 have the peer reviews to be able to look for
21 ourselves at the adequacy of the peer review.
22 And then also to ask for the peer reviews
23 by The Journal Studies of Avian Biology. And we're
24 not sure whether three of those peer reviews that
25 were commissioned by the Division of Wildlife were

1 all the peer reviews, and we need to know that.
2 Peer review is sometimes kept secret.
3 Some journals actually publish them, or at least
4 acknowledge the names. I often sign my name to my
5 peer reviews. So this should be public information
6 since it is such a highly influential scientific
7 study.
8 So that's the request, peer reviews, data.
9 MS. GELATT: So if you want to send me an
10 e-mail of that request, I can look into it farther.
11 DR. RAMEY: I'll let the County do it.
12 CHAIRMAN MARTIN: We'll run that through
13 our process so that we have the direct control of
14 that particular issue, being cooperating agency
15 status in that respect. So we can rely upon that
16 agreement, right, David? Thank you.
17 Do we have anything else? We have one
18 minute.
19 MR. JARMAN: We've got one minute, okay,
20 I'll have to speak very quickly.
21 This is really for Jim on the NEPA
22 process, but really more through Coordination, but
23 it is supported by NEPA, and that is to resolve
24 inconsistencies.
25 So we have the Garfield County plan now

1 adopted and we walked through just some of those
2 inconsistencies with what is at the very least on
3 the NTT report which may be considered as an
4 alternative and the forthcoming EIS.
5 So the question that we really have for
6 you is: How do you intend to follow NEPA and then
7 help us understand and pick apart and come to
8 resolve on inconsistencies between our plan and the
9 EIS?
10 MR. CAGNEY: I don't know the answer to
11 that. I would agree that that needs to be done.
12 MR. JARMAN: Would you be willing to work
13 with us to do that?
14 MR. CAGNEY: Sure, absolutely.
15 CHAIRMAN MARTIN: Between now and the
16 final product, but not after the final product.
17 MR. JARMAN: Well, in the draft is really
18 the issue at play here. So that's really the
19 question is: Can we work together on this following
20 NEPA to be able to have that discussion as it's
21 reflected in the draft?
22 CHAIRMAN MARTIN: There is a hard
23 timeline, isn't there, Jim, in reference to when you
24 have to have that in?
25 MR. CAGNEY: I got a question for you,

1 though. I mean there's a very, very delicate issue
2 there in terms of my inability to disclose
3 predecisional information.
4 So are you talking about in a cooperating
5 agency process or are you talking about in public
6 hearings? Because that really matters what we can
7 say and what we can do regarding the range of the
8 alternatives that we already had on the table.
9 MR. JARMAN: I don't think, other than
10 NTT, we can't do it through Coordination. It would
11 have to be predecisional.
12 MR. CAGNEY: Well, then I'm precluding
13 from addressing some of the things that we've worked
14 out through the cooperating agency process that I
15 think deals with some of these issues.
16 MR. JARMAN: That's a really good point,
17 Jim. So I think there are ways to do that simply
18 between Garfield County and the BLM in a cooperating
19 agency type meeting, to protect that issue that you
20 rightly bring up.
21 CHAIRMAN MARTIN: We don't want to violate
22 that.
23 MR. JARMAN: Yeah, absolutely.
24 CHAIRMAN MARTIN: We want to be able to
25 work those out through the process as set out again

1 by cooperating agency status. But we still have to
2 answer certain questions to our general public in
3 public meetings.
4 So we'll have a fine line to walk, but we
5 will do so. And I wish we had the ability, as some
6 departments, to not answer certain questions. But
7 we have to expose our entire souls in public
8 meetings and still stand the scrutiny in the
9 newspapers when we don't.
10 So you guys got a little better situation
11 than local government does. We're under a lot more
12 scrutiny.
13 MR. CAGNEY: I mean just for conversation
14 sake, I feel comfortable suggesting that when we
15 talk about the full range of alternatives, this
16 document is within that range because the
17 Alternative A, which is already public knowledge, is
18 simply the old land use plans that relate to
19 Garfield County.
20 And I think we would be completely safe in
21 arguing that this is between this, those old plans
22 and the NTT, with one giant exception to that, and
23 that, of course, is the map. We would be
24 introducing a new map at this stage of the process.
25 CHAIRMAN MARTIN: We'd better have a good

1 foundation on one and be able to go ahead and
2 produce that or reproduce it, et cetera, following
3 the same process. And would expect again your map
4 and the discrepancies we find and how you would be
5 able to defend that particular map in the
6 discussions.
7 MR. CAGNEY: Right. And Garfield County
8 understands my concern that by abandoning our
9 longstanding process of working with Game and Fish
10 Agencies, we leap into a void that will just kill
11 us.
12 CHAIRMAN MARTIN: And, Jim, we're not
13 asking you to do that. All we're doing is saying we
14 need to see the scrutiny of how it was put together
15 and believe in the process as well as believe in our
16 process and convey that both to the Division of
17 Wildlife and you so that we can go ahead and make
18 sound policy judgments on the information that we
19 can reproduce.
20 That's where we're coming from. So that's
21 what we would support.
22 Gentlemen, we're four minutes beyond. Is
23 there anything, Wildlife, David, Jim, anything else,
24 Brad? Anybody out there? Moffat County, Rio Blanco
25 County, you're all cooperating agency statuses.

1 Then our team, the last comment.
2 MS. BYFIELD: Well, I was just going to
3 make sure, we didn't allow you a chance to even
4 comment, talk. I didn't know if you had any
5 statements or anything that you wanted to share.
6 MS. GELATT: I appreciate the invitation.
7 Today lots of information was provided. I just
8 received the report on Monday so our biologists
9 haven't had an opportunity to review it. But thank
10 you.
11 CHAIRMAN MARTIN: All right. Staying
12 within those parameters, I think that we're
13 completed then. We'll try and work out and we'll
14 have coordination and communication going back and
15 forth, Jim. Thank you.
16 COMMISSIONER JANKOVSKY: I'd like to thank
17 everybody for being here. Thank you for your time
18 and working with us. Thank you.
19 CHAIRMAN MARTIN: Thank you very much.
20 And everybody got a full package of information from
21 Garfield County to try and digest.
22 (The hearing was concluded.)
23
24
25

1 REPORTER'S CERTIFICATE

2 STATE OF COLORADO)
) ss.
3 COUNTY OF ADAMS)

4 I, Geneva T. Hansen, do hereby certify that I am a Professional Shorthand Reporter and
5 Notary Public within the State of Colorado.

6 I further certify that the foregoing transcript constitutes a true and correct transcript
7 to the best of my ability to hear and understand the audio recording.
8
I further certify that I am not related
9 to, employed by, nor of counsel for any of the parties or attorneys herein, nor otherwise
10 interested in the result of the within action.

11 IN WITNESS WHEREOF, I have affixed my signature and seal this 16th day of May, 2013.
12

13 My commission expires 11-18-15.

14

15 _____

16 Geneva T. Hansen

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Garfield County

April 18, 2014

Jim Cagney
District Manager, NW Colorado BLM
Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

Re: Comments to BLM on Final BLM "Colorado Alternative" Revisions

Dear Jim,

Garfield County appreciates the BLM's continued efforts to work with the State of Colorado and local governments to craft an alternative that better acknowledges our concerns that are appropriate for NW Colorado. We offer the following primary comments in response to the latest revisions presented at the Coordination Agency held on April 10, 2014 for your consideration.

1) Leasing Strategy with Variable Buffers: The County supports the BLM's current approach to provide more flexibility in what activity may occur inside the 4-mile buffer from an active lek. In this way, decisions can be made on a site-specific basis using criteria that contemplate variations in vegetation, terrain, and design features which are especially important in areas within Colorado Management Zone 17 due to wildly varying landscapes and habitat found in Garfield and Rio Blanco Counties. We concur with this approach and find it to be more of a "lek focused" approach rather than a blanket / broad PPH approach and therefore more biologically appropriate.

   However, we are concerned this approach unnecessarily prohibits subsurface access to oil and gas minerals deeply contained under the 1-mile NSO because of an arbitrary NSO (prohibition) in the Mile 2 ring forcing all surface activity to locate at least 2 miles away

without exception despite the BLM's newly developed criteria for development in miles 3 and 4 from the lek. We believe there are certain circumstances such as steep terrain and absence of habitat altogether that will occur within the 2nd mile ring specifically in Garfield and Rio Blanco Counties that should be accommodated. To exclude this as a possibility despite exception criteria appears to be an arbitrary policy.

As mentioned to you in the Cooperating Agency meeting, there are several oil and gas development companies currently operating in Garfield County (and other counties in NW Colorado) that have drilled very successful horizontal wells that could reach resources (such as valid existing leases) under the lek itself from two miles away and thousands of feet below the surface. If the impacts on the surface are minimized and or mitigated with the criteria, activity should be able to occur just outside of the 1 mile NSO.

We are also concerned at the seemingly arbitrary nature of the varied (multi-ring) buffer approach that lacks any basis in science. This approach reinforces the County's long held and unwavering concern that there is an enormous void of science that exists to support current prescriptions / policies being implemented for the protection of the species and its habitat. This varied buffer approach is a precise example of an arbitrary policy that has no basis or foundation in science and cannot be supported by the County. So, ironically, while the approach is certainly more favorable in terms of providing flexibility away from a hard 4-mile buffer proposed in the NTT report, the County is concerned that the USFWS will categorically dismiss it due to a lack of scientific support.

2) 3% Disturbance Cap Program: The County is concerned that the revised Plan continues to include and count disturbance on private property where there is no federal nexus and where the BLM has no authority. The County recommends that approach be taken out.

3) Valid Existing Leases: The County is concerned with the Plan's approach to apply these current proposed prescriptions to valid existing leases already purchased years ago. The net result will render many of these leases undevelopable (despite their value at time of purchase) and therefore will dramatically reduce their value and ability to be developed.

4) 1 Disruption per 640 acre: The proposed language remains vague and provides little direction as to how this will be managed. For example, how big can a disruption be? How does this encourage 'cluster-type' development? This also (arbitrarily) assumes the area is all habitat in a 640 acre block. Again, this appears to be an arbitrary

policy approach with no basis or relationship to actual habitat characteristics on the ground.

5) NSO Exception, Modification & Waiver Criteria: The County supports the BLM's approach to provide opportunities to allow activity in areas within the 4-mile buffer so long as objective criteria are used that acknowledge site-specific issues such as vegetation, terrain and design features on the ground. However, the Plan should better define or eliminate the use of terms such as "extraordinary circumstances" as a qualifier for when it grants exceptions. That is to say, what is extraordinary to one person may not be to another. This provides little to no regulatory certainty. We believe there are certain circumstances such as steep terrain and absence of habitat altogether that will occur within the 2nd mile ring specifically in Garfield and Rio Blanco Counties that should be accommodated. To exclude this as a possibility is arbitrary.

6) Habitat Mapping in Garfield County: We continue to request that the BLM use the County's recently adopted habitat mapping as the basis for applying the Plan's policies. More than ever, the new BLM approaches suggested in this most recent revision appear to be more lek focused and acknowledge that site specific analysis is critical to better protection for the species rather than a blind and arbitrary on-size-fits-all approach.

Again, thank you for providing Garfield County with the opportunity to participate and offer comments on your revised Plan. Please do not hesitate to contact me if you have any questions.

Very truly yours,

Tom Jankovsky, Commissioner

Cc Garfield County Board of County Commissioners

Fred Jarman, Director, Garfield County Community Development Department

Frank Hutfless, Garfield County Attorney

Garfield County

April 19, 2013

Erin Jones, NEPA Coordinator
Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

RE: Garfield County comments on the Preliminary Draft RMPA/EIS for Local/State Office Review

Dear Erin,

Undercover of this letter you will find comments prepared by Garfield County on the Preliminary Draft Resource Management Plan Amendment / Environmental Impact Statement for the Greater Sage-Grouse in Northwest Colorado.

Please do not hesitate to contact me if you have any questions or comments.

Very truly yours,

Fred A. Jarman, AICP
Director, Garfield County Community Development Department
970-945-8212
fredjarman@garfield-county.com

cc Garfield County Commissioner Tom Jankovsky
Garfield County Attorney, Frank Hutfless

To BLM and Forest Service Local/State Office Reviewers & Cooperating Agencies:

The **Preliminary Draft RMPA/EIS** is intended for internal review by the BLM Field Offices, BLM Colorado State Office, and Forest Service from March 21 – April 4, 2013, and by Cooperating Agencies from March 21 – April 18, 2013. (Please do not distribute.)

- Please complete the MSWord comment matrix (provided at the end of these instructions) by saving this file with a new file name including your last name (for example, name your comment matrix "NWCO_Cmts_PDRMPA_201303_Adams.docx"), and then fill out your comments on the document.
- Email your comments on the Preliminary Draft RMPA/EIS for Local/State Office Review by close of business **Thursday, April 4, 2013 (BLM and Forest Service reviewers)** or **Thursday, April 18, 2013 (Cooperating Agencies)** to Erin Jones of the Northwest Colorado District (erjones@blm.gov).
- Contact Erin Jones (970) 244-3008 or Bridget Clayton (970) 244-3045 with questions.

- As defined in the acronyms and abbreviations list in the document:
    - The **planning area** refers to the BLM Northwest Colorado District boundary, composed of all lands regardless of ownership.
    - The **decision area** refers only to BLM- and Forest Service-administered public lands (and federal split-estate minerals) in the planning area (BLM Northwest Colorado District) that are designated as preliminary priority habitat (PPH), preliminary general habitat (PGH), or linkages.
- There are still some outstanding calculations noted and/or highlighted with xx's or notes to BLM throughout the document. These are in progress by the BLM.

Commenting:

For each comment, please fill in the following information under the appropriate column heading in the matrix:

✓ Page number, line number, or table number on which you are commenting. **The page and line numbers in the PDF file or paper copies MUST be used.**

✓ Your comments:

- **Your comments must be specific and provide exact changes to the text.** Please be unambiguous, clear, and directive, with exact wording changes stated. Ambiguous comments, such as "What?," "Poor," or "Is this right?," are not helpful and will not be considered.
- If you have the same comment more than once, do not refer back to a previous comment number. Instead, please copy and paste your comment to a new row in the matrix and provide the specific page number, etc.
- If you need additional space for comments, click in the table cell where you would like to comment, select the *Table* menu, *Insert*, and either *Rows Above* or *Rows Below*.

Comments on Preliminary Draft RMPA/EIS for Local/State Office Review (March 20, 2013)

Cmt #	Page #	Row # or Line #	Reviewer Name	Reviewer Office/ Affiliation	Comment	A/R/M[1]	Response / How Resolved *(Reviewers: Leave this column blank)*
1.	1-20	29	Fred Jarman	Garfield County	Add the following: "Garfield County Greater Sage-Grouse Conservation Plan."		
2.	3-79	26	Fred Jarman	Garfield County	Please provide full citation for this reference		
3.	3-87	8	Fred Jarman	Garfield County	Should read…mitigation measures ~~could be modified~~ shall be allowed on a case-by-case for avoidance		
4.	3-117	26	Fred Jarman	Garfield County	Please define the word "temporary"		
5.	4-68	17	Fred Jarman	Garfield County	There is nothing in here from Dr. Walker's work on distance from forests as a key criterion for defining suitable habitat due to avian predation….		
6.	2-158		Fred Jarman	Garfield County	Table 2-7: In each case for Exception, Modification, and Waiver, there needs to be text added after the first line that reads: The Authorized Officer, based on publically available criteria….		

[1] A = Comment accepted; R = Comment rejected with explanation; M = Comment-response modified

Comments on Preliminary Draft RMPA/EIS for Local/State Office Review (March 20, 2013)

Cmt #	Page #	Row # or Line #	Reviewer Name	Reviewer Office/ Affiliation	Comment	A/R/M[1]	Response / How Resolved *(Reviewers: Leave this column blank)*
7.	2-155		Fred Jarman	Garfield County	Add the following text under Alternative D for Habitat Restoration as a new NTT No. 98: For areas within the political boundaries of Garfield County, only the following shall apply: The naturally patchy habitat in the Plan Area requires that habitat restoration projects be planned accordingly and that creating large contiguous landscapes of sagebrush is not consistent with the plant communities in the Plan Area. Encourage habitat restoration projects on private land. Request that private landowners report annually on the progress of restoration efforts (providing spatial data associated with an API number, date, and status of restoration), so the County may track disturbed vs. restored acreages in and near Suitable Habitat. Recognizing that local conditions in the Plan Area differ from those range-wide for sage-grouse, the County's mapped Suitable Habitat will be used for quantifying habitat conservation objectives of no net loss of Suitable Habitat (excluding that resulting from wildfire and temporary disturbances, as permitted). Require the use of native plant species for restoration based on availability, and probability of successful establishment. Encourage local private landowners to share information among themselves and the County on restoration design and strategies to obtain favorable outcomes. **Policy Item** – Improve sagebrush habitat or in habitat to be converted to sagebrush: make re-establishment of sagebrush and desirable understory plant cover (relative to ecological site potential) the highest priority for restoration efforts.		

[1] A = Comment accepted; R = Comment rejected with explanation; M = Comment accepted modified

Comments on Preliminary Draft RMPA/EIS for Local/State Office Review (March 20, 2013)

Cmt #	Page #	Row # or Line #	Reviewer Name	Reviewer Office/ Affiliation	Comment	A/R/M[1]	Response / How Resolved *(Reviewers: Leave this column blank)*
8.	2-150		Fred Jarman	Garfield County	Add the following text under Alternative D for ES&R in NTT No. 87: For areas within the political boundaries of Garfield County, only the following shall apply: 1) Follow the County's habitat restoration policy in developing an emergency rehabilitation plan for temporarily disturbed areas within suitable habitat. 2) Coordinate with appropriate agencies in developing and implementing rehabilitation plans. 3) Coordinate with private landowners and leaseholders to integrate their expertise and knowledge of local conditions into rehabilitation plans.		
9.	2-149		Fred Jarman	Garfield County	Add the following text under Alternative D for Fire Operations in NTT No. 85 and 86: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), prioritize suppression immediately after firefighter and public safety. Consider GRSG habitat requirements in conjunction with all resource values managed by the BLM, and give preference to grouse habitat unless site specific circumstances warrant an exemption.		
10.	2-148		Fred Jarman	Garfield County	Add the following text under Alternative D for Fuels Management in NTT No. 83 and 84: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), during fuels management project design, consider the utility of using livestock to strategically reduce fire fuels (Diamond at al. 2009), and implement grazing management that will accomplish this objective (Davies et al. 2011 and Launchbaugh et al 2007). Consult with ecologists to minimize impacts to native perennial grasses consistent with the objectives and conservation measures of the range management policy.		

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Comments on Preliminary Draft RMPA/EIS for Local/State Office Review (March 20, 2013)

Cmt #	Page #	Row # or Line #	Reviewer Name	Reviewer Office/ Affiliation	Comment	A/R/M[1]	Response / How Resolved *(Reviewers: Leave this column blank)*
11.	2-147		Fred Jarman	Garfield County	Add the following text under Alternative D for Fuels Management in NTT No. 81 and 82: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Recognizing that local conditions differ from those range-wide for sage-grouse, the County's mapped Suitable Habitat will be used for quantifying habitat conservation objectives of no net loss of Suitable Habitat (excluding that resulting from wildfire and temporary disturbances, as permitted). Require the use of native plant species for restoration based on availability, and probability of successful establishment.		
12.	2-147		Fred Jarman	Garfield County	Add the following text under Alternative D for Fuels Management in NTT No. 80: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Any grazing restrictions or conservation measures that are put in place through a grazing permit shall be based solely on the conditions and activities specific to that permitted grazing allotment.		

[1] A = Comment accepted; R = Comment rejected with explanation; M = Comment-response modified

Comments on Preliminary Draft RMPA/EIS for Local/State Office Review (March 20, 2013)

Cmt #	Page #	Row # or Line #	Reviewer Name	Reviewer Office/ Affiliation	Comment	A/R/M[1]	Response / How Resolved *(Reviewers: Leave this column blank)*
13.	2-146		Fred Jarman	Garfield County	Add the following text under Alternative D for Fuels Management in NTT No. 80: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), All federal and state agencies with management responsibilities in the plan area for the species and/or its habitat shall provide the County with an annual update of the monitoring programs they have in place, data collected and specifics about their collection protocols. These agencies will inform the County of proposed research projects and allow for the County's input and collaboration prior to implementation. All data shall be collected according to the guidelines issued under the Information Quality Act. All data that is gathered in the Plan Area shall be shared with the County in a timely manner, and supplied to the County regardless of its state of completion at the formal request of the County. Private landowners are also encouraged to monitor and share data collected on private property with the County. All data that is shared with the County that is not public information will be treated as confidential and used by the County only to help inform its policies and best management practices.		

[1] A = Comment accepted; R = Comment rejected with explanation; M = Comment-response modified

Comments on Preliminary Draft RMPA/EIS for Local/State Office Review (March 20, 2013)

Cmt #	Page #	Row # or Line #	Reviewer Name	Reviewer Office/ Affiliation	Comment	A/R/M[1]	Response / How Resolved *(Reviewers: Leave this column blank)*
14.	2-145		Fred Jarman	Garfield County	Add the following text under Alternative D for Fuels Management in NTT No. 76-78: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Provide technical (GIS) support that can be used by landowners for voluntary fuels management that is consistent with sage-grouse habitat protection and enhancement. Work with landowners to design fuels management projects in Suitable Habitat to strategically and effectively reduce wildfire threats.		

[1] A = Comment accepted; R = Comment rejected with explanation; M = Comment-response modified

Comments on Preliminary Draft RMPA/EIS for Local/State Office Review (March 20, 2013)

Cmt #	Page #	Row # or Line #	Reviewer Name	Reviewer Office/ Affiliation	Comment	A/R/M[1]	Response / How Resolved *(Reviewers: Leave this column blank)*
15.	2-144		Fred Jarman	Garfield County	Add the following text under Alternative D for **Fuels Management** in NTT No. 75: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), **A. Fuels Management Policy** 1) Provide technical (GIS) support that can be used by landowners for voluntary fuels management that is consistent with sage-grouse habitat protection and enhancement. 2) Work with landowners to design fuels management projects in Suitable Habitat to strategically and effectively reduce wildfire threats. Garfield County Greater Sage-Grouse Conservation Plan Page 36 3) During fuels management project design, consider the utility of using livestock to strategically reduce fire fuels (Diamond at al. 2009), and implement grazing management that will accomplish this objective (Davies et al. 2011 and Launchbaugh et al 2007). Consult with ecologists to minimize impacts to native perennial grasses consistent with the objectives and conservation measures of the range management policy. **B. Emergency Stabilization and Rehabilitation Policy** 1) Follow the County's habitat restoration policy in developing an emergency rehabilitation plan for temporarily disturbed areas within suitable habitat.		

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16.			Fred Jarman	Garfield County	2) Coordinate with appropriate agencies in developing and implementing rehabilitation plans. 3) Coordinate with private landowners and leaseholders to integrate their expertise and knowledge of local conditions into rehabilitation plans.		

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17.	2-144		Fred Jarman	Garfield County	Add the following text under Alternative D for Split Estate Minerals in NTT No. 73 and 74: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Close suitable habitat as determined by the County's GIS mapping to future mineral leasing surface disturbance unless the resource cannot be extracted without minimal surface disturbance. In this case, the Best Management Practices will be followed and if necessary mitigation utilized to ensure a no net loss to sage grouse habitat and no deleterious demographic effect on the population. All active Leks identified outside of suitable habitat shall have a 0.6 mile NSO for all non-functional surface disturbance as defined in the Colorado State Plan. Exceptions for allowing functional disturbance within the 0.6 mile NSO may be allowed for exceptional or unique topography or other non-contributing habitat aspects or circumstances that will not adversely impact sage-grouse. If the resources cannot be accessed without disturbing the active Lek NSO habitat, then Best Management Practices will be followed and necessary mitigation utilized to ensure a no net loss to sage grouse potential habitat and no deleterious demographic effect on the population. No federal land mineral withdrawals shall be made in Suitable Habitat areas if the resources can be accessed and extracted without surface disturbance. .		

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18.	2-143 and 2-144		Fred Jarman	Garfield County	Add the following text under Alternative D for Salable Minerals in NTT No. 71 and 72: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Close suitable habitat as determined by the County's GIS mapping to future mineral leasing surface disturbance unless the resource cannot be extracted without minimal surface disturbance. In this case, the Best Management Practices will be followed and if necessary mitigation utilized to ensure a no net loss to sage grouse habitat and no deleterious demographic effect on the population. All active Leks identified outside of suitable habitat shall have a 0.6 mile NSO for all non-functional surface disturbance as defined in the Colorado State Plan. Exceptions for allowing functional disturbance within the 0.6 mile NSO may be allowed for exceptional or unique topography or other non-contributing habitat aspects or circumstances that will not adversely impact sage-grouse. If the resources cannot be accessed without disturbing the active Lek NSO habitat, then Best Management Practices will be followed and necessary mitigation utilized to ensure a no net loss to sage grouse potential habitat and no deleterious demographic effect on the population. No federal land mineral withdrawals shall be made in Suitable Habitat areas if the resources can be accessed and extracted without surface disturbance.		

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19.	2-143		Fred Jarman	Garfield County	Add the following text under Alternative D for Non-Energy Leasable Minerals in NTT No. 69 and 70: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Close suitable habitat as determined by the County's GIS mapping to future mineral leasing surface disturbance unless the resource cannot be extracted without minimal surface disturbance. In this case, the Best Management Practices will be followed and if necessary mitigation utilized to ensure a no net loss to sage grouse habitat and no deleterious demographic effect on the population. All active Leks identified outside of suitable habitat shall have a 0.6 mile NSO for all non-functional surface disturbance as defined in the Colorado State Plan. Exceptions for allowing functional disturbance within the 0.6 mile NSO may be allowed for exceptional or unique topography or other non-contributing habitat aspects or circumstances that will not adversely impact sage-grouse. If the resources cannot be accessed without disturbing the active Lek NSO habitat, then Best Management Practices will be followed and necessary mitigation utilized to ensure a no net loss to sage grouse potential habitat and no deleterious demographic effect on the population. No federal land mineral withdrawals shall be made in Suitable Habitat areas if the resources can be accessed and extracted without surface disturbance.		

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20.	2-141 and 2-142		Fred Jarman	Garfield County	Add the following text under Alternative D for Locatable Minerals in NTT No. 65 through 68: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Close suitable habitat as determined by the County's GIS mapping to future mineral leasing surface disturbance unless the resource cannot be extracted without minimal surface disturbance. In this case, the Best Management Practices will be followed and if necessary mitigation utilized to ensure a no net loss to sage grouse habitat and no deleterious demographic effect on the population. All active Leks identified outside of suitable habitat shall have a 0.6 mile NSO for all non-functional surface disturbance as defined in the Colorado State Plan. Exceptions for allowing functional disturbance within the 0.6 mile NSO may be allowed for exceptional or unique topography or other non-contributing habitat aspects or circumstances that will not adversely impact sage-grouse. If the resources cannot be accessed without disturbing the active Lek NSO habitat, then Best Management Practices will be followed and necessary mitigation utilized to ensure a no net loss to sage grouse potential habitat and no deleterious demographic effect on the population. No federal land mineral withdrawals shall be made in Suitable Habitat areas if the resources can be accessed and extracted without surface disturbance.		

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21.	2-136 to 2-141		Fred Jarman	Garfield County	Add the following text under Alternative D for Solid Minerals - Coal in NTT No. 62 through 64: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Close suitable habitat as determined by the County's GIS mapping to future mineral leasing surface disturbance unless the resource cannot be extracted without minimal surface disturbance. In this case, the Best Management Practices will be followed and if necessary mitigation utilized to ensure a no net loss to sage grouse habitat and no deleterious demographic effect on the population. All active Leks identified outside of suitable habitat shall have a 0.6 mile NSO for all non-functional surface disturbance as defined in the Colorado State Plan. Exceptions for allowing functional disturbance within the 0.6 mile NSO may be allowed for exceptional or unique topography or other non-contributing habitat aspects or circumstances that will not adversely impact sage-grouse. If the resources cannot be accessed without disturbing the active Lek NSO habitat, then Best Management Practices will be followed and necessary mitigation utilized to ensure a no net loss to sage grouse potential habitat and no deleterious demographic effect on the population. No federal land mineral withdrawals shall be made in Suitable Habitat areas if the resources can be accessed and extracted without surface disturbance.		

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22.	2-133 to 2-136		Fred Jarman	Garfield County	Add the following text under Alternative D for **Fluid Minerals** in NTT No. 55 through 61: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Close suitable habitat as determined by the County's GIS mapping to future mineral leasing surface disturbance unless the resource cannot be extracted without minimal surface disturbance. In this case, the Best Management Practices will be followed and if necessary mitigation utilized to ensure a no net loss to sage grouse habitat and no deleterious demographic effect on the population. **A**ll active Leks identified outside of suitable habitat shall have a 0.6 mile NSO for all non-functional surface disturbance as defined in the Colorado State Plan. Exceptions for allowing functional disturbance within the 0.6 mile NSO may be allowed for exceptional or unique topography or other non-contributing habitat aspects or circumstances that will not adversely impact sage-grouse. If the resources cannot be accessed without disturbing the active Lek NSO habitat, then Best Management Practices will be followed and necessary mitigation utilized to ensure a no net loss to sage grouse potential habitat and no deleterious demographic effect on the population. No federal land mineral withdrawals shall be made in Suitable Habitat areas if the resources can be accessed and extracted without surface disturbance.		

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23.	2-129 to 2-133		Fred Jarman	Garfield County	Add the following text under Alternative D for Leased Fluid Minerals in NTT No. 47 through 54: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Close suitable habitat as determined by the County's GIS mapping to future mineral leasing surface disturbance unless the resource cannot be extracted without minimal surface disturbance. In this case, the Best Management Practices will be followed and if necessary mitigation utilized to ensure a no net loss to sage grouse habitat and no deleterious demographic effect on the population. All active Leks identified outside of suitable habitat shall have a 0.6 mile NSO for all non-functional surface disturbance as defined in the Colorado State Plan. Exceptions for allowing functional disturbance within the 0.6 mile NSO may be allowed for exceptional or unique topography or other non-contributing habitat aspects or circumstances that will not adversely impact sage-grouse. If the resources cannot be accessed without disturbing the active Lek NSO habitat, then Best Management Practices will be followed and necessary mitigation utilized to ensure a no net loss to sage grouse potential habitat and no deleterious demographic effect on the population. No federal land mineral withdrawals shall be made in Suitable Habitat areas if the resources can be accessed and extracted without surface disturbance.		

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24.	2-129 to 2-133		Fred Jarman	Garfield County	Add the following text under Alternative D for Leased Fluid Minerals in NTT No. 47 through 54: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Encourage use of anti-perch devices, burying of powerlines, closed rubbish bins, removal of road kill and dead livestock, and other methods to discourage predators on sage-grouse and limit excess predation. If predation on sage-grouse is documented to have a deleterious effect on the Roan Plateau sage-grouse population, then allow for appropriate mitigation of predation under USDA guidance. Restrict the construction of tall facilities and fences to the minimum number and amount needed. To discourage avian predators, require installation of anti-perch devices on new fences and facilities within 4 miles of occupied suitable habitat where avian predation has been identified as a cause of mortality. Additionally, encourage retrofitting of existing fences and structures with anti-perch devices that are also located within 4 miles of occupied suitable habitat where avian predation has been identified as a cause of mortality.		

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25.	2-127 to 2-129		Fred Jarman	Garfield County	Add the following text under Alternative D for Unleased Fluid Minerals in NTT No. 46: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Close suitable habitat as determined by the County's GIS mapping to future mineral leasing surface disturbance unless the resource cannot be extracted without minimal surface disturbance. In this case, the Best Management Practices will be followed and if necessary mitigation utilized to ensure a no net loss to sage grouse habitat and no deleterious demographic effect on the population. All active Leks identified outside of suitable habitat shall have a 0.6 mile NSO for all non-functional surface disturbance as defined in the Colorado State Plan. Exceptions for allowing functional disturbance within the 0.6 mile NSO may be allowed for exceptional or unique topography or other non-contributing habitat aspects or circumstances that will not adversely impact sage-grouse. If the resources cannot be accessed without disturbing the active Lek NSO habitat, then Best Management Practices will be followed and necessary mitigation utilized to ensure a no net loss to sage grouse potential habitat and no deleterious demographic effect on the population. No federal land mineral withdrawals shall be made in Suitable Habitat areas if the resources can be accessed and extracted without surface disturbance.		

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26.	2-125 through 2-127		Fred Jarman	Garfield County	Add the following text under Alternative D for Wild Horses in NTT No. 40 through 45: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Wild Horses and Burro's are not known to occur within the Plan Area and therefore do not presently impact sage grouse habitat. Collaborate with appropriate agencies to discourage establishment of (feral) wild horse populations that could be detrimental to sage-grouse habitat.		

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27.	2-124 to 2-125		Fred Jarman	Garfield County	Add the following text under Alternative D for Retirement of Grazing Privileges in NTT No. 39: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Garfield County continues to enjoy a long history of livestock grazing on both private and public lands. When properly managed, livestock can coexist with sage-grouse as well as help improve suitable habitat and decrease fire hazards. Maintain sustainable grazing consistent with historic land use and ranching practices that are sustainable for both agricultural operations as well as sage-grouse habitats, as recommended by the U.S. Department of Agriculture, Natural Resources Conservation Service throughout the Plan Area. Livestock grazing can be utilized as a tool to properly manage sage-grouse habitat, and should not be removed from the Plan Area. Any grazing restrictions or conservation measures that are put in place through a grazing permit shall be based solely on the conditions and activities specific to that permitted grazing allotment.		

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28.	2-122 through 2-124		Fred Jarman	Garfield County	Add the following text under Alternative D for **Structural Range Improvements and Livestock Management Tools** in NTT No. 34 through 38: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Maintain sustainable grazing consistent with historic land use and ranching practices that are sustainable for both agricultural operations as well as sage-grouse habitats, as recommended by the U.S. Department of Agriculture, Natural Resources Conservation Service throughout the Plan Area. Livestock grazing can be utilized as a tool to properly manage sage-grouse habitat, and should not be removed from the Plan Area. Any grazing restrictions or conservation measures that are put in place through a grazing permit shall be based solely on the conditions and activities specific to that permitted grazing allotment. All federal and state agencies with management responsibilities in the plan area for the species and/or its habitat shall provide the County with an annual update of the monitoring programs they have in place, data collected and specifics about their collection protocols. These agencies will inform the County of proposed research projects and allow for the County's input and collaboration prior to implementation.		

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29.	2-122 through 2-124		Fred Jarman	Garfield County	Add the following text under Alternative D for **Structural Range Improvements and Livestock Management Tools** in NTT No. 34 through 38: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), All data shall be collected according to the guidelines issued under the Information Quality Act. All data that is gathered in the Plan Area shall be shared with the County in a timely manner, and supplied to the County regardless of its state of completion at the formal request of the County. Private landowners are also encouraged to monitor and share data collected on private property with the County. All data that is shared with the County that is not public information will be treated as confidential and used by the County only to help inform its policies and best management practices.		

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30.	2-120 through 2-122		Fred Jarman	Garfield County	Add the following text under Alternative D for **Treatments to Increase Forage for Livestock / wild Ungulates** in NTT No. 32 through 33: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Maintain sustainable grazing consistent with historic land use and ranching practices that are sustainable for both agricultural operations as well as sage-grouse habitats, as recommended by the U.S. Department of Agriculture, Natural Resources Conservation Service throughout the Plan Area. Livestock grazing can be utilized as a tool to properly manage sage-grouse habitat, and should not be removed from the Plan Area. Any grazing restrictions or conservation measures that are put in place through a grazing permit shall be based solely on the conditions and activities specific to that permitted grazing allotment. All federal and state agencies with management responsibilities in the plan area for the species and/or its habitat shall provide the County with an annual update of the monitoring programs they have in place, data collected and specifics about their collection protocols. These agencies will inform the County of proposed research projects and allow for the County's input and collaboration prior to implementation.		

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31.	2-120 through 2-122		Fred Jarman	Garfield County	Add the following text under Alternative D for **Treatments to Increase Forage for Livestock / wild Ungulates** in NTT No. 32 through 33: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), All data shall be collected according to the guidelines issued under the Information Quality Act. All data that is gathered in the Plan Area shall be shared with the County in a timely manner, and supplied to the County regardless of its state of completion at the formal request of the County. Private landowners are also encouraged to monitor and share data collected on private property with the County. All data that is shared with the County that is not public information will be treated as confidential and used by the County only to help inform its policies and best management practices.		

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32.	2-117 through 2-120		Fred Jarman	Garfield County	Add the following text under Alternative D for **Riparian Areas and Wet Meadows** in NTT No. 27 through 31: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Maintain sustainable grazing consistent with historic land use and ranching practices that are sustainable for both agricultural operations as well as sage-grouse habitats, as recommended by the U.S. Department of Agriculture, Natural Resources Conservation Service throughout the Plan Area. Livestock grazing can be utilized as a tool to properly manage sage-grouse habitat, and should not be removed from the Plan Area. Any grazing restrictions or conservation measures that are put in place through a grazing permit shall be based solely on the conditions and activities specific to that permitted grazing allotment. All federal and state agencies with management responsibilities in the plan area for the species and/or its habitat shall provide the County with an annual update of the monitoring programs they have in place, data collected and specifics about their collection protocols. These agencies will inform the County of proposed research projects and allow for the County's input and collaboration prior to implementation.		

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33.	2-117 through 2-120		Fred Jarman	Garfield County	Add the following text under Alternative D for **Riparian Areas and Wet Meadows** in NTT No. 27 through 31: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), For areas within the political boundaries of Garfield County within Suitable Habitat (SH), All data shall be collected according to the guidelines issued under the Information Quality Act. All data that is gathered in the Plan Area shall be shared with the County in a timely manner, and supplied to the County regardless of its state of completion at the formal request of the County. Private landowners are also encouraged to monitor and share data collected on private property with the County. All data that is shared with the County that is not public information will be treated as confidential and used by the County only to help inform its policies and best management practices.		

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34.	2-115 through 2-117		Fred Jarman	Garfield County	Add the following text under Alternative D for **Implementing Management Actions after Land Health and Habitat Evaluations** in NTT No. 23 through 26: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), All federal and state agencies with management responsibilities in the plan area for the species and/or its habitat shall provide the County with an annual update of the monitoring programs they have in place, data collected and specifics about their collection protocols. These agencies will inform the County of proposed research projects and allow for the County's input and collaboration prior to implementation. All data shall be collected according to the guidelines issued under the Information Quality Act. All data that is gathered in the Plan Area shall be shared with the County in a timely manner, and supplied to the County regardless of its state of completion at the formal request of the County. Private landowners are also encouraged to monitor and share data collected on private property with the County. All data that is shared with the County that is not public information will be treated as confidential and used by the County only to help inform its policies and best management practices.		

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35.	2-115 through 2-117		Fred Jarman	Garfield County	Add the following text under Alternative D for **Implementing Management Actions after Land Health and Habitat Evaluations** in NTT No. 23 through 26: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Garfield County continues to enjoy a long history of livestock grazing on both private and public lands. When properly managed, livestock can coexist with sage-grouse as well as help improve suitable habitat and decrease fire hazards. Maintain sustainable grazing consistent with historic land use and ranching practices that are sustainable for both agricultural operations as well as sage-grouse habitats, as recommended by the U.S. Department of Agriculture, Natural Resources Conservation Service throughout the Plan Area. Livestock grazing can be utilized as a tool to properly manage sage-grouse habitat, and should not be removed from the Plan Area. Any grazing restrictions or conservation measures that are put in place through a grazing permit shall be based solely on the conditions and activities specific to that permitted grazing allotment.		

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36.	2-115 to 2-115		Fred Jarman	Garfield County	Add the following text under Alternative D for **Range Management** in NTT No. 19 through 22: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Maintain sustainable grazing consistent with historic land use and ranching practices that are sustainable for both agricultural operations as well as sage-grouse habitats, as recommended by the U.S. Department of Agriculture, Natural Resources Conservation Service throughout the Plan Area. Livestock grazing can be utilized as a tool to properly manage sage-grouse habitat, and should not be removed from the Plan Area. Any grazing restrictions or conservation measures that are put in place through a grazing permit shall be based solely on the conditions and activities specific to that permitted grazing allotment. Predation of sage-grouse eggs, juveniles, and adults occurs naturally, but can increase in association with human development, unless precautions are undertaken. Encourage use of anti-perch devices, burying of power lines, closed rubbish bins, removal of road kill and dead livestock, and other methods to discourage predators on sage-grouse and limit excess predation. If predation on sage-grouse is documented to have a deleterious effect on the Roan Plateau sage-grouse population, then allow for appropriate mitigation of predation under USDA guidance.		

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37.	2-115 to 2-115		Fred Jarman	Garfield County	Add the following text under Alternative D for **Range Management** in NTT No. 19 through 22: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Restrict the construction of tall facilities and fences to the minimum number and amount needed. To discourage avian predators, require installation of anti-perch devices on new fences and facilities within 4 miles of occupied suitable habitat where avian predation has been identified as a cause of mortality. Additionally, encourage retrofitting of existing fences and structures with anti-perch devices that are also located within 4 miles of occupied suitable habitat where avian predation has been identified as a cause of mortality.		
38.	2-113		Fred Jarman	Garfield County	Add the following text under Alternative D for **Proposed Land Withdrawals** in NTT No. 17 through 18a: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), No federal land mineral withdrawals shall be made in Suitable Habitat areas if the resources can be accessed and extracted without surface disturbance.		

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39.	2-112		Fred Jarman	Garfield County	Add the following text under Alternative D for **Land Tenure Adjustment** in NTT No. 15 through 16: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Private land ownership of sage-grouse Habitat areas should be continued and encouraged as private land conservation efforts have been the most effective methods to preserve diverse and healthy habitats for many species. No federal land mineral withdrawals shall be made in Suitable Habitat areas if the resources can be accessed and extracted without surface disturbance.		
40.	2-111		Fred Jarman	Garfield County	Add the following text under Alternative D for **Lands Realty (ROW)** in NTT No. 14: For areas within the political boundaries of Garfield County within Suitable Habitat (SH), Placement of new above-ground power lines in Suitable Habitat and Lek NSO areas is prohibited. Bury new powerlines within Suitable Habitats and follow existing corridors unless there is a technical infeasibility, subject to valid existing rights. Anti-perch devices may be used where powerline burial is technically infeasible. Encourage placement liquid gathering facilities outside of priority areas. Have no tanks at well locations within priority areas (minimizes perching and nesting opportunities for ravens and raptors and truck traffic). Pipelines must be under or immediately adjacent to the road (Bui et al. 2010).		

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41.	2-111		Fred Jarman	Garfield County	Add the following text under Alternative D for **Lands Realty (ROW)** in NTT No. 13: For areas within the political boundaries of Garfield County, "avoidance areas" are only to be considered for lands within Suitable Habitat (SH) and 0.6 miles NSO areas from an active lek that occurs outside of suitable habitat as defined by Garfield County.		
42.	2-111		Fred Jarman	Garfield County	Add the following text under Alternative D for **Lands Realty (ROW)** in NTT No. 12: For areas within the political boundaries of Garfield County in Suitable habitat (SH), Habitats within the Plan Area are naturally fragmented and patchy; therefore, there are opportunities for new roads and energy development infrastructure to be placed outside Suitable Habitats. Further, any land acquisition shall be by mutual agreement between public and private entities. Placement of new above-ground power lines in Suitable Habitat and Lek NSO areas is prohibited. Bury new powerlines within Suitable Habitats and follow existing corridors unless there is a technical infeasibility, subject to valid existing rights. Anti-perch devices may be used where powerline burial is technically infeasible. Encourage placement liquid gathering facilities outside of priority areas. Have no tanks at well locations within priority areas (minimizes perching and nesting opportunities for ravens and raptors and truck traffic). Pipelines must be under or immediately adjacent to the road (Bui et al. 2010).		

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43.	2-111		Fred Jarman	Garfield County	Add the following text under Alternative D for **Lands Realty (ROW)** in NTT No. 11: For areas within the political boundaries of Garfield County in Suitable habitat (SH), Bury new powerlines within Suitable Habitats and follow existing corridors unless there is a technical infeasibility, subject to valid existing rights. Anti-perch devices may be used where powerline burial is technically infeasible.		
44.	2-110		Fred Jarman	Garfield County	Under Disturbance Exception Criteria where it states the "authorized officer may authorize disturbance" needs to include objective and publically available criteria to make that decision rather than leaving it to personal discretion.		
45.	2-110		Fred Jarman	Garfield County	Add the following text under Alternative D for **Lands Realty (ROW)** in NTT No. 10: For areas within the political boundaries of Garfield County in Suitable habitat (SH),**:** Encourage clustering / centralization of disturbances, operations (fracture stimulation, liquids gathering, etc.), and facilities. Encourage placement of infrastructure in already disturbed locations where the habitat has not been restored. Encourage a phased development approach with concurrent reclamation. Encourage placement liquid gathering facilities outside of priority areas. Have no tanks at well locations within priority areas (minimizes perching and nesting opportunities for ravens and raptors and truck traffic). Pipelines must be under or immediately adjacent to the road (Bui et al. 2010).		

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46.	2-110		Fred Jarman	Garfield County	Add the following text under Alternative D for **Lands Realty (ROW)** in NTT No. 10: For areas within the political boundaries of Garfield County in Suitable habitat (SH), this habitat is naturally fragmented and patchy; therefore, there are opportunities for new roads and energy development infrastructure to be placed outside Suitable Habitats. Further, any land acquisition shall be by mutual agreement between public and private entities. Placement of new above-ground power lines in Suitable Habitat and Lek NSO areas is prohibited. Bury new powerlines within Suitable Habitats and follow existing corridors unless there is a technical infeasibility, subject to valid existing rights. Anti-perch devices may be used where powerline burial is technically infeasible. Encourage clustering / centralization of disturbances, operations (fracture stimulation, liquids gathering, etc.), and facilities.		

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47.	2-109		Fred Jarman	Garfield County	Add the following text under Alternative D for **Recreation** in NTT No. 9: For areas within the political boundaries of Garfield County in Suitable habitat (SH), Recreational use within Suitable Habitat is extremely limited because the majority of the land is privately held and access is strictly controlled. This significantly reduces potential direct or indirect impacts to sage-grouse or their habitats by the general public. Any plan for creating new or additional recreational opportunities on federal lands in Suitable Habitats must provide Garfield County a sage-grouse impact analysis for review. Limit motorized recreational use to existing roads, primitive roads, and trails (as verified by Garfield County), in Suitable Habitat and Lek NSO areas. Avoid all Suitable Habitat and Lek NSO areas as identified on Garfield County Habitat Maps.		

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48.	2-108		Fred Jarman	Garfield County	Add the following text under Alternative D for **Recreation** in NTT No. 9: For areas within the political boundaries of Garfield County in Suitable habitat (SH), Encourage habitat restoration projects on private land. Request that private landowners report annually on the progress of restoration efforts (providing spatial data associated with an API number, date, and status of restoration), so the County may track disturbed vs. restored acreages in and near Suitable Habitat. Recognizing that local conditions in the Plan Area differ from those range-wide for sage-grouse, the County's mapped Suitable Habitat will be used for quantifying habitat conservation objectives of no net loss of Suitable Habitat (excluding that resulting from wildfire and temporary disturbances, as permitted). Require the use of native plant species for restoration based on availability, and probability of successful establishment.		

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49.	2-108		Fred Jarman	Garfield County	Add the following text under Alternative D for **Travel** in NTT No. 7 and 8: For areas within the political boundaries of Garfield County in Suitable habitat (SH), Allow no upgrading of existing routes, as verified by Garfield County, in Suitable Habitat or Lek NSO areas that would change route category (road, primitive road, or trail) or capacity unless the upgrading would have minimal impact on sage-grouse habitat, is necessary for motorist safety, or eliminates the need to construct a new road. When reclaiming roads and trails, use locally native seed mixes as prescribed by a professional biologist and use transplanted or seeded sagebrush unless unfeasible.		
50.	2-108		Fred Jarman	Garfield County	Add the following text under Alternative D for **Travel** in NTT No. 6: For areas within the political boundaries of Garfield County in Suitable habitat (SH), Allow no upgrading of existing routes, as verified by Garfield County, in Suitable Habitat or Lek NSO areas that would change route category (road, primitive road, or trail) or capacity unless the upgrading would have minimal impact on sage-grouse habitat, is necessary for motorist safety, or eliminates the need to construct a new road.		

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51.	2-106		Fred Jarman	Garfield County	Add the following text under Alternative D for **Travel** in NTT No. 4: For areas within the political boundaries of Garfield County in Suitable habitat (SH), Allow no upgrading of existing routes, as verified by Garfield County, in Suitable Habitat or Lek NSO areas that would change route category (road, primitive road, or trail) or capacity unless the upgrading would have minimal impact on sage-grouse habitat, is necessary for motorist safety, or eliminates the need to construct a new road.		
52.	2-106		Fred Jarman	Garfield County	Add the following text under Alternative D for **Travel** in NTT No. 2: For areas within the political boundaries of Garfield County in Suitable habitat (SH), County roads, as determined by Garfield County and identified on County Maps (see Habitat Maps Chapter of the Plan), shall only be closed or restricted by Garfield County.		

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53.	2-106		Fred Jarman	Garfield County	Add the following text under Alternative D for **Travel** in NTT No. 1: For areas within the political boundaries of Garfield County in Suitable habitat (SH), Limit motorized travel to existing roads, primitive roads, and trails, as verified by Garfield County, at a minimum in Suitable Habitats and in Lek NSO areas. County roads, as determined by Garfield County and identified on County Maps (see Habitat Maps Chapter of the Plan), shall only be closed or restricted by Garfield County. Allow no upgrading of existing routes, as verified by Garfield County, in Suitable Habitat or Lek NSO areas that would change route category (road, primitive road, or trail) or capacity unless the upgrading would have minimal impact on sage-grouse habitat, is necessary for motorist safety, or eliminates the need to construct a new road. When reclaiming roads and trails, use locally native seed mixes as prescribed by a professional biologist and use transplanted or seeded sagebrush unless unfeasible.		
54.	2-110		Fred Jarman	Garfield County	In Alternative D under **Disturbance Exception Criteria** where it states "authorized officer may authorize disturbance in" it should say "…authorized officer may authorize disturbance using publicly available objective criteria…"		

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55.	ES-5	7-9	Fred Jarman	Garfield County	Correct acreage totals for BLM-administered lands in the planning area. Current acreage totals include private lands not administered by the BLM. (Page 1-2 uses approximately 1,669,669 acres of BLM and NFS administered lands, and 2,711,233 acres of federal mineral estate that may lie beneath other surface ownerships, but do not take into account the differences between suitable habitat as mapped by Garfield County and the BLM/CPW PPH and PGH map totals.) This statement conflicts with, and is inconsistent with Garfield County Plan Principle #6 (GCGSGCP pg 30). "No policies shall infringe on the private property rights of any landowner within Garfield County. All species and land coverage information gathered on private property shall be treated as the property of the landowner and shall not be used by any private or government entity for any purpose unless express, written permission has been obtained by the landowner." Action necessary for consistency: remove private land acreages from PPH, PGH and linkage habitat acreage totals as BLM-administered lands.		

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56.	ES-8	19-22	Fred Jarman	Garfield County	Garfield County Sage-Grouse Suitable Habitat Map was developed using the habitat criteria consistent with Connelly et al. 2004. Based on the uniqueness of the habitats on the Roan, these criteria were "relaxed" in order to pick up potential habitats in less optimal habitats (such as mixed mountain shrublands, and on steeper slopes, and closer to forests), therefore allowing for more habitat than otherwise would be captured under the WAFWA standards. Action needed: Use Garfield County's approved sage-grouse suitable habitat maps for those areas within the planning area that are within the political boundaries of Garfield County.		
57.	ES-9	8	Fred Jarman	Garfield County	In part agrees with Garfield County Plan to recognize private property rights and in part conflicts with Garfield County Plan which insists that no policies shall "infringe" on private property rights. See Principle #6. "No policies shall infringe on private property rights of any landowner within Garfield County. All species and land coverage information gathered on private property shall be treated as the property of the landowner and shall not be used by any private or government entity for any purposes unless express, written permission has been obtained by the landowners."		
58.	ES-9	13-16	Fred Jarman	Garfield County	Agrees with Garfield County's Sage-Grouse Plan Implementation process through government-to-government coordination.		
59.	ES-9	17-19	Fred Jarman	Garfield County	Consistent with Garfield County's Sage-Grouse Plan.		

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60.	ES-9	26-29	Fred Jarman	Garfield County	Agrees in part with Garfield County's Plan, however Garfield County's plan goes further requiring that "All data and information used to produce conservation measures shall be made available to the public and the County and shall be coordinated with the County." (See principle #10).		
61.	ES-10	4-8	Fred Jarman	Garfield County	Agrees with Garfield County's Plan		
62.	ES-10	13	Fred Jarman	Garfield County	Agrees in part with Garfield County Plan Principle #10, however, the Garfield County principle goes further to ensure that there is a cause and effect relationship between the conservation measure and the benefit to the species.		
63.	ES-10	22-25	Fred Jarman	Garfield County	Current mapping data relied upon to determine PPH, PGH and linkage areas is not reproducible and does not comply with the Information Quality Act of 2000. The data upon which it relies has not been released to the public, and has been prepared using "guesswork" and "assumptions" rather than best available science. (See April 4, 2013 Comments by Brad Petch during Garfield County, BLM, USFWS and CPW coordination meeting). Need to replace mapping for the area within the political boundaries of Garfield County with Garfield County approved sage-grouse suitable habitat maps. Failure to utilize maps that comply with IQA violates not only the BLM's criteria, but also Garfield County Principle #3: "Sage-grouse management decisions shall be made based on the best available scientific information that is applicable to sage-grouse habitat in Garfield County. The scientific information used will be consistent with standards of the Information Quality Act (see definitions of Quality, Objectivity, Utility and Integrity), as determined by the County.		

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64.	ES-10	26-33	Fred Jarman	Garfield County	Conflicts with Garfield County Principle #1 which recognizes the uniqueness of the habitat in the county compared with other areas of the state and region and requires that development of the conservation measures be done from a bottom up approach using local knowledge and expertise, rather than a national and state top down approach.		
65.	ES-12	3-7	Fred Jarman	Garfield County	This statement conflicts with the purpose of the Garfield County Plan which does not limit the development of conservation measures or the analysis of impacts to just those identified by the USFWS's candidate determination notice of 2010.		
66.	ES-12	27-28	Fred Jarman	Garfield County	Insert Suitable Habitat to the following title: "Delineated Lands as Preliminary Priority Habitat, Preliminary General Habitat, ~~and~~ Linkages and Suitable Habitat as contained within the political boundaries of Garfield County determined by the Garfield County Habitat Map."		
67.	ES-12	29-32	Fred Jarman	Garfield County	Add the following text after alternative, line 30: except for the areas within the political boundaries of Garfield County under Alternative D, where the habitat is delineated as Suitable habitat (SH) determined by the Garfield County Habitat Map.		
68.	1-2	Table 1-1	Fred Jarman	Garfield County	**Planning Area Land Ownership and GRSG Habitat Table**. Change the Garfield County row data to: GRSG Habitat Type to SH (Suitable Habitat), BLM Land Ownership 7,491; State, County, City 31.5; Private 21,313.5; and Unclassified 11.8. (Based on Garfield County updated plan maps)		

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69.	1-3	Table 1-2	Fred Jarman	Garfield County	**Subsurface Federal Mineral Estate Table.** Change Garfield County row data to: GRSG Habitat Type SH (Suitable Habitat). All minerals 28,847.8; Planning Area Subtotal SH 28,847.8; Planning Area Total Acres 28,847.8. (Note that 14,791.6 are under private lands).		
70.	1-8	4-11	Fred Jarman	Garfield County	Inconsistent with Garfield County Plan description of Roan Plateau. Replace text with: The Parachute-Piceance-Roan Plateau area is comprised of roughly 28,847.8 acres of suitable habitat (SH). Roughly 85% of the land within the area does not support habitat characteristics necessary to support GSG as identified by Connelly et. al. 2004. The area is naturally fragmented, as a result of topography and the patch nature of sagebrush, non-sagebursh shrubs, meadows, aspen and conifers in the Plan area. Expanses of contiguous sagebrush, necessary to support a large stable population do not exist. Additionally, the sage-grouse population inhabiting the area is a peripheral population located on the far southeastern edge of the species range.		
71.	1-17	14-17	Fred Jarman	Garfield County	Garfield County Sage-Grouse Suitable Habitat Map was developed using the habitat criteria consistent with Connelly et al. 2004. Based on the uniqueness of the habitats on the Roan, these criteria were "relaxed" in order to pick up potential habitats in less optimal habitats (such as mixed mountain shrublands, and on steeper slopes, and closer to forests), therefore allowing for more habitat than otherwise would be captured under the WAFWA standards. Action needed: Use Garfield County's approved sage-grouse suitable habitat maps for those areas within the planning area that are within the political boundaries of Garfield County.		

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72.							
73.	1-17	18-20	Fred Jarman	Garfield County	BLM Instruction Memorandum 2012-044 requires that at the sub-regional level adjustments be made to conservation measures in order to address "local ecological site variability." Because of the very specific and unique ecological site variability in Garfield County habitat, inserting the County's Plan as the preferred alternative for the area within the political boundaries of Garfield County would be an appropriate and consistent action to comply with IM 2012-044.		
74.	1-17	39	Fred Jarman	Garfield County	In part agrees with Garfield County Plan to recognize private property rights and in part conflicts with Garfield County Plan which insists that no policies shall "infringe" on private property rights. See Principle #6. "No policies shall infringe on private property rights of any landowner within Garfield County. All species and land coverage information gathered on private property shall be treated as the property of the landowner and shall not be used by any private or government entity for any purposes unless express, written permission has been obtained by the landowners."		
75.	1-18	1-5	Fred Jarman	Garfield County	Agrees with Garfield County's Sage-Grouse Plan principle 4 and 5 requiring the Counties policies be applied on public lands as regulatory assurances through Coordination and applied on private lands as incentive-based assurances.		
76.	1-18	6-9	Fred Jarman	Garfield County	Agrees with Garfield County's Sage-Grouse Plan Implementation process through government-to-government coordination.		
77.	1-18	10-13	Fred Jarman	Garfield County	Consistent with Garfield County's Sage-Grouse Plan.		

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78.	1-18	14-17	Fred Jarman	Garfield County	Garfield County's Sage-Grouse Plan should be rigorously analyzed as an alternative for the habitat area within the political boundaries of County.		
79.	1-18	22-26	Fred Jarman	Garfield County	Agrees in part with Garfield County's Plan, however Garfield County's plan goes further requiring that "All data and information used to produce conservation measures shall be made available to the public and the County and shall be coordinated with the County." (See principle #10). Also, Garfield County's Plan includes, at a minimum, annual updates and changes to the conservation measures to ensure new science and effectiveness of conservation measures are based on the most current and best science as is appropriate to the unique Garfield County habitat (See principle #1).		
80.	1-18, 19	41-42, 1-4	Fred Jarman	Garfield County	Consistent with Garfield County Plan.		
81.	1-19	9-10	Fred Jarman	Garfield County	Agrees in part with Garfield County Plan Principle #10, however, the Garfield County principle goes further to ensure that there is a cause and effect relationship between the conservation measure and the benefit to the species.		

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82.	1-19	22-26	Fred Jarman	Garfield County	Current mapping data relied upon to determine PPH, PGH and linkage areas is not reproducible and does not comply with the Information Quality Act of 2000. The data upon which it relies has not been released to the public, and has been prepared using "guesswork" and "assumptions" rather than best available science. (See April 4, 2013 Comments by Brad Petch during Garfield County, BLM, USFWS and CPW coordination meeting). Need to replace mapping for the area within the political boundaries of Garfield County with Garfield County approved sage-grouse suitable habitat maps. Failure to utilize maps that comply with IQA violates not only the BLM's criteria, but also Garfield County Principle #3: "Sage-grouse management decisions shall be made based on the best available scientific information that is applicable to sage-grouse habitat in Garfield County. The scientific information used will be consistent with standards of the Information Quality Act (see definitions of Quality, Objectivity, Utility and Integrity), as determined by the County.		
83.	2-2	31-38	Fred Jarman	Garfield County	Garfield County Plan as an alternative for the area within the political boundaries of the county meets all five of the alternative goals identified: (1) Addresses the identified major planning issues, (2) explores opportunities to enhance management of resources and resource uses, (however, Garfield County plan goes further here by providing for immediate updates and changes to the conservation measures instead of at the end of a five year review period), (3) resolve conflicts among resources and resource uses, (4) meets the purpose of and need for the RMP and RMPA, and (5) is feasible.		

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84.	2-3	1-6	Fred Jarman	Garfield County	If Garfield County Plan is not included as an alternative within the political boundaries of Garfield County, then major conflicts between the four alternatives and Garfield County's plan will need to be resolved prior to release of the Draft EIS.		
85.	2-4	1-14	Fred Jarman	Garfield County	Substantial conflicts exist between Alternative A and the Garfield County Plan that must be resolved and discussed in the draft EIS if the Garfield Plan is not included as an alternative for the area within the political boundaries of Garfield County. Appropriate methods, procedures, actions and/or programs for consistency review will need to be carried out prior to release of the draft EIS. (43 CFR 1610.3.1(3))		
86.	2-4, 5	15-26, 1-2	Fred Jarman	Garfield County	Substantial conflicts exist between Alternative B and the Garfield County Plan that must be resolved and discussed in the draft EIS if the Garfield Plan is not included as an alternative for the area within the political boundaries of Garfield County. Appropriate methods, procedures, actions and/or programs for consistency review will need to be carried out prior to release of the draft EIS. (43 CFR 1610.3.1(3))		
87.	2-5	3-12	Fred Jarman	Garfield County	Substantial conflicts exist between Alternative C and the Garfield County Plan that must be resolved and discussed in the draft EIS if the Garfield Plan is not included as an alternative for the area within the political boundaries of Garfield County. Appropriate methods, procedures, actions and/or programs for consistency review will need to be carried out prior to release of the draft EIS. (43 CFR 1610.3.1(3))		

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88.	2-5	13-26	Fred Jarman	Garfield County	Substantial conflicts exist between Alternative D and the Garfield County Plan that must be resolved and discussed in the draft EIS if the Garfield Plan is not included as an alternative for the area within the political boundaries of Garfield County. Appropriate methods, procedures, actions and/or programs for consistency review will need to be carried out prior to release of the draft EIS. (43 CFR 1610.3.1(3))		
89.	2-2 (2nd 2-2)	9	Fred Jarman	Garfield County	Insert after "state agencies," local governments.		
90.	2-3 (2nd 2-3)	35-38	Fred Jarman	Garfield County	Statement that "Restrictions on resource uses (e.g. closed to leasing) made through this amendment apply for the life of the RMP," conflicts with Garfield County Plan where the cause and effect of impacts on sage-grouse and its habitat are reviewed and adjusted at a minimum annually. The county's plan is deliberately designed to react to changes quickly, utilizing the county's plan amendment process which can be finalized and implemented within months of determining the measures need to be changed.		
91.	2-2 (3rd 2-2)	Table 2-2	Fred Jarman	Garfield County	**Comparative Summary of Alternatives**: To include Garfield County Plan under Alternative D, adjust habitat acres to reflect 0 acres of PPH, PGH and Linkage for the area within the political boundaries of Garfield County, and add "Suitable Habitat" category that adds 28,847.8 acres. All other acreage numbers in table need to be changed to reflect the inclusion of the Garfield County Plan alternative.		

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92.	2-2 (3rd 2-2)	Table 2-2	Fred Jarman	Garfield County	**Identified for withdrawal:** Change Alternative D to reflect the Suitable Habitat within the boundaries of Garfield County would not be subject to withdrawal. (See Mineral Development Policy C: "No federal land mineral withdrawals shall be made in Suitable Habitat areas if the resources can be accessed and extracted without surface disturbance."		
93.	2-12	NTT no. 5	Fred Jarman	Garfield County	**Alternative B, Travel Management:** 3% disturbance policy conflicts with Garfield County Principle #9: "The ability of wildlife, including sage-grouse to habituate to inanimate manmade structures and changes to the landscape shall be acknowledged. Conflicts with Principle # 8, requiring that the land should not be managed for a singular purpose, which a 3% disturbance cap effectively forces to occur. It also conflicts with principle #3 requiring all decision be made based on the "best available scientific information that is applicable to sage-grouse habitat in Garfield County." A 3% disturbance cap across the PPH, PGH and linkage areas as mapped by BLM and CPW is not supported by best available science as most of this area is not capable of providing adequate habitat for the sage-grouse.		
94.	2-17	NTT No. 9	Fred Jarman	Garfield County	**Alternative B, Recreation:** To be consistent with Garfield County Plan, insert the following: <u>Any plan for creating new or additional recreational opportunities on federal lands in Suitable Habitat areas within the political boundaries of Garfield County must provide to the County a sage-grouse impact analysis for review.</u> (See GCSGCP page 33, Recreation.)		

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Comments on Preliminary Draft RMPA/EIS for Local/State Office Review (March 20, 2013)

Cmt #	Page #	Row # or Line #	Reviewer Name	Reviewer Office/ Affiliation	Comment	A/R/M[1]	Response / How Resolved *(Reviewers: Leave this column blank)*
95.	4-7	20-23	Fred Jarman	Garfield County	**Assumption re Disturbances:** Conflicts with Garfield County Plan Principle #9 which recognizes that "The ability of wildlife, including sage-grouse, to habituate to inanimate manmade structures and changes to the landscape shall be acknowledged." Change the word "would" to "may" in line 20.		
96.	4-7	29-31	Fred Jarman	Garfield County	**Assumption re Information Basis for Decisions:** Conflicts with Garfield County Plan Principle # 3 and #10 which requires all conservation measures, policies and management actions taken to conserve the Sage-Grouse be based on "best available science," verified under the criteria set forth in the Information Quality Act, and must be applicable to the local habitat. These measures shall be scientifically defensible and take into account the latest research and technological advances. Also the balance of impacts to other species must also be weighed. To correct the inconsistency, replace "information" with science at line 29 and add consistent with the standards of the Information Quality Act. Strike "management and conservation plans, and other research and related directives" and replace with Those management and conservation plans and other research and related directives that have been developed using the best available science and most recent technological advances as well as being locally applicable, will be relied upon and finish sentence with existing "to guide wildlife habitat management on BLM-administered lands."		

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Cmt #	Page #	Row # or Line #	Reviewer Name	Reviewer Office/ Affiliation	Comment	A/R/M[1]	Response / How Resolved *(Reviewers: Leave this column blank)*
97.	4-1 through 4-567	All	Fred Jarman	Garfield County	**Comment Pertaining to Chapter 4, Environmental Consequences:** CEQ regulations at 40 CFR 1502.16(c) requires the following to be included in this analysis; "Possible conflicts between the proposed action and the objective of Federal, regional, State, and local land use plans, policies and controls for the area concerned." It also requires that "Where an inconsistency exists, the statement should describe the extent to which the agency would reconcile its proposed action with the plan or law." (40 CFR 1506.2(d)) BLM Land Use Planning Regulations also require consistency with Garfield County. (43 CFR 1610.3-1 and 2) If the Garfield County Plan is not included as an alternative for the area within the political boundaries of the county, then each of the impact discussions in this chapter must evaluate the conflicts between the proposed action and Garfield County's Plan. A few examples of how these could be identified and resolved are shown in the following four comments for pages 4-9 through 4-11.		

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Comments on Preliminary Draft RMPA/EIS for Local/State Office Review (March 20, 2013)

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98.	4-9	1-5	Fred Jarman	Garfield County	**Impacts from Travel Management on Terrestrial Wildlife, Habitat Degradation:** Alternative A - D fails to recognize Garfield County Travel Management Policy B, which states "County roads, as determined by Garfield County and indentified on County Maps, shall only be closed or restricted by Garfield County." (D conflicts only if Garfield County Plan is not included as a part of this alternative) Suggested resolution: Add to Alternative's B, C, and D For the areas within the political boundaries of Garfield County, County roads shall only be closed or restricted by Garfield County. BLM will coordinate with the County to discuss closures of County's roads it finds would be beneficial to the sage-grouse.		
99.	4-9, 4-10	27-38, 1-2	Fred Jarman	Garfield County	**Impacts from Travel Management on Terrestrial Wildlife, Habitat Fragmentation:** Alternative B, C and D fails to recognize Garfield County Travel Management Policy B, which states "County roads, as determined by Garfield County and indentified on County Maps, shall only be closed or restricted by Garfield County." (D conflicts only if Garfield County Plan is not included as a part of this alternative) Suggested resolution: Add to Alternative's B, C, and D For the areas within the political boundaries of Garfield County, County roads shall only be closed or restricted by Garfield County. BLM will coordinate with the County to discuss closures of County's roads it finds would be beneficial to the sage-grouse.		

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100.	4-10	3-15	Fred Jarman	Garfield County	**Impacts from Travel Management on Terrestrial Wildlife, Habitat Restoration:** Alternative B, C and D fails to recognize Garfield County Travel Management Policy B, which states "County roads, as determined by Garfield County and indentified on County Maps, shall only be closed or restricted by Garfield County." (D conflicts only if Garfield County Plan is not included as a part of this alternative) Suggested resolution: Add to Alternative's B, C, and D For the areas within the political boundaries of Garfield County, County roads shall only be closed or restricted by Garfield County. BLM will coordinate with the County to discuss closures of County's roads it finds would be beneficial to the sage-grouse.		
101.	4-10, 4-11	29-36, 1-3	Fred Jarman	Garfield County	**Impacts from Recreation Management on Terrestrial Wildlife, Permitted Uses:** Alternatives A-D fails to recognize Garfield County Recreation Policy that requires "Any plan for creating new or additional recreational opportunities on federal lands in Suitable Habitats must provide Garfield County a sage-grouse impact analysis for review." (D conflicts only if Garfield County Plan is not included as a part of this alternative) Suggested resolution: add the following text to each alternative description. An impact analysis will need to be provided to Garfield County prior to approval of any recreational action in areas of Suitable Habitat in Garfield County.		
102.	5-4	Table 5-1	Fred Jarman	Garfield County	Add to Past Present and Reasonably Foreseeable Projects, Plans or Actions that comprise the Cumulative Impacts Scenario: Garfield County Greater Sage-Grouse Conservation Plan (Garfield County 2013) and the Parachute Piceance Roan Conservation Plan.		

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Comments on Preliminary Draft RMPA/EIS for Local/State Office Review (March 20, 2013)

Cmt #	Page #	Row # or Line #	Reviewer Name	Reviewer Office/ Affiliation	Comment	A/R/M[1]	Response / How Resolved *(Reviewers: Leave this column blank)*
103.	5-11	11	Fred Jarman	Garfield County	Insert local government so that the sentence reads "… coordination with states, local governments and agencies during consistency reviews,"		
104.	G-2	27-39	Fred Jarman	Garfield County	Conflicts with Garfield County Plan. Insert underlined sections into the text at line 33, after "However, a portion of the PPH does have special worth, and does give the BLM cause for concern." This area excludes that within the political boundaries of Garfield County where the habitat is naturally fragmented (patch size averages 16.7 acres) and is attended by a limited peripheral population that is not essential to the species survival.		
105.	G-3	1-11	Fred Jarman	Garfield County	Insert at the end of the sentence on line 8: excluding the area within the political boundaries of Garfield County which contains naturally fragmented habitat and is attended by a limited peripheral population that is not essential to the species survival.		
106.	3-274	8-12	Fred Jarman	Garfield County	Narrative describing study area unemployment rates and their relationship to the State of Colorado rate is inconsistent with the data presented in Table 3-97		
107.	3-276	Table 3-98	Fred Jarman	Garfield County	Footnote 2 references party spending per visit which is not a component of this table.		
108.	3-276	2-3	Fred Jarman	Garfield County	Total estimated visitor spending on BLM and Forest Service lands in the study area of $301 million may be low. Colorado Division of Parks and Wildlife estimated the annual direct economic impact of hunting and fishing alone in these counties at $218 million in 2008.		
109.	3-280	11-35	Fred Jarman	Garfield County	Discussion of mining employment should also note that mining activity (particularly oil and gas drilling) also generates a substantial number of jobs that are classified in the construction sector and not included in the numbers in these paragraphs.		

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110.	4-532	Table 4-13	Fred Jarman	Garfield County	Table indicates Alternative A (No Action) grazing on federal lands supports $1.8 million to $2.6 million in annual economic output. However, Table K-11 in socioeconomic appendix indicates Alternative A supports 327,000 to 477,000 AUMs, while Table K-12 indicates the total economic impact per AUM is $106 to $133. Combining these figures, Alternative A should support between $35 and $63 million in annual economic output from grazing.		
111.	4-535	Table 4-14	Fred Jarman	Garfield County	The total output figures from recreation appear consistent with the assumptions set forth in Appendix K. However, the assumption in that appendix of an average visitor expenditure of $37.20 per day for non-local, overnight trips (page K-32, line 13) is very low and inconsistent with the data reported in Table 3-99, which indicates non-local overnight visitors spend $91 to $201 per visitor day depending on their accommodations.		
112.	4-537	27-28	Fred Jarman	Garfield County	Text notes that existing wells would not be impacted by the alternatives. Should also note that new wells from existing leases would also not be impacted. Was this consideration reflected in the economic analysis?		
113.	4-538	14-22	Fred Jarman	Garfield County	BLM has not provided an estimate of the economic impact of Alternative D on oil and gas, yet has identified Alternative D as its Preferred Alternative. BLM should not proceed to issue a ROD in favor of Alternative D without providing some quantification of its economic impact on oil and gas, even if that impact must be shown as "up to" the impacts identified for Alternative B.		
114.	4-544	Table 4-17	Fred Jarman	Garfield County	Far right column is mislabeled. Should be labeled "Impact of Alternative C relative to 2010 Baseline." Numbers should be shown as negative.		

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Cmt #	Page #	Row # or Line #	Reviewer Name	Reviewer Office/ Affiliation	Comment	A/R/M[1]	Response / How Resolved *(Reviewers: Leave this column blank)*
115.	4-544	Table 4-17	Fred Jarman	Garfield County	The comparison of the economic contribution under Alternative A and Alternative C, and the impact of Alternative C relative to 2010 conditions, is useful. However, a summary of the estimated economic impact of Alternative D (BLM's Preferred Alternative) would be more useful, given the likelihood that BLM will proceed with that alternative.		
116.	5-51	Table 5-5	Fred Jarman	Garfield County	As noted in previous comments, Alternative D may be the most important, since it is BLM's Preferred Alternative. Some quantification of its impacts on oil and gas and agriculture should be provided, even if only the worst case ("up to") can be estimated.		
117.	5-52	Table 5-6	Fred Jarman	Garfield County	As noted in previous comments, Alternative D may be the most important, since it is BLM's Preferred Alternative. Some quantification of its impacts on oil and gas and agriculture should be provided, even if only the worst case ("up to") can be estimated.		
118.	4-193	27-29	Fred Jarman	Garfield County	The introduction discussion to Fluid Leasable Minerals notes that "decisions …also apply to oil shale…." Given the national strategic emphasis placed on recovery of these reserves, the known area holding these reserves and the unique development potential of local oil shale deposits, which cannot be replicated elsewhere and that could be of significant economic value, the effect on oil shale prospects deserve far greater attention throughout the document.		

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119.	4-210	6-9	Fred Jarman	Garfield County	"….the result would be to eliminate more than 44,000 wells from future production.." (alt. B) This number of wells, concentrated in a small portion of the geographic area, is a large impact, completely out of scale with the projections of very modest loss of jobs and economic activity. For example: Table 4-15 (page 4-538) suggests a loss of less than 2000 jobs between scenario A and B; and Appendix pages K-34- 38 suggests a loss of only 1800 wells between Alt. A and Alt. B.		
120.	4-210	21-24	Fred Jarman	Garfield County	"….making approximately 733,578 acres of currently unleased federal minerals in high potential areas for oil and gas unavailable for leasing would eliminate more than73,000 wells..." (alt. B). This number of wells, concentrated in a small portion of the geographic area, is a large impact completely out of scale with the projections of very modest lost jobs and economic activity. For example: Table 4-15 (page 4-538), which suggests a loss of less than 2000 jobs between scenario A and B; Appendix pages K-34- 38, which suggests a loss of only 1800 wells between Alt. A and Alt. B.		
121.	5-4	Table 5-1	Fred Jarman	Garfield County	Table 5-1 identifies the Garfield County Land Use Resolution of 2008 as a "Past, Present, and Reasonably Foreseeable Projects, Plans, or Actions that Comprise the Cumulative Impact Scenario." Despite this, there is no basis provided for including these land use regulations as a "plan" etc. Table 5-1 also neglected to include the Parachute Piceance Roan Conservation Plan and the Garfield County Greater Sage Grouse Conservation Plan as having an effect on how cumulative impacts are considered.		

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122.	5-14	8-14	Fred Jarman	Garfield County	This sentence should be amended to read: "Data and information that could become available between the Draft EIS and the Final EIS and enable a more comprehensive quantitative analysis may include the following: ongoing state and local land use plan amendments and revisions, state and local plans that may not yet be completed, coordination with states, ~~and~~ agencies, and local governments during consistency reviews, and data from non-BLM-administered lands. Those data that become available will be compiled and included in the quantitative cumulative effects analysis for GRSG in the Final EIS."		
123.	5-15	Table 5-3	Fred Jarman	Garfield County	Table 5-3: Habitat by Land Status should be revised to include the column header Acres within Suitable Habitat (SH) as mapped by Garfield County and it shall reflect the following totals for surface ownership: BLM: 7,491 acres or 26% of Suitable Habitat Private: 21,313.5 or 74% of Suitable Habitat Total: 28847.8 acres		
123.	5-22	39-41	Fred Jarman	Garfield County	The sentence should be revised to read: "Voluntary protections would continue to be implemented on private land (i.e., NRCS SGI) and in Colorado (i.e., the Colorado Greater Sage-Grouse Conservation Plan, The Parachute-Piceance-Roan Conservation Plan, and the Garfield County Greater Sage-Grouse Conservation Plan),		

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124.	5-29	4-7	Fred Jarman	Garfield County	Rewrite the language in Alternative A such that it reads: "In Colorado, the less-restrictive statewide Conservation Plan would likely mean that threats would continue to worsen in that portion of the Management Zone unless local working groups, counties, private land owners, and state and federal agencies coordinated together to develop~~ed~~ protections including incentives and best management practices ~~that are consistently implemented across broad areas~~ such as what is contained in the Garfield County Greater Sage-Grouse Conservation Plan and the Parachute-Piceance-Roan Conservation Plan.		
125.	5-30	9	Fred Jarman	Garfield County	Add after the last sentence: Additionally, this balanced approach is further demonstrated and supported by the policies and principles contained with the Garfield County Greater Sage-Grouse Conservation Plan and associated Suitable Habitat mapping that are included within this DEIS as a sub-component specifically as applied to the land area located within the political boundaries of Garfield County.		

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126.		Exhibit L	Fred Jarman	Garfield County	The cover letter from DNR states: "***This will be an iterative process. As stakeholders review the compiled material in the Package, they may notice gaps or inaccuracies. Those edits should be sent to Lisa Dale (lisa.dale@state.co.us) for inclusion, and revised versions of the document will be shared with FWS***." Garfield County sent DNR the Garfield County Greater Sage-Grouse Conservation Plan on March 22, 2013 as a result of an earlier email from DNR that stated: "***We would very much like to be able to include inputs from Garfield County, and I am happy to include information about new policies when you submit them…but bear in mind that we still have plenty of time before the FWS will be making a listing proposal and we expect to provide new information as needed over the next year or more.***" Despite this email and our asking DNR to include it, DNR has not updated the Colorado package to reflect this new set of policies and mapping. <u>Requested Action</u>: If the DEIS is publically released and relies on the Colorado Package as it is currently drafted, that document should be revised to include all of Garfield County's recently adopted Greater Sage-Grouse Conservation Plan. As it currently exists, it does not.		

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127.	E-1	4	Fred Jarman	Garfield County	Appendix E: It states "The subregional alternative…" which should be replaced with "Alternative D…". Also, we request adding the following at the end of that paragraph on Line 8: However, note that the disturbance caps discussed herein do not apply to the areas with the political boundaries of Garfield County. Rather than an arbitrary percentage cap management tool, Garfield County uses a 'cause and effect' approach to specific threats. Specifically, Garfield County utilizes an avoidance policy for areas defined and mapped as Suitable Habitat and uses an NSO of 0.6 miles around an active lek that is not located in Suitable Habitat. For these areas refer t the Suitable Habitat map as defined and mapped by Garfield County.		
128.	Appendix C on page 3	10	Fred Jarman	Garfield County	At the end of Section 1 in Appendix C: Figures: Add a new figure, **Figure 1-6**, as the **Suitable Habitat Map for Lands within the Political Boundaries of Garfield County** as adopted by Garfield County and which is contained in the Garfield County Greater Sage-Grouse Conservation Plan. (See last page of this document.)		

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129.	2-5 and 2-6	27-40 and 1-24	Fred Jarman	Garfield County	On page ES-9, The EIS states as a part of the planning criteria that "The RMPAs will be limited to making land use planning decisions specific to the conservation of GRSG habitat." However, under the discussions of alternatives, the EIS has included in Alternative D the designation of a utility corridor: "Included under Alternative D, and consistent with 43 CFR 2802.11, the BLM proposes to designate a new utility corridor through the LSFO in order to provide a siting option through northwestern Colorado for utilities, while at the same time avoiding as much PPH as possible." (Draft EIS 2-5). This has not been included in any of the other alternatives and it directly conflicts with the criteria above. Garfield County requests that the proposed Utility Corridor be removed from Alternative D because it conflicts with the planning criteria.		

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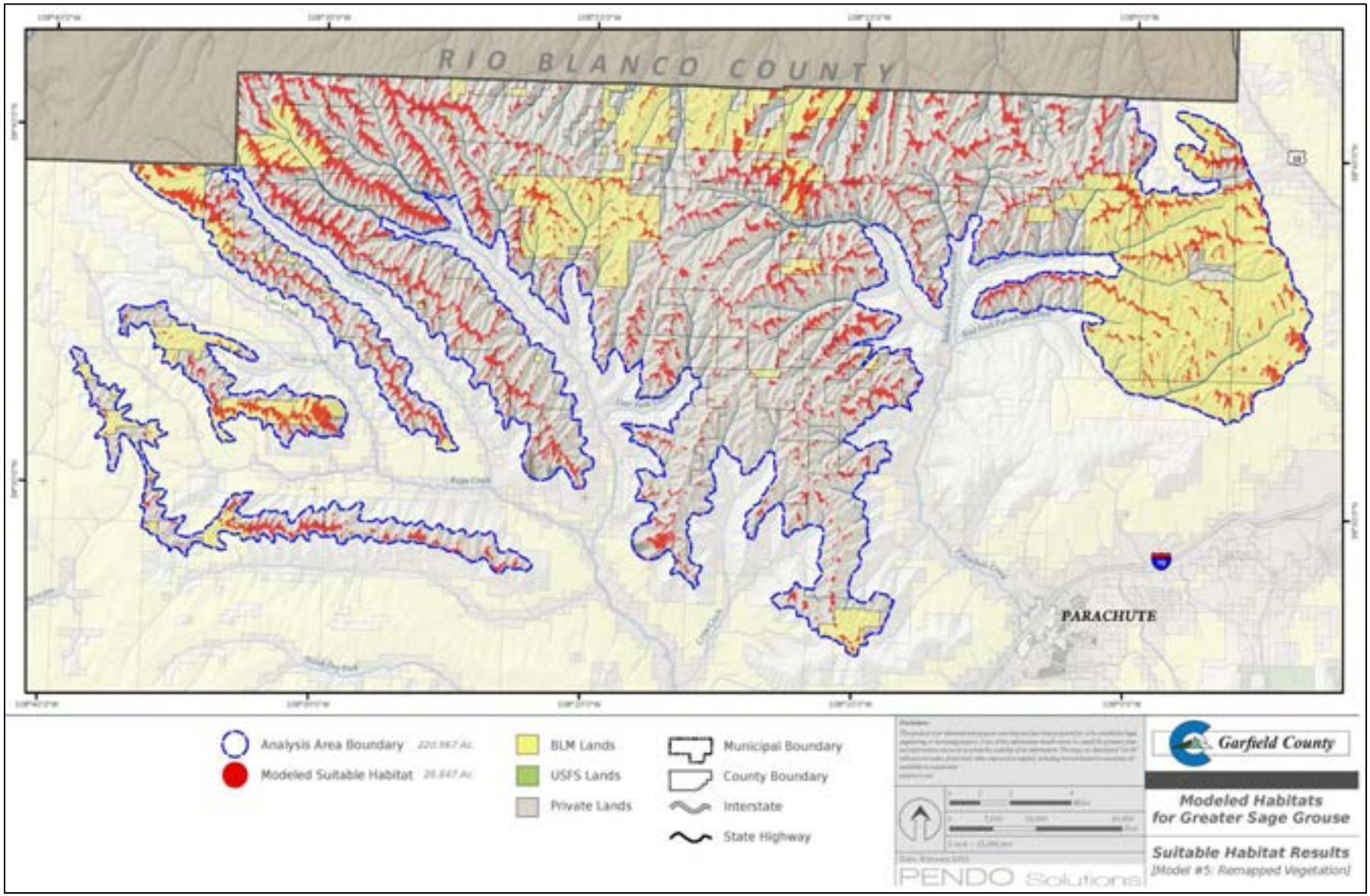
Figure 1-6: Suitable Habitat (SH) located within the political boundaries of Garfield County



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Testimony of Tom Jankovsky

Commissioner, Garfield County, Colorado

Before the

House Natural Resources Committee

Tuesday, June 4, 2013

Thank you Mr. Chairman and members of the committee.

My name is Tom Jankovsky, County Commissioner from Garfield County, Colorado. Also with me today is Dr. Rob Ramey, President of Wildlife Science International and a member of the Garfield County Greater Sage Grouse team.

I am here to discuss why local plans are more effective for endangered species conservation through our County's experience with the potential listing of the Greater Sage Grouse and its habitat.

Garfield County worked with the BLM on the NW Colorado Greater Sage Grouse Environmental Impact Statement (EIS) as a cooperating agency as one of nine counties that have Sage Grouse habitat managed by five local plans.

In these cooperating agency meetings we realized local plans were not being considered. Because we have a local plan, we engaged the BLM in the Coordination process. Congress set forth the coordination process through the Federal Land Policy Management Act (FLPMA) whereby the Secretary of the Interior shall: keep apprised of local plans; give consideration to those plans; meaningfully involve local governments; resolve inconsistencies; and, make Federal plans consistent with local plans.

Our first two Coordination meetings covered the Coordination process and significant differences between our local plan and the policies being directed through the BLM's National Technical Team (NTT) Report. Our primary concern is that the policies the BLM is attempting to put in place do not fit our unique topography and will fail, destroy our local economy and create the need for litigation.

The studies for the NTT Report were primarily from central Wyoming with miles of rolling sage brush while our topography and vegetation is quite unique characterized by high plateaus with sage brush at the ridge tops, steep drops to drainages and valley floors, with a patchwork of sage brush, conifer, aspen and pinion-juniper forests. *(See Attachment 1: Topography Differences)* As a result, conservation measures must adapt to the unique habitat through our local plan.

The map used in the EIS covers 220,000 acres of private and federal lands in our county. We questioned this map and were told that the mapping was not the responsibility of the BLM, but was provided by Colorado Parks & Wildlife (CPW) and that our plan was not acceptable because it was voluntary with no regulatory assurance.

We met with CPW who stated the map was prepared at a 50,000 ft. view. That was concerning since the map is the foundation for the policies being developed in the EIS.

We then hired Dr. Ramey and mapping experts to evaluate the basis of the science used in the NTT Report and for the creation of the CPW habitat map. We found the map was based on very coarse vegetation data, a subjective occupied range map, and a four-mile lek buffer that assumes large expanses of intact habitat.

Ultimately, this map was not reproducible. So we prepared our own map based on CPW criteria and highly accurate vegetation data. The net result reduced suitable habitat from 220,000 acres to 28,000 acres. *(See Attachment 2: Suitable Habitat Mapping Differences)*

With the refined mapping and best available science, we adopted the Garfield County GSG Conservation Plan that provides private and public land owners with land management principles, policies and BMPs that are tailor-fit to the County's unique landscape and habitat characteristics.

This plan retains regulatory assurance by mandating our policies on federal land. It is designed with an adaptive management approach and places the County at the center of decision making through Coordination. (*See Attachment 3: Coordination Diagram*) This allows all of the different federal, state and local interests to come together through one comprehensive plan in the spirit of cooperation thereby avoiding legal conflict. It is critical that agency plans be consistent with local plans.

In our third Coordination meeting with the BLM, US Fish & Wildlife Service (the Service), and CPW, we presented our plan to specifically discuss and resolve inconsistencies with the NTT Report. Lastly, we met with CPW to validate our habitat mapping which revealed a high correlation of accuracy. The intent is to work with CPW to amend the CPW map that will ultimately be used in the final BLM EIS.

Garfield County supports the Secretary's specific direction to the BLM that requires them to address "local ecological site variability" for regional / sub-regional plans. *(See Attachment 4: Instructional memorandum 2012-044)* Additionally, FLPMA requires the BLM to coordinate their efforts with local plans.

I would like to take this opportunity to request assistance from this Committee. First, the Service has withheld valuable data that supports a warranted listing. We only wish to verify their data as required under the Information Quality Act. We would appreciate this Committee's interceding on our behalf to obtain this data as soon as possible.

Second, we ask that you direct the Secretary of Interior to coordinate fully with local governments to ensure consistency between local and federal plans, more specifically local sage-grouse plans. Finally, we simply request the BLM abide by FLPMA and their own statutes and regulations to resolve policy conflicts at the local level. Then, not only would litigation be avoided, but solutions would be put in place that truly benefit the sage-grouse.

Thank you for your time and assistance in this matter. We appreciate this opportunity and would be more than happy to answer any questions this Committee may have.

Attachment 1: Topography Differences

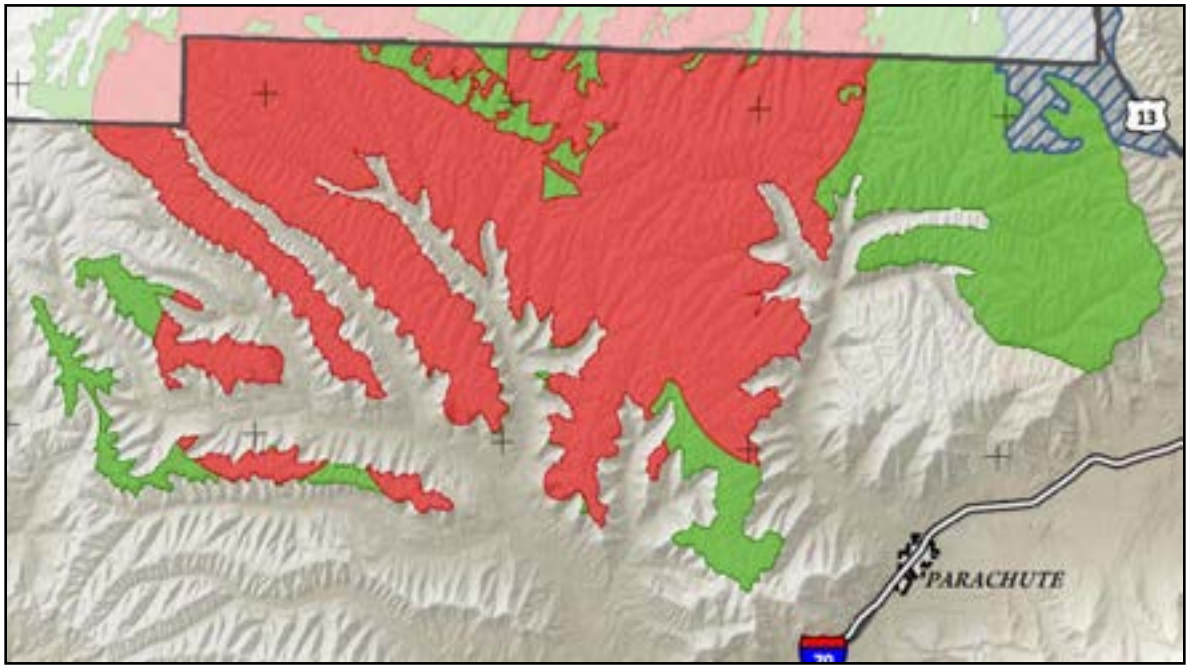
Pinedale, Wyoming Region & primary basis for science in NTT Report →

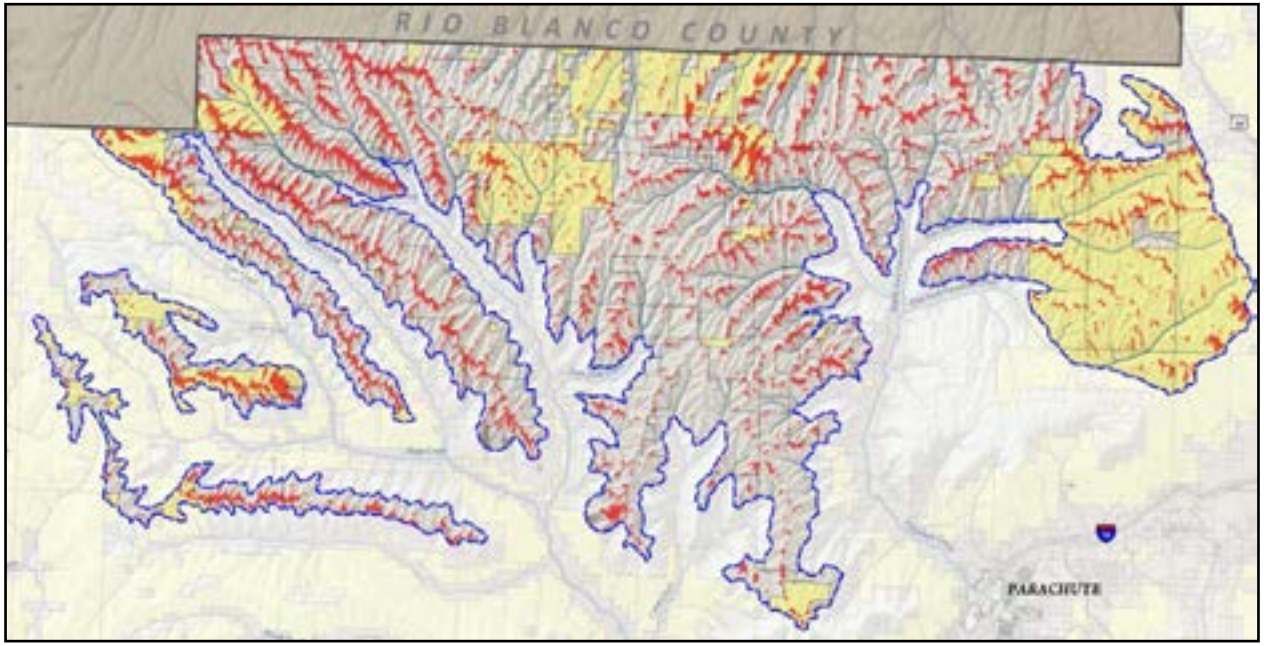
Typical topography and vegetation in Garfield County, CO in the Plan Area of the Greater Sage-Grouse Conservation Plan

←

Attachment 2: Suitable Habitat Mapping Differences

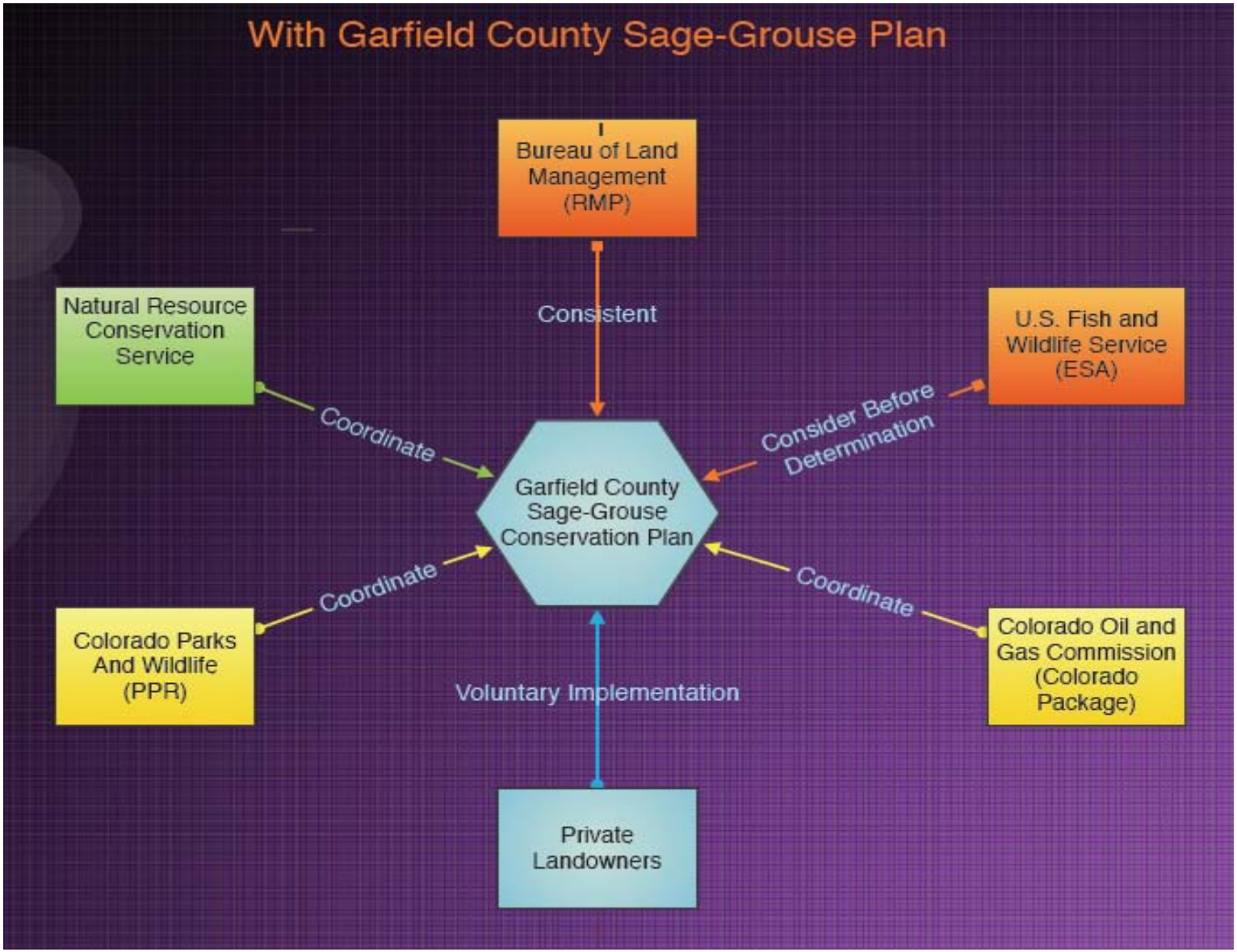
Colorado Parks & Wildlife Map: 220,000 acres of Greater Sage-Grouse Habitat (PPH & PGH)





Garfield County Map: 28,000 acres of Greater Sage-Grouse Suitable Habitat

Attachment 3: Coordination Diagram



Attachment 4: BLM Instructional Memorandum 2012-044

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240
http://www.blm.gov/
December 27, 2011

In Reply Refer To:
1110 (230/300) P
EMS TRANSMISSION 12/27/2011
Instruction Memorandum No. 2012-044
Expires: 09/30/2013

To: All Field Officials
From: Director
Subject: BLM National Greater Sage-Grouse Land Use Planning Strategy
Program Areas: All Programs.

Purpose: This Instruction Memorandum (IM) provides direction to the Bureau of Land Management (BLM) for considering Greater Sage-Grouse conservation measures identified in the Sage-Grouse National Technical Team's - *A Report on National Greater Sage-Grouse Conservation Measures* (Attachment 1) during the land use planning process that is now underway in accordance with the 2011 *National Greater Sage-Grouse Planning Strategy* (Attachment 2).

This IM supplements direction for Greater Sage-Grouse contained in WO IM No. 2010-071 (*Gunnison and Greater Sage-Grouse Management Guidelines for Energy Development*), the BLM's 2004 *National Sage-Grouse Habitat Conservation Strategy* and is a component of the 2011 *National Greater Sage-Grouse Planning Strategy* (Attachment 2). It is also consistent with WO IM No. 2011-138 (*Sage-Grouse Conservation Related to Wildland Fire and Fuels Management*).

In March 2010, the U.S. Fish and Wildlife Service (FWS) published its decision on the petition to list the Greater Sage-Grouse as "Warranted but Precluded." 75 Fed. Reg. 13910 (March 23, 2010). Over 50 percent of the Greater Sage-Grouse habitat is located on BLM-managed lands. In its "warranted but precluded" listing decision, FWS concluded that existing regulatory mechanisms, defined as 'specific direction regarding sage-grouse habitat, conservation, or management' in the BLM's Land Use Plans (LUPs), were inadequate to protect the species. The FWS is scheduled to make a new listing decision in Fiscal Year (FY) 2015.

The BLM has 68 land use planning units which contain Greater Sage-Grouse habitat. Based on the identified threats to the Greater Sage-Grouse and the FWS timeline for making a listing decision on this species, the BLM needs to incorporate explicit objectives and desired habitat conditions, management actions, and area-

wide use restrictions into LUPs by the end of FY 2014. The BLM's objective is to conserve sage-grouse and its habitat and potentially avoid an ESA listing.

In August 2011, the BLM convened the Sage-Grouse National Technical Team (NTT), which brought together resource specialists and scientists from the BLM, State Fish and Wildlife Agencies, the FWS, the Natural Resources Conservation Service (NRCS), and the U.S. Geological Survey (USGS). The NTT met in Denver, Colorado in August and September 2011, and in Phoenix, Arizona in December 2011, and developed a series of science-based conservation measures to be considered and analyzed through the land use planning process. This IM provides direction to the BLM on how to consider these conservation measures in the land use planning process.

In order to be effective in our ability to conserve Greater Sage-Grouse and their habitat, the BLM will continue to work with its partners including: the Western Association of Fish and Wildlife Agencies (WAFWA), FWS, USGS, NRCS, U.S. Forest Service (USFS), and Farm Services Agency (FSA) within the framework of the Sagebrush Memorandum of Understanding (2008) and the *Greater Sage-Grouse Comprehensive Conservation Strategy* (2006).

Policy / Action: The BLM must consider all applicable conservation measures when revising or amending its RMPs in Greater Sage Grouse habitat. The conservation measures developed by the NTT and contained in Attachment 1 must be considered and analyzed, as appropriate, through the land use planning process by all BLM State and Field Offices that contain occupied Greater Sage-Grouse habitat. <u>While these conservation measures are range-wide in scale, it is expected that at the regional and sub-regional planning scales there may be some adjustments of these conservation measures in order to address local ecological site variability</u>. Regardless, these conservation measures must be subjected to a hard look analysis as part of the planning and NEPA processes.

This means that a reasonable range of conservation measures must be considered in the land use planning alternatives. As appropriate, the conservation measures must be considered and incorporated into at least one alternative in the land use planning process. Records of Decision (ROD) are expected to be completed for all such plans by the end of FY 2014. This is necessary to ensure the BLM has adequate regulatory mechanisms in its land use plans for consideration by FWS as part of its anticipated 2015 listing decision.

When considering the conservation measures in Attachment 1 through the land use planning process, BLM offices should ensure that implementation of any of the measures is consistent with applicable statute and regulation. Where inconsistencies arise, BLM offices should consider the conservation measure(s) to the fullest extent consistent with such statute and regulation.
The NTT-developed conservation measures were derived from goals and objectives developed by the NTT and included in Attachment 1. These goals and objectives are a guiding philosophy that should inform the goals and objectives developed for individual land use plans. However, it is anticipated that individual plans may

develop goals and objectives that differ and are specific to individual planning areas.

Through the land use planning process, the BLM will refine Preliminary Priority Habitat and Preliminary General Habitat data (defined below) to: (1) identify Priority Habitat and analyze actions within Priority Habitat Areas to conserve Greater Sage-Grouse habitat functionality, or where possible, improve habitat functionality, and (2) identify General Habitat Areas and analyze actions within General Habitat Areas that provide for major life history function (e.g., breeding, migration, or winter survival) in order to maintain genetic diversity needed for sustainable Greater Sage-Grouse populations. Any adjustments to the NTT recommended conservation measures at the local level are still expected to meet the criteria for Priority and General Habitat Areas.

Preliminary Priority Habitat (PPH): Areas that have been identified as having the highest conservation value to maintaining sustainable Greater Sage-Grouse populations. These areas would include breeding, late brood-rearing, and winter concentration areas. These areas have been/are being identified by the BLM in coordination with respective state wildlife agencies.

Preliminary General Habitat (PGH): Areas of occupied seasonal or year-round habitat outside of priority habitat. These areas have been/are being identified by the BLM in coordination with respective state wildlife agencies.

PPH and PGH data and maps have been/are being developed by the BLM through a collaborative effort between the BLM and the respective state wildlife agency, and are stored at the National Operations Center (NOC). These science-based maps were developed using the best available data and may change as new information becomes available. Such changes would be science-based and coordinated with the state wildlife agencies so that the resulting delimitation of PPH and PGH provides for sustainable populations. In those instances where the BLM State Offices have not completed this delineation, the Breeding Bird Density maps developed by Doherty 2010[1] As LUPs are amended or revised, the BLM State Offices will be responsible for coordinating with the NOC to use the newest delineation of PPH and PGH. To access the PPH and PGH data, please use the following link: \\blm\dfs\loc\EGIS\OC\Wildlife\Transfers\GREATER_SAGE_GROUSE_GIS_DATA.
will be used. The NOC will establish the process for updating files to include the latest PPH and PGH delineations for each state. This information will assist in applying the conservation measures identified in Attachment 1 below.

Timeframe: This IM is effective immediately and will remain in effect until LUPs are revised or amended by the end of FY 2014.

Budget Impact: This IM will result in additional costs for coordination, NEPA review, planning, implementation, and monitoring.

Background: Following a full status review in 2005, the FWS determined that the Greater Sage Grouse was “not warranted” for protection. Decision documents in

support of that determination noted the need to continue and/or expand all efforts to conserve sage-grouse and their habitats. As a result of litigation challenging the 2005 determination, the FWS revisited the determination and concluded in March 2010 that the listing of the Greater Sage-Grouse is warranted but precluded by higher priority listing actions.

In November 2004, the BLM published the *National Sage-Grouse Habitat Conservation Strategy*. The BLM National Strategy emphasizes partnerships in conserving Greater Sage-Grouse habitat through consultation, cooperation, and communication with WAFWA, FWS, NRCS, USFS, USGS, state fish and wildlife agencies, local sage-grouse working groups, and various other public and private partners. In addition, the *Strategy* set goals and objectives, assembled guidance and resource materials, and provided comprehensive management direction for the BLM's contributions to the ongoing multi-state sage-grouse conservation effort.

In July 2011, the BLM announced its *National Greater Sage-Grouse Planning Strategy* (Attachment 2). The goal of the *Strategy* and this IM is to review existing regulatory mechanisms and to implement new or revised regulatory mechanisms through the land use planning process to conserve and restore the Greater Sage-Grouse and their habitat. The Gunnison Sage-Grouse, bi-state population in California and Nevada and the Washington State distinct population segments of the Greater Sage-Grouse will be addressed through other policies and planning efforts.

Manual/Handbook Sections Affected: None.

Coordination: This IM was coordinated with the office of National Landscape Conservation System and Community Partnership (WO-170), Assistant Director, Renewable Resources and Planning, (WO-200), Minerals and Realty Management (WO-300), Fire and Aviation (WO-400), BLM State Offices, FWS and state fish and wildlife agencies.

Contact: State Directors may direct questions or concerns to Edwin Roberson, Assistant Director, Renewable Resources and Planning (WO-200) at 202-208-4896 or edwin_roberson@blm.gov; and Michael D. Nedd, Assistant Director, Minerals and Realty Management (WO-300) at 202-208-4201 or mike_nedd@blm.gov.

Signed by: Authenticated by:
Mike Pool Ambyr Fowler
Acting, Director Division of IRM Governance, WO-560

Attachment 5: Key differences that make the Garfield County Greater Sage Grouse Plan a more effective conservation tool than those proposed by federal agencies.

High-resolution habitat mapping

The habitat mapping provided by State and Federal agencies in 2012 for Greater Sage-Grouse in the Plan Area was at a landscape level that did not accurately address the unique topography of the Roan Plateau, or provide planning information at resolution accurate enough for County to use in the Plan, and for relevant land-use planning activities potentially occurring within the Plan area, including protection of sage grouse habitat. Because of the significant implications on land use and ongoing land management, the Board of County Commissioners deemed that most accurate delineation of habitat was deemed necessary. This habitat mapping process followed the latest and most relevant peer-reviewed habitat mapping process available for mapping large and diverse areas, using the highest resolution data available (with a two-meter resolution, as compared to the one kilometer, landscape-level resolution used by the agencies).

The sage-grouse habitat in Garfield County is naturally fragmented, as a result of topography and the patchy nature of sagebrush, non-sagebrush shrubs, meadows, aspen, and conifers in the Plan area. Expanses of contiguous sagebrush, necessary to support a large stable population (as described by the Fish and Wildlife Service in their 2010 candidate determination notice), do not exist in Garfield County. Additionally, the sage-grouse population inhabiting Garfield County is a peripheral population located on the far southeastern edge of the species range. As a result, the stewardship of the population requires detailed knowledge of local conditions, including accurate mapping of its habitat.

Conservation measures are tailored to local circumstances

Rather than rely on one-size-fits-all regulatory prescriptions, such as four mile buffers and three percent anthropogenic disturbance thresholds proposed by the BLM's National Technical Team (NTT), the County has taken a more effective approach: tailoring conservation measures to address specific threats to sage grouse and local circumstances that are unique to Garfield County (i.e. predation and a naturally fragmented habitat). The significance of this strategy to sage grouse conservation is that it allows for a more efficient allocation of conservation effort by focusing on threats that matter most in *this* sage grouse population.

Voluntary conservation efforts on private land

In contrast to the NTT report, where the proposed conservation measures assume that private land management is inferior to federal land management, and requires a regulatory "command and control" approach, the Garfield County Plan recognizes and builds upon the importance of voluntary conservation by private landowners. The importance of voluntary conservation on private land is recognized by many scholars of the Endangered Species Act, including the current Deputy Assistant

Secretary of Fish and Wildlife and Parks, Michael Bean, who has authored multiple papers on the subject.

Annual Review and adaptive management

Recognizing that local governments can be more nimble than federal agencies, the Garfield County Plan includes a required annual coordination review with the federal and state agencies that have habitat or species responsibilities within the Plan Area. (A review may also be initiated based on important new information.) This review process will evaluate the availability and condition of habitats, direct and indirect impacts, conservation measures, policies and best management practices being implemented by each agency for their effectiveness and applicability to the Plan Area. Also incorporated in this coordination review is any new scientific information and, if warranted, modifications to the best management practices, policies, and conservation incentives within the Plan. The County will also initiate meetings with private property owners in the Plan Area for the purpose of analyzing their conservation efforts and effectiveness, as well as any new scientific data. The annual coordination review will ensure that Plan updates are timely, adaptive, and based on the best available scientific and commercial data.

Consistency with the Information Quality Act

The Garfield County Plan ensures that sage-grouse habitat management decisions shall be made based on the best available scientific information that is applicable to sage-grouse habitat in Garfield County. The scientific information used will be consistent with standards of the Information Quality Act (Quality, Objectivity, Utility and Integrity), as determined by the County. In contrast to the interpretation of the Act by some federal agencies, this means that the data collected by state and federal agencies, or used in published scientific research relied upon by those agencies, must be provided to the County.

The Garfield County Plan acknowledges that many of the purported "universal" negative impacts of fluid mineral development, an important economic activity on the Roan Plateau and Piceance Basin, are based upon outdated information and/or overstated. In fact, none of the studies cited in the NTT report can definitively point to an actual population decline rather than temporary displacement of sage grouse from areas immediately affected by current fluid mineral development. Instead, the extraction of fluid minerals in Garfield County (and increasingly elsewhere) is accomplished using increasingly advanced technologies, more efficient operations, avoidance of important habitat, more effective mitigation measures, and interim habitat restoration, than in the past. As a result, surface disturbances that potentially affect sage grouse tend to be minimal and temporary in nature. The fast pace of these technological developments and more efficient operations has meant that the primary literature on the impacts of fluid mineral extraction on sage grouse in Wyoming is inconsistent with current practices used in Garfield County. It is anticipated that the more advanced technologies under development will continue to allow the efficient extraction of resources while further avoiding or minimizing impacts to sage grouse and other species.

A balance of harms approach ensures responsible stewardship of natural and human resources in Garfield County

In contrast to the approach proposed in the NTT report, that focuses solely on the welfare of sage grouse, the Garfield County Plan requires that the balance of impacts to other species and to human welfare must be weighed prior to approval and implementation.

Garfield County

September 3, 2013

Ms. Noreen Walsh, Regional Director
U.S. Fish & Wildlife Service - Region 6
134 Union Boulevard
Lakewood, CO 80228

RE: Request for Coordination Meeting in Garfield County, Colorado regarding the Greater Sage-Grouse and its habitat

Dear Director Walsh,

Over the last 18 months, Garfield County has been working diligently with our federal and state agency partners and private land owners in addressing a multitude of issues surrounding Greater Sage Grouse (GSG). Through these efforts, we have developed a GSG Conservation Plan based on the most recent and best available science that we believe will affect the decision being made by the Service to either list or not list the GSG as Threatened or Endangered.

Because there is strong interest among counties in the Mountain Prairie Region, we invite you to Grand Junction, Colorado on October 2, 2013 at 1:00 PM to meet with us so that we can present our plan and describe our recent habitat modeling efforts and conservation measures. We recognize that under the settlement agreement, the Service is obligated to make a final listing determination in 2015 on the GSG. We also recognize that prior to making this determination, you must take "into account those efforts, if any, being made by ... political subdivision of a State ... to protect such species ...." (16 USC 1533(b)(1)(A)).

Because we have been actively involved in implementing conservation measures for the Greater Sage Grouse and, because the habitat in our county is distinctive and cannot be compared to any other area of the species national range, we believe it is critical that we meet

prior to you issuing your proposed rule to ensure you have the benefit of our unique experiences, science, data and knowledge regarding the viability of the Greater Sage Grouse.

More than that, we hope to have a meaningful discussion with you so we can more fully understand what the Service is looking for as it deliberates a listing decision. We would look forward to meeting with you personally as well as any additional staff that is closely involved in the preparation of the proposed notice.

We would appreciate hearing from you by September 16th, 2013 as to whether you will be able to attend this meeting, or whether an alternate date would be better suited with your schedule. Please do not hesitate to call Commissioner Jankovsky at (970) 618-2712 or email at tjankovsky@garfield-county.com.

Very truly yours,

John Martin, Chairman

Garfield County Board of County Commissioners

Mike Samson, Commissioner

Garfield County Board of County Commissioners

Tom Jankovsky, Commissioner

Garfield County Board of County Commissioners

Cc Andrew Gorgey, Garfield County Manager

Frank Hutfless, Garfield County Attorney

Garfield County

October 21, 2013

Mike King, Executive Director
Colorado Department of Natural Resources
Executive Director's Office
1313 Sherman Street, Room 718
Denver, CO 80203

RE: Meeting held on Monday, September 16th, 2013 regarding the Greater Sage Grouse habitat mapping in Garfield County

Dear Director King,

Thank you for taking the time to meet with myself and members of our team working on behalf of Garfield County regarding Greater Sage Grouse (GSG) habitat mapping and policy issues in Garfield County. We very much appreciate the effort you made in convening key staff from your office as well as from Colorado Parks and Wildlife (CPW) in order to talk candidly about habitat mapping concerns raised by Garfield County. As you can understand, the impact of proposed federal policy via the pending Bureau of Land Management's (BLM) Environmental Impact Statement (EIS) on GSG in Northwest Colorado will have a dramatic, if not crippling socio-economic affect on some counties in NW Colorado. It is critical that local and state government be aligned as much as possible relying on best available and reproducible science to support a realistic response to the US Fish and Wildlife Service (USFWS) as a listing decision hangs in the balance that works for both Garfield County and northwest Colorado. To this latter point, we very much appreciate your willingness to work with Garfield County.

To revisit and memorialize the outcome from our meeting, we understand that CPW has developed and primarily uses two maps regarding the management of Greater Sage Grouse in Colorado which include the Sensitive Wildlife Habitat (SWH) map and the Restricted Surface Occupancy (RSO) map. It was made clear that the SWH map does not accurately delineate

actual habitat; rather, it is used as a reference tool intended to require consultation for potential development within its boundaries and should not be construed as a map depicting any form of a "No Surface Occupancy" (NSO) policy. Additionally, the RSO map is intended to define a 0.6 mile buffer round an active lek with the purpose of prohibiting development activity. We also understand that the SWH map has been sent to the BLM in the form of the Preliminary Priority Habitat (PPH) map for use in their EIS. Further, CPW intends to adjust this Preliminary Priority Habitat (PPH) map with the very recent data collected by Dr. Brett Walker which is anticipated to reduce / shrink the PPH boundaries. Once this has occurred, CPW will resubmit that revised map to the BLM for use in the EIS. (CPW staff also reaffirmed that the acceptable margin of error for distance from plotted bird locations was no greater than 50 meters.)

While the County certainly appreciates the efforts on the part of CPW to continue to refine their mapping, we will continue to advocate for our habitat mapping efforts in our comments 1) to the BLM on the draft EIS on GSG in Northwest Colorado, 2) in our comments to the Colorado Oil and Gas Conservation Commission's (COGCC) rulemaking hearings on wildlife mapping, and 3) in future coordination meetings with the USFWS. As discussed in our meeting, one the County's primary concerns is there appears to be a fundamental disconnect between how CPW designed and uses the SWH map as a basis for consultation versus how the BLM is using the PPH map for project-specific land management policies and "in-the-field" decisions.

As explained to the County by CPW staff on September 5, 2012 in a County Coordination meeting, this BLM - PPH map (which is CPW's SWH map) was generated at a *50,000-foot level* not intended for specific "on-the-ground" land use management. Again, the County urges CPW and DNR to continue to provide that comment and direction to the BLM on the draft EIS. In effect, it should be made clear that the BLM - PPH map (based on CPW's SWH map) should be better defined as a *Wildlife Consult Map* that should not be confused with actual habitat for which the BLM is to manage for the survival of the bird.

As a matter of background and in the context of the BLM's EIS, the County has analyzed CPW's SWH map and found it to be problematic if it is used for localized land use decisions. First, the habitat model designed by Dr. Mindy Rice was done so using vegetation data on a 1-kilometer scale (0.6 mile grid cells). In doing so, it inaccurately typed large amounts of vegetation that do not include any vegetation communities known to support Greater Sage Grouse such as pinion-juniper, fir, and aspen groves. Furthermore, numerous other criteria that are known to directly influence suitable greater sage-grouse habitats were, admittedly by design, excluded from the habitat model, including slope parameters, relevant landforms, percent canopy cover, etc. Again, this model approach is too coarse to be used as an effective local habitat management tool which Dr. Rice specifically notes in her paper.

Second, in the design of the SWH map, CPW has applied an arbitrary four-mile buffer (eight-mile diameter) around active leks. (The four mile distance is believed to be the distance from the lek where 80% of the hens will nest.) However, this distance also assumes the birds will be nesting in their commonly understood habitat as is commonly found to be true in large expanses of gently rolling sage brush communities in Wyoming, Montana, etc. Garfield County does not have these same expanses of rolling sage brush communities; conversely, the habitat is severely fragmented in a scattered patchwork of sage brush on hill tops intermixed with large areas of non-habitat vegetation communities such as aspen, conifer, pinion-juniper, etc. Moreover, the area in Garfield County also contains large areas of slopes (in excess of 30%) that are not known to support Greater Sage Grouse. So, the County opposes an arbitrary application of a four-mile buffer around an active lek in this landscape because it captures thousands of acres of non-habitat where development and activity could / should occur without requiring any involvement from government agency oversight.

Third, CPW's SWH map (which is used by the BLM as the PPH map) is based on the agency's "Occupied Range" map which appears to be an internal map maintained primarily by research staff and updated based on field-observations over time. This is problematic because the data used to inform this map is specific to individual professional opinion which may vary from time to time depending on individual field personnel and is not reproducible. In recent discussions with CPW staff, it became apparent that these opinions stray far from data that is cited in the literature from CPW biologists as to the accepted criteria for what defines habitat and where the Greater Sage Grouse are commonly located within that habitat.

In response to this, the County recently spent considerable resources to produce a highly accurate Suitable Habitat Map which is attached as ***Exhibit A*** to this letter. This map is a result of creating two distinct models (a weighted overlay model and a fuzzy overlay model). These models were driven by criteria developed from an exhaustive literature search using CPW's own researcher criteria (including slope, distance to forest, canopy cover, landforms and vegetation community). In addition, the Garfield County habitat model utilized a vegetation dataset that maps existing vegetation communities with a much higher degree of accuracy, based on performing a supervised image classification process on 2-meter cell resolution color-infrared photography. Moreover, in recent meetings with CPW to validate our mapping, it became clear that our mapping had a high degree of correlation to relevant / recent bird location data points collected by CPW's Dr. Brett Walker. In doing so, our model captured 92 percent of the bird locations within 100 meters of our habitat model. An important additional correlation is made with a high degree of accuracy when CPW's RSO map is overlaid on Garfield County's Suitable Habitat map which is attached as ***Exhibit B*** to this letter. It should also be understood; the County's Suitable Habitat map was created with a transparent process and is reproducible. To the contrary, after considerable effort, we found that the CPW SWH map is

not reproducible and is based on data that the agency refuses to release to the public in order that it is verified.

The net result proved that CPW's proposed SWH map has inaccurately mapped large areas of non-habitat (pinion-juniper, fir, and aspen groves) on the Roan Plateau in Garfield County as priority habitat. As understood in terms of acres, while CPW has mapped approximately 220,000 acres as priority habitat in their PPH map, Garfield County's Suitable Habitat map identifies only 59,093 acres of suitable habitat. This is a 73% reduction in habitat in Garfield County. Put another way, CPW's SWH map was developed with such a broad brush approach, it erroneously captured approximately 160,907 acres of land that does not have Greater Sage Grouse habitat characteristics supported by relevant peer-reviewed literature and 'data-verified' field observations. By doing so, it will have the practical effect of requiring a land owner to consult with CPW on projects that are clearly cited in areas of non-habitat.

We want to thank you for convening staff from both DNR and CPW and taking time to discuss these issues and providing clear direction regarding the intent and use of the Sensitive Wildlife Habitat map (BLM - PPH map) in the BLM's EIS. We appreciate your clarity and direction on how the SWH map is intended to be used as a tool for consultation only for projects within its borders and not specifically designed as an actual 'habitat' map to be interpreted as any form of NSO or otherwise by the BLM in developing land use policy. The County urges CPW and DNR to continue to provide this direction in their comments to the BLM on the draft EIS. In effect, it should be made clear that the BLM - PPH map (based on CPW's SWH map) should be better defined as a wildlife consult map that should not be confused with defining actual priority or general habitat for which the BLM is required to manage for the survival of the bird.

We look forward to continuing to work with you and CPW so that our collective comments to the BLM will be as aligned as possible. It is our hope that these comments are both realistic and effective to ensure protection of the bird and its habitat so that realistic policies are put in place by the BLM that help avoid a listing without severely impacting the socio-economics of northwest Colorado counties. Do not hesitate to contact us if you have any questions or comments.

Very truly yours,

John Martin, Chairman

Garfield County Board of County Commissioners

Mike Samson, Commissioner

Garfield County Board of County Commissioners

Tom Jankovsky, Commissioner

Garfield County Board of County Commissioners

Cc The Honorable John Hickenlooper, Governor, Colorado

The Honorable Scott Tipton, US House of Representatives

Representative Bob Rankin, State House of Representatives, Colorado

Representative Randy Baumgardner, State House of Representatives, Colorado

Steve Yamashita, Colorado Parks and Wildlife, Acting Director

James Cagney, BLM Northwest Colorado District Manager

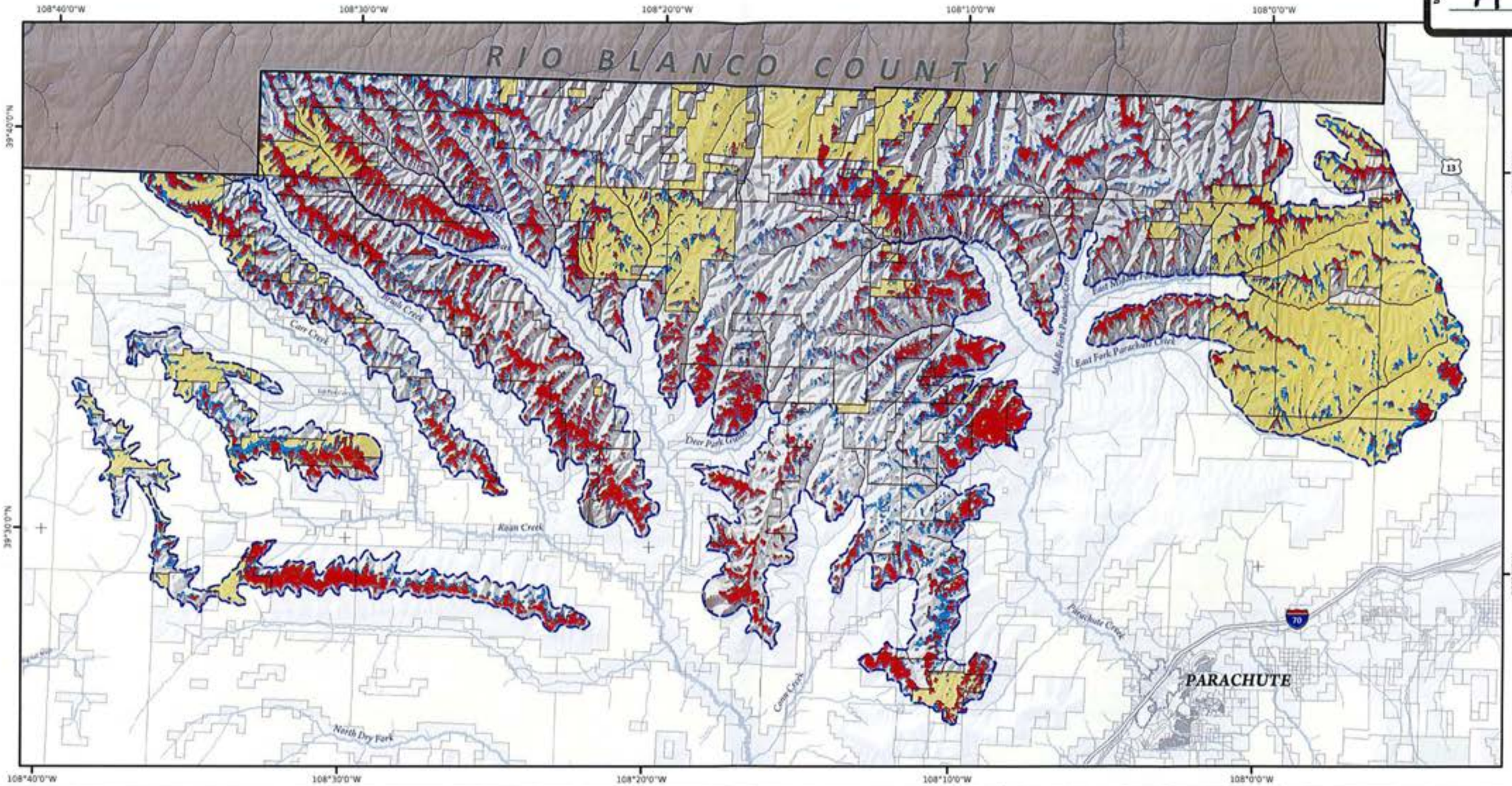
Andrew Gorgey, Garfield County Manager

Frank Hutfless, Garfield County Attorney

Fred Jarman, Director, Community Development Department

EXHIBIT

A



Analysis Area Boundary	220,967 Ac.	BLM Lands		Municipal Boundary	
Prioirty Habitat	31,070 Ac.	USFS Lands		County Boundary	
General Habitat	28,023 Ac.	Private Lands		Interstate	
				State Highway	

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0 1 2 4 Miles

0 7,500 15,000 30,000 Feet

1 inch = 15,000 feet

Date: July 2013

PENDO Solutions

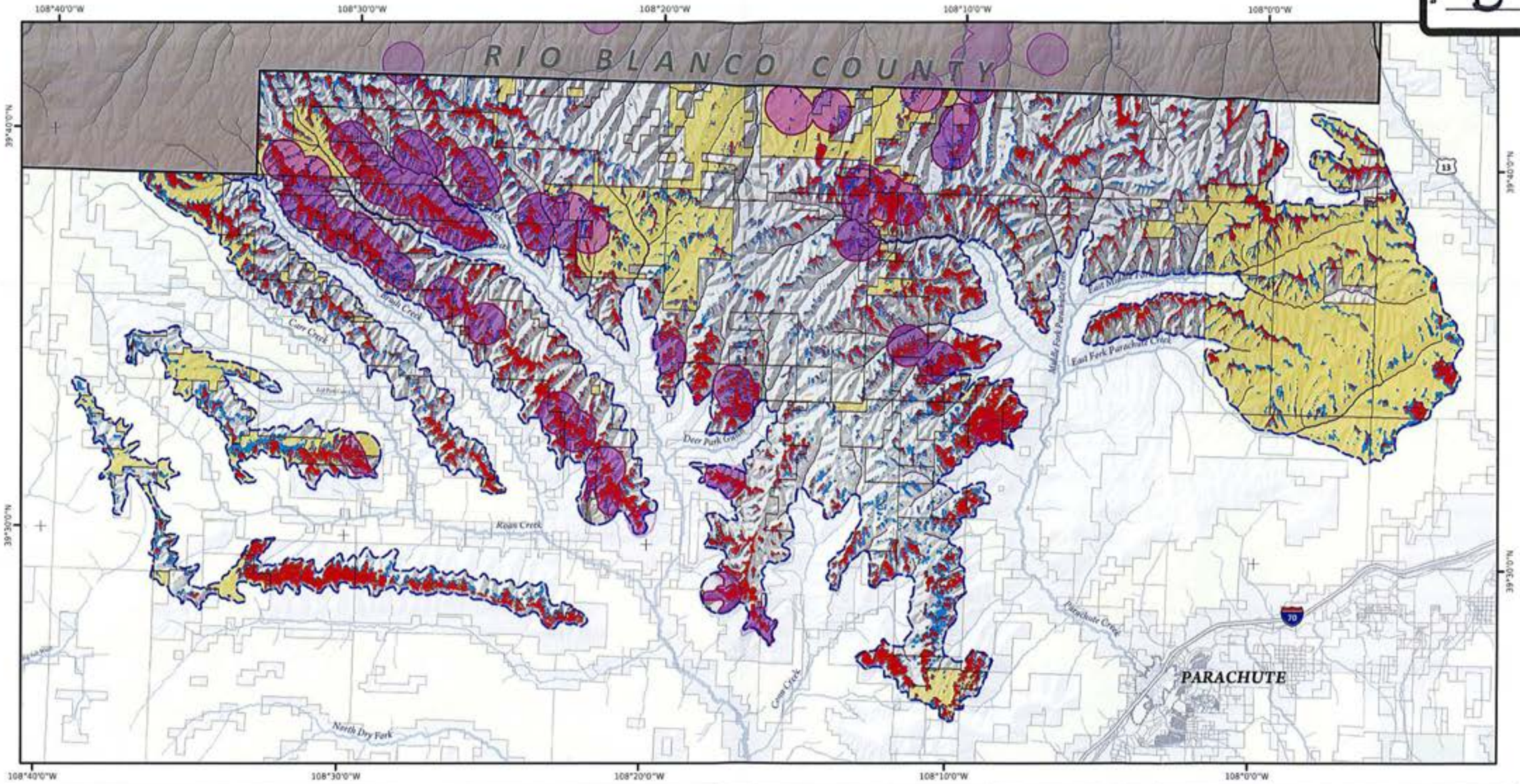
Garfield County

Modeled Habitats for Greater Sage Grouse

Suitable Habitat Results

[Model v1: Revised Vegetation]

EXHIBIT
B



Analysis Area Boundary	220,967 Ac.	BLM Lands		Municipal Boundary	
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Greater Sage-grouse Restricted Surface Occupancy				State Highway	

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0 1 2 4 Miles
0 7,500 15,000 30,000 Feet
1 inch = 15,000 feet

Date: July 2013
PENDO Solutions

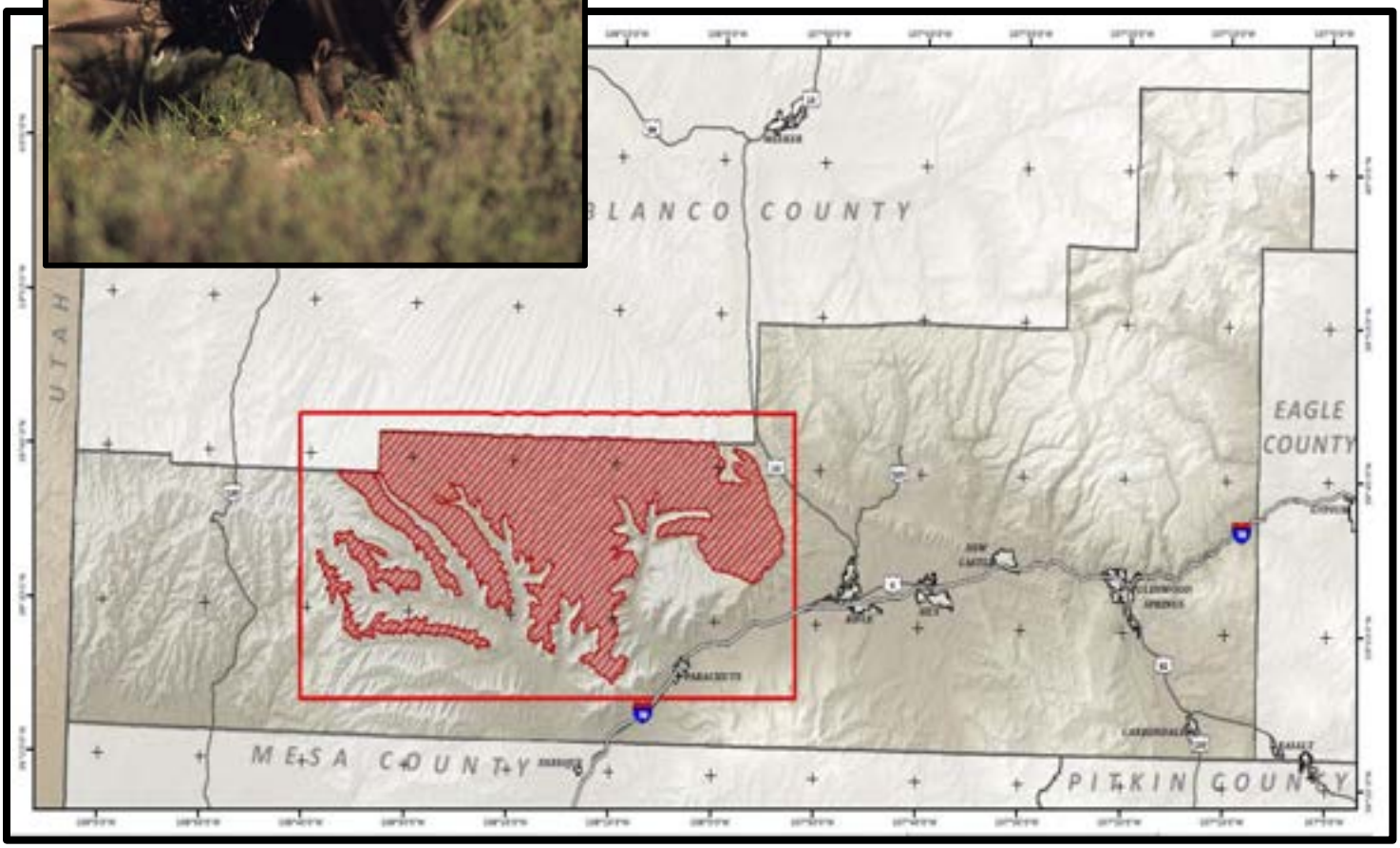
Garfield County

Modeled Habitats for Greater Sage Grouse

Suitable Habitat Results
[Model v1: Revised Vegetation]

Comments on the BLM's NW Colorado Greater Sage Grouse Draft Resource Management Plan and Draft Environmental Impact Statement

December 2, 2013



Submitted by:

<u>Garfield County Board of County Commissioners</u>

John Martin, Chairman
Mike Samson
Tom Jankovsky

Garfield County

December 2, 2013

James Cagney
NW Colorado District Manager
Bureau of Land Management
2815 H Road
Grand Junction, Colorado 81506

Re: Garfield County Comments concerning the BLM's Northwest Colorado Greater Sage Grouse Draft Resource Management Plan and Draft Environmental Impact Statement

Dear Mr. Cagney,

Under cover of this letter you will find specific comments (attached as ***Exhibits A through Q***) prepared by Garfield County (the County) concerning the Bureau of Land Management's (BLM) Northwest Colorado Greater Sage Grouse Draft Resource Management Plan and Draft Environmental Impact Statement (DEIS). Garfield County appreciates the ability to provide these formal comments to the BLM on such an important issue. All of the attached exhibits are considered specific critical comments in the DEIS including scientific analyses, socio-economic analyses, reports, regulatory compliance analyses, letters from concerned special districts, and technical mapping documents and letters. All of these documents combined comprise Garfield County's formal response to the BLM's DEIS.

As you are aware, the County participated as a Cooperating Agency as the BLM crafted the four alternatives prior to its public release. Additionally, the County hosted five Coordination meetings with a variety of state and federal agencies including the BLM in order to provide a forum to attempt to point out and resolve inconsistencies between the BLM's planning efforts and local efforts by Garfield County. Unfortunately, despite the County's sincere efforts to work closely with the BLM, these inconsistencies between the BLM's DEIS and the County's Greater Sage Grouse Conservation Plan remain unresolved.

The County has performed an in-depth review of the DEIS including not only an analysis of the proposed alternatives and the associated GSG habitat maps but also a thorough review of the socio-economic impact analysis. As a result of this review and as a general comment, the County finds the DEIS has failed to meet its legal obligation to provide a reasonable range of alternatives by

excluding County's Greater Sage Grouse Conservation Plan within the range of alternatives and has not adequately identified the socio-economic impacts to our communities in Garfield County.

If, in fact, the goal of the preferred alternative in the DEIS is to provide the US Fish and Wildlife Service (USFWS) with enough 'regulatory assurance' so that a determination can be made to list (or not) the species as threatened or endangered as has been portrayed by the BLM in multiple Cooperation Agency meetings and Coordination meetings, then the County asserts the DEIS has soundly missed that objective. As a cursory sample regarding some of these issues that are discussed more fully within the body of the County's comments, we offer the following significant failures of the DEIS.

A. Inability to Adequately Define GSG Habitat

The DEIS contains a host of contradictory statements on what is habitat, how it will be quantified, and who will make that determination. It introduces a vague and ambiguous management strategy which significantly impacts activities on private lands outside of the regulatory authority of the BLM. As demonstrated in a letter to Mike King, Executive Director of the Colorado Department of Natural Resources (***Exhibit D)***, CPW admitted that the Preliminary Priority Habitat map (PPH) was based on their own Sensitive Wildlife Habitat (SWH) map which was used as a tool for consultation created at a 50,000-foot level and not specifically identifying actual habitat types. Unfortunately, the DEIS continues to use that very broad map as a basis for specific 'on the ground' land management policies assuming it accurately defines habitat for the Greater Sage Grouse (GSG); however, the DEIS contains significant and wildly contradictory statements such as the following:

- Pg. 226: *"GRSG are considered a sagebrush ecosystem obligate species. Obligate species are those species that are restricted to certain habitats or to limited conditions during one or more seasons of the year to fulfill their life requirements. GRSG are only found where species of sagebrush exist."*

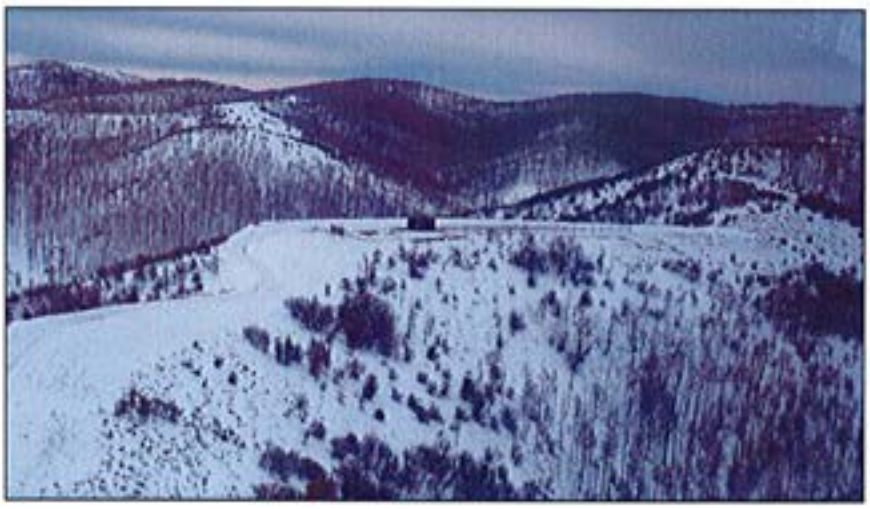
- Pg. 245: *"As is the case with the North Eagle/Southern Routt population on the east side of the CRVFO, the Roan Plateau is at the southernmost part of the range for this species. It is incorporated in the Parachute-Piceance-Roan population. Although the area is mapped as preliminary general habitat (PGH), it does not contain large contiguous sagebrush stands."*

- Pg. 256: *"Adding to this vulnerability, the Parachute-Piceance-Roan population is distributed in clusters across the Piceance Basin and Roan Plateau...Although CPW monitoring of telemetered birds has established that there is regular, but infrequent, interchange among these groups, the large interval of land separating these subgroups (about 9 miles) is relatively devoid of suitable habitat...Habitat potentially suited for use by Parachute-Piceance-Roan GRSG comprises only 16 percent of the mapped overall range."*

- Pg. 507: *"Not all habitats within mapped priority and general GRSG ranges are capable of supporting GRSG populations."*

As you also know, the County provided a much more refined habitat map (attached as ***Exhibit B***) that conflicts with the BLM's PPH / PGH map which is contained in the County's GSG Conservation Plan and as Appendix D of the DEIS and attached to our comments; yet the BLM has not resolved the conflicts between the two mapping efforts to date despite the enormous contradiction in literature citations and CPW's revised position that the PPH map is a consultation tool and contains large areas of non-habitat. As a simple visual illustration, consider the following photos that contrast the Pinedale, WY region (purported to represent the best available science as stated in the NTT report and basis for BLM's management policies) versus the landscape in Garfield County which was described in the literature and quoted above from the DEIS as having ***only 16% habitat***, etc., despite the current mapping in the DEIS:

Pinedale Wyoming Example of Priority Habitat cited as basis for the NTT Report →



Example local landscape in Garfield County mapped as "Priority Habitat" ←

B. <u>Lack of Regulatory Assurance</u>

The DEIS fails to meet the ***Purpose and Need*** of protecting sage-grouse and its habitat, as it allows numerous loop-holes regarding measuring habitat, measuring habitat impacts, and who will

conduct such monitoring. It introduces numerous occasions where the "authorized officer" may introduce their own opinion on the social merit of a project with a BLM nexus regardless of the impact to sage-grouse habitat. To achieve the 'regulatory assurance' the BLM is hopeful for, the DEIS should accurately define what is habitat, where it is, and how it would be managed. Currently, because the DEIS is so vague and misleading, it is difficult to either navigate a process to conduct activities in PPH/PGH areas, or be assured that 'real' habitats would actually be protected. For example, see the following excerpt from Page F-3 of the DEIS:

> ***The initial calculations and the analysis in this document are based on sagebrush maps created using the Regional GAP Analysis Project data, but implementation would be based on site-specific information wherever it is useful. Areas currently dominated by sagebrush, <u>or specially identified by CPW as contributing to the health of GRSG populations</u>*** (emphasis added)***, would be included in the analysis and calculations, independent of ecological site maps.***

This statement introduces regulatory uncertainty to any applicant or agency staff in managing sage-grouse habitats. This statement diverges from previous statements where "***The reference to ecological sites supporting sagebrush is intended to focus disturbance cap management on the most preferred sagebrush habitat***" (pg. F-1). The inclusion of this statement and others such as "***...or specially identified by CPW as contributing to the health of GRSG populations***" affords great discretion to an authorized officer in determining the areas that are managed under the disturbance cap management program; this allows for areas to be managed under the program that are deemed suitable habitat based solely on the judgment of BLM. Accepting the statement on page 226 of the main DEIS as true, ***"GRSG are only found where species of sagebrush exist."*** The County continues to question why would other vegetation communities be proposed to be managed under the disturbance cap management program? This remains a fundamental problem in how the DEIS has attempted to attach poorly crafted specific local land use policies to a very broad 'habitat' map produced by CPW.

C. <u>Implementation of the Alternatives</u>

The County is concerned about actual implementation of the alternatives contained within the DEIS. For example and related to the points made directly above, what entity would be responsible for providing site-specific information regarding what is truly habitat? If CPW or the BLM, would they re-map habitats? Would a project proponent be responsible to collect site-specific information? Who would determine what is habitat? Would it be data from the WAFWA report or ReGAP or the PPH/PGH maps? If a project proponent expends significant time and resources to provide site-specific data, would CPW/BLM accept this information even through CPW did not "specifically identify" the site-specific information? This places a significant burden on project proponents, with no or at least very vague guidance on how site-specific information would be collected, who would review it, and what the definition of effective GRSG habitat actually is, given the DEIS utilizes multiple maps showing significant differences in what habitat really is, but all maps claim to be "defining" habitat. How is the USFWS able to judge protection of habitat if no one really knows what habitat is?

D. Lack of Basis for Stable & Healthy Population

The County finds the DEIS fails to substantiate the ***Purpose and Need*** for Colorado GSG populations. The DEIS states ***"The need for this LUPA is to establish regulatory mechanisms in BLM and USFS LUPs to respond to the recent "warranted, but precluded" ESA listing petition decision from USFWS"*** (pg. xxvi). Multiple evidence presented in the DEIS establishes that the GSG populations in Colorado are at minimum stable, and more likely, increasing as directly quoted in the DEIS:

- Pg. 252: *"The overall results indicated that lek size has decreased, but populations have increased in Colorado."*

- Pg. 253: *"Populations in the late 1960s and early 1970s were approximately 0.7 to 1.6 times the current populations (see diagram 3.3, Change in the Population Index for GRSG in Colorado, 1965-2003 (Connelly et al. 2004)) with relatively large population fluctuations."*

- Pg. 253: *"Although GRSG populations have definitely declined nationwide, the GRSG in Colorado have been increasing for about the last 17 years, and breeding populations have not declined for the last 39 years."*

As has been established above, the DEIS fails to identify or determine what habitat types benefit the bird versus what types does not. To correct this, the DEIS should have developed a specific GSG habitat definition so that readers can actually understand what characteristics birds seek out for utilization and so that potential developers can understand what to look for, avoid and protect. Along the same lines, if the primary objective is to maintain a healthy and stable GSG population, then the DEIS also needs to quantify what constitutes a healthy population. Most recently, CPW hosted a meeting in Rifle, Colorado on 11/20/13 in which Dr. Brett Walker specifically stated that CPW does not know what the base population is of GSG in the Parachute-Piceance-Roan (PPR) area despite their work on lek locations, etc. To date, while CPW appears to understand the 'high male lek count', there is no information in the DEIS that defines a healthy and stable population in NW Colorado.

E. Socio-Economic Impacts

One of the most critical flaws in the DEIS is its failure to properly characterize and identify the socio-economic impacts to communities in NW Colorado for each alternative. Perhaps the most single key concern is the fact that the DEIS does not recognize that oil and gas development occurs across multiple jurisdictional boundaries (public lands, split-estate, and fee simple lands) and does not fit neatly into lands only managed only by the BLM. The result is that the DEIS has ignored an enormous amount of oil and gas development activity on private lands due to the nature of their development (projects with a federal nexus, etc.) that are clearly subject to management policies contained in each of the action alternatives. As such, the alternatives are either silent on or severely underestimate the resulting impacts which directly impact communities in NW Colorado.

Of equal importance is the effect the alternatives will have on tax revenue attributable to oil and gas development to local governments. The DEIS simply states (pages 906-907), *"...the largest*

impact of management alternatives on county fiscal revenues would be through taxes paid by the oil and gas sector." The County agrees with that statement; however, after making that statement, there is no further discussion about the impacts of the alternatives on County revenues and no comparison of the effects of the alternatives. While the DEIS is silent beyond making this statement on impacts to counties, it also does not address the impacts on other service districts that support communities such as fire districts, school districts, and hospital districts to name a few. (Please refer to ***Exhibits E – L*** which comprise letters from concerned municipalities and special districts in Garfield County.)

In comments prepared by BBC Research and Consulting (attached as ***Exhibit C***) on behalf of the County for the review of this DEIS, they note that *"Impacts on county revenues, particularly property taxes, are a major concern for the oil and gas producing counties, where oil and gas properties can be the largest source of county revenues. On a proportional basis (relative to overall sources of revenue) these effects would be much larger for the affected counties than the changes in state severance tax revenues or federal royalties (which are estimated in this section) would be to the State of Colorado or the federal government. Some effort to quantify these effects on county revenues is crucial in the interest of disclosing the socioeconomic effects of the alternatives."*

"To further emphasize the importance of this issue, the Garfield County Assessor's office recently examined the current contribution of oil and gas properties to the local tax base. That analysis revealed that more than 70 percent of the tax base (assessed property value) for the County government and the RE-2 school district was attributable to oil and gas properties, while more than 90 percent of the tax base for School District 16 was attributable to oil and gas. The analysis also identified a number of fire and hospital districts that rely on oil and gas properties for at least 75 percent of their assessed value. All told, oil and gas-related property tax revenues contributed a total of over $90 million in 2012 to the County and at least 10 other local government jurisdictions in Garfield County." However, the DEIS is silent on the impact the action alternatives will have on these revenues. It is estimated conservatively that approximately $218 Billion of oil and gas reserves in the Piceance Basin in Garfield County will be directly impacted by the action alternatives in the DEIS; as a result, the County and other special districts (school, fire and hospital) stand to lose significant revenues from gas production tax over the next 25 years. Note this does not provide an anticipated loss to the special districts and their ability to continue to provide services even though they depend almost exclusively (in some cases near 95%) on tax revenues directly attributable to oil and gas development in their districts. It is the services (education, fire protection and medical services, etc.) they provide to our community which is at stake in the DEIS.

To amplify these issues and to point out the shortcomings of the DEIS, BBC Research and Consulting prepared a report (attached as ***Exhibit C***) whose objective *is to demonstrate the potential economic consequences for Garfield County of BLM's implementation of the proposed Sage-Grouse habitat preservation plans and thus restricting the development of natural gas reserves in the Piceance Basin.* Further, *this report is not meant as a substitute analysis for the BLM's study, but rather a simple demonstration of the order of magnitude economic impacts to Garfield County that were not documented or revealed in the EIS. It is hoped that representation presented here can illuminate the EIS's shortcomings and the magnitude of the document's missing information.*

F. Failure to Consider a Reasonable Alternative

Earlier this year, Garfield County adopted the Garfield County Greater Sage-Grouse Conservation Plan. This plan was developed to ensure the conservation measures implemented were appropriate for the unique landscape and culture of the county, which is unlike any other habitat in the eleven state ranges of the grouse. The county also developed this plan so that there would be coordination among all of the agencies and governments with jurisdictional responsibilities for the habitat and the species.

NEPA regulations require your agency to "study, develop and describe alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." (40 CFR 1507.2) It is concerning to us that after reviewing the Garfield County Plan, it was not carried forward as a reasonable alternative for the lands within the jurisdictional boundaries of Garfield County.

The plan, properly compared with the other alternatives, provides the most protection to the greater sage-grouse, while also ensuring the productive use of the land will continue. Under the Garfield County plan, the County could continue to operate from current funds derived from oil and gas exploration and production well into the future and continue to ensure the protection of our citizens, their property and the greater sage-grouse. This plan demonstrates that the grouse and the people can be fully protected without sacrificing human protection. It should have been fully considered and not summarily dismissed.

Rigorous analysis and comparison of the Garfield County plan would have helped to sharply define the issues, "providing a clear basis of choice among options by the decision makers and the public," (40 CFR 1502.14) as required under the NEPA rules. This currently does not exist in the comparison of alternatives carried forward. The action alternatives (B-D) vary only slightly from each other.

They are all a variation of the NTT approach mandated to be included by the Secretary of Interior as the policies preferred. Alternative B is the NTT alternative where these conservation measures are specifically carried forward. Alternative C is a more restrictive version of these same NTT polices. Alternative D is a slightly less restrictive alternative based on the same NTT principles.

There are no sharply defining issues that show clear distinctions between the three action alternatives. They all carry forward the NTT approach in some fashion. Only the Garfield County Plan offers any distinction in how to develop and implement conservation measures for the protection of the grouse. However, you failed to analyze or consider this a reasonable and preferable alternative.

Section 2.6.2 points out that "The alternative is presented in Appendix D...but has not been analyzed in detail primarily because it is contained within the existing range of alternatives...Consequently, the public is asked to review the Garfield County alternative and provide comments." A closer review of the action alternatives revealed that none of the Garfield County policies in the Garfield County Plan were incorporated within the range of alternatives.

Moreover, the BLM shirked its NEPA required responsibilities to thoroughly analyze the County's Plan and, instead, shifted that duty to the public contrary to its federal requirements.

G. Summary of Fundamental Concerns regarding the DEIS

1) The BLM and USFS should make it clear to the DEIS readers including USFWS, that the existing RMP and LUP provide a plethora of regulatory mechanisms to manage and protect GRSG habitat as well as other multiple use objectives. This remains a fundamental failure of the DEIS by refusing to disclose this in the No Action Alternative.

2) The DEIS contains a great deal of opinion that is not backed up by any demonstrated scientific results. More concerning is the fact that the DEIS authors appear to have extrapolated science from other areas and arbitrarily applied it to NW Colorado and the PPR region. This is a constant theme throughout the DEIS. For example, there is virtually zero evidence provided in the literature that clearly demonstrates oil and gas activity is an actual threat in the overall range, NW Colorado, or Garfield County; rather, it appears that it is unfounded opinion not justified by science.

3) The scientific justification for requiring 4-mile buffers and surface disturbance caps (whether they are 1, 3, or 5%) is entirely based on the opinions of selected authors (some of whom were NTT members) and the erroneous assumption that a local and temporary displacement of sage grouse from an area of development means that a population decline has occurred. However, none of the cited studies actually ever documented a population decline. (Please refer to ***Exhibit M*** entitled "How the National Technical Team Report Changes the Way the BLM Operates" which is a compilation of internal BLM emails obtained through a Freedom of Information Act (FOIA) request that points out the internal BLM's own concern over lack of scientific data to support claims in the NTT report which is the very basis for the action alternatives in the DEIS.)

4) Neither the DEIS or the NTT Report acknowledge that that there has been no population-level decline reported in any of the cited studies, only decreased lek attendance in affected areas. The DEIS needs to be revised to explicitly acknowledge these facts and alternative hypotheses that are consistent with the data.

5) The DEIS provides little in the way of actual "regulatory assurance" sought by the USFWS for protections of habitat; rather the alternatives provide total discretion to "authorized officers" in the field without any published or publically available clear standards or criteria to make decisions. A thorough weighing of existing rules and regulations currently at the command of the BLM may, in fact, provide sufficient regulatory assurance sought by the USFWS; however, the BLM ignored providing this information in the No Action Alternative.

6) The DEIS does not provide habitat mapping that addresses "local ecological site variability" for the areas in Garfield County and NW Colorado that was required by the BLM Director in the Instructional Memorandum 2012-044. Garfield County provided a plan that specifically addressed local ecological site variability which was ignored by the BLM.

7) The DEIS, despite recent sound scientific studies, as pointed out in ***Exhibit Q*** by Dr. Ramey II attached hereto, has neglected to address one of the most the significant issues: **Predation**. This issue was continuously raised by many of the Cooperating Agencies during the scoping of the DEIS, but was summarily dismissed by the BLM as an issue that belonged to CPW and not the BLM as part of the DEIS.

8) The DEIS failed to consider and properly analyze the Garfield County GSG Conservation Plan as required by NEPA in the set of alternatives.

9) The current set of proposed action alternatives (B-D) do not provide a wide set of policy alternatives; rather they are only slight variations of the NTT report.

10) The DEIS does not provide a basis or define what a "healthy and stable" population is in the PPR region in Garfield County; as a result, there no established population baselines or goals to reach. This was recently reiterated by CPW's Dr. Brett Walker in their meeting held in Rifle on 11/20/13 where he explained that CPW does not know what the population is the PPR region.

11) The PPH / PGH habitat maps provided by CPW map large areas of non-habitat in Garfield County despite cited literature and specific text in the DEIS that directly contradict the mapping. This results in CPW erroneously mapping 160,000 acres of non-habitat as "habitat." Recent mapping completed by CPW (Dr. Brett Walker) appears to be very consistent with Garfield County's mapping which revealed large areas of non-habitat that are currently in the PPH / PGH maps.

12) The DEIS erroneously applies specific local landscape management policies in the action alternatives to a broadly crafted and coarse 50,000-foot view consultation map provided by CPW resulting in policies applying directly to non-habitat.

13) As a practical matter, the DEIS action alternatives provide virtually no information on how or who implements the specifics of the policies.

14) The socio-economic impact analysis fails to accurately characterize fundamental socio-economic components of each alternative and therefore significantly underestimates impacts to our region, county and cities and towns.

15) The DEIS glosses over (1 page in 1,000) one of the most critical socio-economic impact issues concerning financial impacts to taxing entities that provide services to our local communities. Tax revenues from natural gas development directly fund and improve our community by directly funding education, fire protection, medical services, county road infrastructure improvements, etc. for residents in Garfield County, yet the BLM did not coordinate with these local governments as required by NEPA and FLPMA. The impacts of their current alternatives will have devastating effects on these services.

16) Because the socio-economic impact analysis was so deficient, BBC Research and Consulting produced a Supplement Report (***Exhibit C***) with the objective to...

Demonstrate the potential economic consequences for Garfield County of BLM's implementation of the proposed Sage-Grouse habitat preservation plans and thus restricting the development of natural gas reserves in the Piceance Basin. Further, *this report is not meant as a substitute analysis for the BLM's study, but rather a simple demonstration of the order of magnitude economic impacts to Garfield County that were not documented or revealed in the EIS. It is hoped that representation presented here can illuminate the EIS's shortcomings and the magnitude of the document's missing information.*

17) Despite our efforts as a Cooperating Agency and through our sincere attempts to coordinate with the BLM, the BLM refused to follow NEPA and include the County Plan as an Alternative in the DEIS.

18) The BLM's DEIS attempts to assert its management authority on private lands through the Disturbance Cap Management program; this directly impacts activities on 1/4 of privately held lands in Garfield County without the legal authority to do so. If the BLM believes it has the legal authority to implement this program, it should disclose its legal arguments in the DEIS.

H. Summary

In summary, for all these reasons above as well as the very detailed comments contained in all the exhibits attached to this letter, Garfield County specifically requests that a supplemental statement should be prepared to properly consider the local impact of the proposed action on the human and natural environment. This supplemental statement should be prepared in coordination with Garfield County and other local governments for the purpose of resolving the conflicts with our policies and to ensure all reasonable alternatives are considered which would include a rigorous analysis of the Garfield County Greater Sage-Grouse Conservation Plan.

If implemented, the proposed action, the action alternatives (based from the NTT report) would represent a violation of BLM's multiple use mandate and a violation of the public trust in that agency to protect human life and property as its first priority. Just as it is the BLM's mission to "sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations," it is our mission to protect the health, safety and welfare of our citizens.

To amplify the significance of the impacts that will result from the draft policies contained in the DEIS, even BLM Staff admits (in box below) in an email exchange between BLM's Jim Perry, Senior Natural Resource Specialist, and other BLM Staffers (see ***Exhibit M***) as to the ultimate significance of the policies as contained in the NTT:

> Overall, the NTT Report conservation measures are complete game-changers for any actions within the Priority Habitats where there are valid existing rights and showstoppers for those actions where there are no valid existing rights.

The BLM's failure to coordinate this DEIS with Garfield County has placed the County in a very difficult situation should you not consider our needs given the extraordinary impacts that will result

from the policies in the DEIS as noted by the BLM in the email excerpt above. We implore the BLM to delay approval of the proposed action and instead prepare a supplemental statement which takes these concerns into account. These comments are only a summary of our concerns and not a complete analysis of the conflicts we find in the DEIS as those are contained in the documents attached hereto. We look forward to be able to meaningfully coordinate with the BLM to resolve inconsistencies in the DEIS with Garfield County's local land use policies.

Very truly yours,

[Absent from Meeting - A second signed letter will follow w/ signature.]

John Martin, Chairman (Absent)

Board of County Commissioners

Mike Samson, Commissioner

Tom Jankovsky, Commissioner

cc: The Honorable John Hickenlooper, Governor, State of Colorado
The Honorable Mark Udall, U.S. Senate
The Honorable Michael Bennet, U.S. Senate
The Honorable Scott Tipton, U.S. House of Representatives
The Honorable Bob Rankin, State House of Representatives
Neil Kornze, Acting Director, Bureau of Land Management
Tom Tidwell, Chief, U.S. Forest Service
John Mehlhoff, Acting State Director, BLM, Colorado
Mike King, Executive Director, Colorado Department of Natural Resources
Robert Broscheid, Director, Colorado Parks & Wildlife

Exhibits

A: Specific and detailed Comments to the BLM DEIS

B: Garfield County Greater Sage Grouse Suitable Habitat Map
C: Economic Impacts of Sage Grouse Management: Supplemental Report
D: Letter from Garfield County Commissioners to Mike King dated October 21, 2013
E: Letter to BLM from the Colorado River Fire Rescue District
F: Letter to BLM from Grand River Hospital District
G: Letter to BLM from the Town of Parachute
H: Letter to BLM from the RE-16 School District
I: Resolution from the Town of Silt, Colorado
J: Letter to BLM from the De Beque Fire Protection District
K: Letter to BLM from the Grand Valley Fire Protection District (Anticipated)
L: Letter to BLM from the City of Rifle
M: How the NTT Report Changes the Way the BLM Operates (Internal BLM emails obtained through FOIA)
N: NW Colorado Sage Grouse Joint Letter dated 11/26/13
O: Deficiencies in the Northwest Colorado Greater Sage-Grouse Draft Environmental Impact Statement and Draft Resource Management Plan Amendment
P: Analysis of Compliance of the BLM's DEIS with National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ), and the BLM's own Policies and Procedures
Q: Memorandum from Dr. Rob Ramey II containing comments on the DEIS

Garfield County

November 26, 2013

John Mehlhoff
Acting State Director, Colorado
Bureau of Land Management
2850 Youngfield Street
Lakewood, Colorado 80215

Dan Jirón
Regional Forester, Rocky Mountain Region
U.S. Forest Service
740 Simms Street
Golden, Colorado 80401

RE: Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement

Dear Mr. Mehlhoff and Mr. Jirón:

The undersigned organizations write to express our concerns with the Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement (DLUPA/EIS). This comment letter does not replace but is in addition to detailed technical comments that may be submitted by the individual undersigned organizations to the Bureau of Land Management and U.S. Forest Service (the agencies) on this matter. Our constituents represent a diverse group of stakeholders that drive and rely on economic development in northwest Colorado, utilize public lands for myriad multiple-use activities, and play a significant role in the protection and conservation of plant and wildlife species, including the Greater Sage-Grouse (GSG), and its habitat. We therefore have a direct and vested interest in the proposed management decisions in the DLUPA/EIS.

We believe there have been significant efforts undertaken in northwest Colorado to conserve GSG and we support the agencies' efforts to craft additional management procedures to conserve and protect the species and its habitat in order to demonstrate to the U.S. Fish & Wildlife Service (FWS) that a listing under the Endangered Species Act (ESA) is unnecessary. Nonetheless, after reviewing the DLUPA/EIS we have identified several issues with the document that, if implemented, will have a number of inequitable socioeconomic consequences in northwest Colorado. Furthermore, we have concluded that the proposed management procedures in the DLUPA/EIS far exceed what is needed to demonstrate to FWS that the regulatory mechanisms needed to conserve GSG and its habitat will exist in the planning area.

The signatories of this letter are seriously concerned about many facets of the DLUPA/EIS that will adversely affect our respective constituencies. We collectively believe that the document has been rendered fundamentally flawed due to the following reasons:

1. The document does not contain an adequate range of alternatives as required under the National Environmental Policy Act (NEPA)
2. The analysis and recommendations in the document rely heavily on the BLM National Technical Team's Report (NTT) Report, which failed to include recent scientific and commercial data and would severely limit the ability of the agencies to meet their multiple-use mandates
3. The agencies have proposed overly broad and rigid management restrictions in mapped habitat areas
4. The analysis underestimates the negative socioeconomic impact of the proposed management of GSG in the planning area
5. The disturbance cap methodology proposed in the DLUPA/EIS is not clearly defined and lacks scientific justification
6. The document does not adequately explain the proposed mitigation strategy or the context for its use.

Because the management policies resulting from this planning effort will significantly affect northwest Colorado and the future economic vitality of local communities within the planning area, the agencies must rectify these issues before preparing the final LUPA/EIS and issuing a Record of Decision.

Inadequate Range of Alternatives

NEPA and Council on Environmental Quality (CEQ) regulations require agencies to consider a well-defined range of management alternatives and have a clear basis for choosing among the options. While the agencies claim they "will consider a range of reasonable alternatives, including appropriate management prescriptions,"[1] the DLUPA/EIS does not include an alternative that would protect GSG and its habitat while also meeting the traditional multiple-use concepts required under the Multiple-Use Sustained Yield Act of 1960, the Federal Lands Policy and Management Act of 1976 (FLPMA), and the Forest and Rangeland Renewable Resources Planning Act of 1974 as amended by the National Forest Management Act of 1976. Alternatives carried forward for analysis must be reasonable and meet existing land use objectives and mandates.

Instead, the preferred alternative (Alternative D) largely represents a mixture of the elements of Alternatives B and C, one of which relies on non-site specific recommendations from the NTT report, and another that employs impractical restrictions developed by special-interest environmental groups. As currently proposed, it is unclear how the BLM would implement any of the proposed alternatives and still be able to meet their multiple-use mandate.

[1] DLUPA/EIS at 25

During scoping, the agencies received input from local and state governments that have been recognized as cooperating agencies in this process. During these meetings, the cooperating agencies offered substantive input that would provide a fourth alternative usually reserved for cooperating agency guidance. Unfortunately, those suggestions were not factored into the formulation of alternatives.

To ameliorate this dilemma, we urge the agencies to draw upon the materials submitted by the cooperating agencies that foster GSG conservation as well as a range of public land uses and incorporate those elements into the preferred alternative in the final LUPA/EIS. Taking this step will help ensure that the final LUPA/EIS actually balances economic development with GSG protection in the planning area and that the agencies have considered a broader range of management alternatives as required under NEPA and CEQ regulations.

Overreliance on the NTT Report

We question the reliance on many cited sources in the DLUPA/EIS, particularly the NTT Report. Some recommendations from the NTT report are directly included in the preferred alternative, and it appears the report serves as the basis of many of the proposed management restrictions.

The use of the NTT report is problematic as it contains overly burdensome recommendations that are not based on local conditions in northwest Colorado. An independent review of the report shows that it contains many methodological and technical errors, selectively presents scientific information to justify recommended conservation measures, and was disproportionally influenced by a small group of specialist advocates.[2] As such, the NTT report does not adequately represent a comprehensive and complete review of the best scientific and commercial data available and is inappropriate for use as the primary basis of many of the proposed management restrictions.

Overly Broad Application of Restrictions in Habitat Areas

We question the proposal to impose rigid, uniform management restrictions without consideration of local conditions in habitat areas that were mapped by Colorado Parks & Wildlife. The agencies have proposed to prohibit surface occupancy or disturbance within four miles of a lek in Preliminary Priority Habitat (PPH) during nesting, lekking, and early brood-rearing periods. The four-mile buffer around leks does not address the variations in habitat quality or use and given the topography of the planning area there is substantial acreage within four miles of leks that may not actually be GSG habitat.

The map of "Ecological Sites Supporting Sagebrush" fails to differentiate between sagebrush habitat quality or use by GSG. As a result, the agencies may be arbitrarily expanding areas subject to the management restrictions outlined in the DLUPA/EIS to areas that do not actually contain active leks or GSG habitat. In addition, there is no scientific evidence that enforcing rigid, uniform restrictions across thousands of acres will actually benefit the species and its habitat, which is counter to the

[2] Rob Roy Ramey, *Review of Data Quality Issues in a Report on National Sage-Grouse Conservation Measures Produced by the BLM National Technical Team (NTT)*, (September 19, 2013).

agencies' objectives for this planning process. These factors undercut the agencies' ability to work with users of public lands to identify site-specific plans that allow for development while protecting the GSG and high-quality habitat.

Furthermore, the agencies have not provided a mechanism to ground-truth the habitat areas on a project-specific basis before imposing restrictions, or to monitor its quality or use in the future. Without ground-truthing and future monitoring, the agencies will likely preclude multiple-use activities in areas that do not actually support GSG habitat or active leks, unnecessarily preventing economic activities without commensurate benefit to GSG populations and habitat.

Inadequate Socioeconomic Analysis

Users of public lands in northwest Colorado pump millions of dollars of into the national, state and local economies and provide thousands of high-paying jobs within the planning area. The management restrictions and closures in the DLUPA/EIS will undeniably have a direct impact on these users and will have a negative impact on the future viability of coal and hard rock mining, oil and natural gas development, agricultural production, grazing and ranching activities, and power generation in the planning area and beyond. As a result, crucial tax revenue and other economic benefits from these activities will decline.

Unfortunately, the agencies underestimate and consequently underreport this negative impact. The socioeconomic analysis is biased in favor of non-market valuation methods which by the agencies' own admission "are not directly comparable to regional economic indicators commonly used to describe how natural resources on public lands contribute to the regional economic indicators such as output/sales, labor income, and employment."[3] Due to this bias, the agencies have overestimated non-market valuations and underestimated the negative economic impact on local communities and the State of Colorado.

The agencies portray the socioeconomic impacts on the entire planning area but do not delineate the effects that would result from the proposed management restrictions on specific areas, including counties. A more specific portrayal of the projected impacts which was proposed by many cooperating agencies during the scoping process would help those impacted to fully understand the varying levels of socioeconomic impacts that will result from the DLUPA/EIS.

Disturbance Cap Methodology

Limiting surface disturbance in the 21 management zones using a cap is a central component of the management of GSG as proposed in the DLUPA/EIS. The methodology proposed for implementing a cap in the DLUPA/EIS is not clearly defined, lacks scientific justification, and no evidence exists that it will result in sustaining or increasing sage grouse populations.

The agencies have not adequately elucidated several critical details about the functionality and application of the cap concept. For example, the DLUPA/EIS does not clearly explain the scientific

[3] DLUPA/EIS at M-13

data or the sources for that data that is being used to establish the cap; how the disturbance database would be managed and updated and by whom; if or how disturbance percentages will capture reclamation or habitat enhancements; whether and how temporary anthropogenic disturbances will be treated differently than permanent disturbances; and whether and how GSG populations will be actively monitored in each zone and by whom. Because a cap tool, like the one proposed in the DLUPA/EIS, presents myriad challenges that may inhibit consistent and clear implementation, the basis and functionality of the tool must be clearly thought out and presented to entities that will be impacted by its use.

The agencies have not presented information adequately demonstrating that limiting total disturbance to less than 30% in a particular management zone is actually achievable, scientifically defensible, and would result in stable populations in the management zones. Habitat disturbance should be managed according to more localized considerations including habitat quality and habitat distribution, as well the nature and variability of multiple use activities and their associated mitigation.

We are similarly concerned that the cap approach affords the agencies the unprecedented discretion to halt projects on public lands in order to compensate for disturbances on private land. While the agencies state they will not inventory private lands or monitor the activities of private landowners, they will track and account for large projects on private lands and apply them against disturbance caps.[4] This approach represents a broad overreach of the agencies' authority and is inappropriate.

Mitigation Strategy and Context for Use

Throughout the DLUPA/EIS, the agencies reference the notion of utilizing mitigation strategies but have not adequately defined the basis or context when mitigation might be used. While BLM has adopted an interim offsite mitigation policy, the DLUPA/EIS lacks the specificity necessary to implement approaches that would meet the parameters of this policy, much less give adequate direction to BLM Field Offices that mitigation is a viable option.

Colorado, through a diverse stakeholder process, has under development a mitigation approach called the *Colorado Habitat Exchange* that would meet, if not exceed, BLM's mitigation policy. We request that the agencies develop a more meaningful strategy for mitigation and further define the means by which mitigation might be used in the context of the alternatives in the DLUP/EIS with special attention paid toward the efforts underway in the State around the *Colorado Habitat Exchange*.

[4] DLUPA/EIS at F-3

Conclusion

We respectfully request that the agencies rectify the issues identified above before preparing the final LUPA/EIS and issuing a Record of Decision. As written, the DLUPA/EIS does not represent a balanced approach to the future conservation of GSG and economic development in the planning area and its implementation may ultimately preclude the agencies from carrying out their respective multiple-use mandates. It also far exceeds what is needed to demonstrate to FWS that a federal listing of the GSG is unnecessary. The undersigned organizations appreciate the agencies' consideration of these concerns and are fully willing to further discuss these comments and recommendations with you in more detail.

Sincerely,

John Martin, Chairman

Board of County Commissioners

Mike Samson, Commissioner

Tom Jankovsky, Commissioner

Other Signatures include:

Associated Governments of Northwest Colorado
Moffat County Commissioners
American Petroleum Institute
Bord Gulch Ranch
Colorado Cattlemen's Association
Colorado Farm Bureau
Colorado First Conservation District
Colorado Mining Association
Colorado Public Lands Council
Colorado Woolgrowers Association

Douglas County Conservation District
Independent Petroleum Association of America
Public Lands Advocacy
Rio Blanco County Commission
West Slope Colorado Oil and Gas Association
Western Energy Alliance
White River Conservation District

cc: The Honorable John Hickenlooper, Governor, State of Colorado
The Honorable Mark Udall, U.S. Senate
The Honorable Michael Bennet, U.S. Senate
The Honorable Scott Tipton, U.S. House of Representatives
Tom Tidwell, Chief, U.S. Forest Service
Neil Kornze, Acting Director, Bureau of Land Management
Jim Cagney, Northwest Colorado District Manager, Bureau of Land Management
Mike King, Executive Director, Colorado Department of Natural Resources
Robert Broscheid, Director, Colorado Parks & Wildlife

The following comprises the comments prepared by Garfield County in response to the Bureau of Land Management's Northwest Colorado Greater Sage Grouse Draft Resource Management Plan and Draft Environmental Impact Statement (DEIS)

Date: December 2, 2013

[The following comments are formatted such that they are meant to address specific portions of the DEIS in a linear fashion from the beginning of the document. For the ease of the reader, a page number and actual text from the DEIS for reference will be provided in ***bold italics*** followed by a comment on that section.]

Main Document

Pg. xxxii: "No PPH, PGH, or linkage/connectivity habitat would be delineated under Alternative A. Goals and objectives for BLM-administered and National Forest System lands and mineral estate would not change. Appropriate and allowable uses and restrictions pertaining to such activities as mineral leasing and development, recreation, utility corridor construction, and livestock grazing would also remain the same. The BLM/USFS would not modify existing or establish additional criteria to guide the identification of site-specific use levels for implementation."

- Add the requirements already listed in BLM Manual 6840 and USFWS Manual 2600 which require special management of candidate species habitat.

- The DEIS fails to acknowledge the fact that there are existing laws, regulations and policies that mandate the BLM and USFS manage habitat for candidate, sensitive, threatened, endangered and other special species designations.

- Add the fact that existing goals and objectives include managing candidate species so that they do not become listed, thus the No Action alternative is compatible with GRSG conservation.

- Change to state that the BLM/USFS are mandated by existing laws, regulations and policies to modify existing uses to protect candidate species and the GSG.

- Add a section to explain that USFWS did not direct BLM and USFS to rewrite RMPs and LUPs. Instead, USFWS merely pointed out that they did not have the ability to assess regulatory mechanisms because of how the information was being reported. As stated by USFWS at 75 FR 13976 – "the BLM…reported information at a different scale than was used for their landscape mapping. Therefore, we lack the information necessary to assess how this regulatory mechanism effects sage-grouse conservation…" USFWS was not looking for new regulatory mechanisms. It seems clear from the Warranted but Precluded determination that the agency was seeking evidence that the current regulatory mechanisms would be implemented and documentation of the effectiveness of those mechanisms.

- After reviewing the exact language of the Warranted but Precluded determination, BLM and USFW need to rewrite the No Action Alternative to clearly explain existing regulatory mechanisms in place as well as the authority under existing laws, regulations and policies, to protect and conserve sage-grouse habitat.

Executive Summary

ES.5 (Page xxix) Planning Criteria

- In direct conflict with the legal requirements, the BLM did not develop the Planning Criteria with Garfield County as a local Cooperating Agency. The draft policies contained DEIS do not meet the Planning Criteria as proposed by the BLM.

ES.1 (Page xxiii): "The planning area incorporates the PPH, PGH, and linkage/connectivity habitat. Though the planning area includes private lands, decisions are made only for BLM and USFS federal surface and federal minerals in this LUPA. Management direction and actions outlined in this LUPA apply only to these BLM-administered and Routt National Forest lands within the planning area and to federal mineral estate under BLM administration that may lie beneath other surface ownership; this is defined as the decision area."

- This statement is misleading at best because the BLM has chosen to delineate Management Zones that include large areas of private land (private minerals and surface) and proposes to manage a disturbance cap program on those lands. The disturbance cap program, by design, will have an indirect impact on private land activities / disturbance by effectively holding cap space hostage on public lands hostage while cap space is consumed on private lands. The BLM states here that the "management direction and actions outlined in this LUPA apply only to BLM-administered lands", yet the BLM specifically states in Appendix F that it will inventory disturbance on private lands in the cap management program which is a direct contradiction. (Please refer to Section II, page 6 of Exhibit C to the County's comments that identifies a major concern regarding impacts to existing leaseholders in contrast to how the BLM proposes its disturbance cap management program.)

ES.1 (Page xxii): "This LUPA addresses GRSG habitat within northwest Colorado. The BLM's Northwest Colorado District office has mapped this habitat preliminarily, in coordination with the Colorado Department of Natural Resources, Parks and Wildlife (CPW). GRSG habitat falls into one of the three following categories:

- ***<u>Preliminary Priority Habitat (PPH)</u> - Areas that have been identified as having the highest conservation value to maintaining sustainable GRSG populations; include breeding, late brood-rearing, and winter concentration areas.***

- ***<u>Preliminary General Habitat (PGH)</u> - Areas of seasonal or year-round habitat outside of priority habitat***

- ***<u>Linkage/Connectivity Habitat</u> - Areas that have been identified as broader regions of connectivity important to facilitate the movement of GRSG and to maintain ecological processes***

PPH and PGH are considered preliminary until a decision on this document is made, at which point they would become Priority Habitat and General Habitat. Collectively, PPH, PGH, and linkage/connectivity habitat are referred to as all designated habitat (ADH)."

- The BLM uses maps in this EIS provided to them by CPW for the PPH, PGH, and ADH. These maps are currently defined by the BLM as "habitat" maps; however, in coordination meetings hosted by Garfield County as well as with Mike King, Executive Director of DNR and CPW, CPW explains that these maps are based on CPW's Sensitive Wildlife Habitat map that is actually designed and used by CPW as a tool to require consultation only rather than a map that explicitly defines habitat as suggested by the BLM. (Please refer to Exhibit D, Letter to Mike King dated October 21, 2013.)

- This meeting reaffirmed that CPW developed and uses two maps regarding the management of GSG in Colorado which include the Sensitive Wildlife Habitat (SWH) map and the Restricted Surface Occupancy (RSO) map. It was made clear that the SWH map does not accurately delineate actual habitat; rather, it is used as a reference tool intended to require consultation for potential development within its boundaries and should not be construed as a map depicting any form of a "No Surface Occupancy" (NSO) policy. Additionally, the RSO map is intended to define a 0.6 mile buffer round an active lek with the purpose of prohibiting development activity. We also understand that the SWH map has been sent to the BLM in the form of the Preliminary Priority Habitat (PPH) map for use in their EIS. Further, CPW intends to adjust this Preliminary Priority Habitat (PPH) map with recent data collected by Dr. Brett Walker which is anticipated to more accurately define the PPH boundaries. Once this has occurred, Garfield County requests CPW to resubmit that revised map to the BLM for use in the EIS. (CPW staff also reaffirmed that the acceptable margin of error for distance from plotted bird locations was no greater than 50 meters.)

- There appears to be a fundamental disconnect between how CPW designed and uses the SWH map as a basis for consultation versus how the BLM is using the PPH map for project-specific land management policies and "in-the-field" decisions. As explained specifically to the County by

CPW staff on September 5, 2012 in a County Coordination meeting, this BLM - PPH map (which is CPW's SWH map) was generated at a 50,000-foot level not intended for specific "on-the-ground" land use management. Again, the County urges CPW and DNR (***Exhibit D***) to continue to provide that comment and direction to the BLM on the draft EIS. In effect, it should be made clear that the BLM - PPH map (based on CPW's SWH map) should be better defined as a Wildlife Consult Map that should not be confused with actual habitat for which the BLM is to manage for the survival of the bird.

- The County has analyzed CPW's SWH map and found it to be problematic if it is used for localized land use decisions. First, the habitat model designed by Dr. Mindy Rice et a. 2013 was done so using data on a moving 1-kilometer scale (0.6 mile grid cells). In doing so, it inaccurately typed large areas that do not include habitats known to support GSG such as pinyon-juniper, mixed conifer forest, and aspen groves. Furthermore, numerous other criteria that are known to directly influence suitable greater sage-grouse habitats were, admittedly by design, excluded from the habitat model, including slope parameters, relevant landforms, percent canopy cover, etc. Again, this model approach is too coarse to be used as an effective local habitat management tool which Dr. Rice specifically notes in her paper.

- In the design of the SWH map, CPW has applied an arbitrary four-mile buffer (eight-mile diameter) around active leks. (The four mile distance is believed to be the distance from the lek where 80% of the hens will nest.) However, this distance also assumes the birds will be nesting in their commonly understood habitat as is commonly found to be true in large expanses of gently rolling sage brush communities in Wyoming, Montana, etc. Garfield County does not have these same expanses of rolling sage brush communities; conversely, the habitat is severely fragmented in a scattered patchwork of sage brush on hill tops intermixed with large areas of non-habitat vegetation communities such as aspen, conifer, pinyon-juniper, etc. Moreover, the area in Garfield County also contains large areas of slopes (in excess of 30%) that are not known to support GSG. So, the County opposes an arbitrary application of a four-mile buffer around an active lek which captures thousands of acres of non-habitat where other land uses and activity could occur without requiring involvement from government agency oversight for the management of the GSG.

- Prohibition on surface disturbance within 4 miles of a lek in PPH, including during the lekking and early brood-rearing period when there is no specific cause and effect mechanism cited and the prohibition is solely based upon the subjective opinion of the NTT and opinions expressed in selected reports and publications. The DEIS effectively proposes "protecting" large areas (~50 square miles) of non-habitat and marginal habitat surrounding each lek without any demonstrable benefit to sage grouse populations, ignoring more appropriate conservation actions suited to local ecological conditions, and basing the presumed benefits of this recommendation upon speculation. (Please refer to ***Exhibit M***: "How the NTT Report Changes the Way the BLM Operates" which contains internal BLM emails obtained through FOIA that underscore the BLM's own concern for lack of scientific citations and data to support opinions rather than actual science used in the NTT Report.)

- The scientific justification for requiring 4-mile buffers and surface disturbance caps (whether they are 1, 3, or 5%) is entirely based on the opinions of selected authors (some of whom were NTT members) and the erroneous assumption that a local and temporary displacement of sage grouse from an area of development means that a population decline has occurred. However,

none of the cited studies actually ever documented a population decline. One of the most frequently cited studies, the unpublished dissertation by Holloran (2005), was wrong in all of its predicted population declines. To the contrary, recent data from the state of Wyoming has documented that the sage grouse population in Pinedale actually experienced an overall increase from 1990 to 2012. Throughout that time period, it has consistently been above statewide averages and has the highest density of sage grouse in the state. (Please refer to ***Exhibit M***: "How the NTT Report Changes the Way the BLM Operates" which contains internal BLM emails obtained through FOIA that underscore the BLM's own concern for lack of scientific citations and data to support opinions rather than actual science used in the NTT Report.)

- CPW's SWH map (which is used by the BLM as the PPH map) is also based on the agency's "Occupied Range" map which appears to be an internal map maintained primarily by research staff and updated based on field-observations over time. This is problematic because the data used to inform this map is specific to individual professional opinion which may vary from time to time depending on individual field personnel and is not reproducible. In recent discussions with CPW staff, it became apparent that these opinions stray far from data that is cited in the literature from CPW biologists as to the accepted criteria for what defines habitat and where the GSG are commonly located within that habitat. The DEIS needs to disclose and clarify how changes in "occupied range" will be managed over tome to address unoccupied habitats and newly discovered habitats.

- The County recently spent considerable resources to produce a highly accurate Suitable Habitat Map which is attached as ***Exhibit B*** to this packet of information. This map is a result of creating two distinct models (a weighted overlay model and a fuzzy overlay model). These models were driven by criteria developed from an exhaustive literature review using CPW's own occupied habitat driven criteria (including slope, distance to forest, canopy cover, landforms and vegetation community). In addition, the Garfield County habitat model utilized a vegetation dataset with a much higher degree of accuracy, based on performing a supervised image classification process on 2-meter cell resolution color-infrared photography. Moreover, in recent meetings with CPW to validate our mapping, it became clear that our mapping had a high degree of correlation to relevant / recent bird location data points collected by CPW's Dr. Brett Walker. In doing so, our model captured 92 percent of the bird locations within 100 meters of our habitat model. An important additional correlation is made with a high degree of accuracy when CPW's lek data is overlaid on Garfield County's Suitable Habitat map which is attached as Exhibit B to this letter. It should also be understood; the County's Suitable Habitat map was created with a transparent process and is reproducible. To the contrary, after considerable effort, we found that the PPH / PGH map is not reproducible and is based on data that the BLM refuses to release to the public in order that it is verified.

- The net result proved that the PPH / PGH map in the DEIS has inaccurately mapped large areas of non-habitat (pinion-juniper, fir, and aspen groves) on the Roan Plateau in Garfield County as priority habitat. As understood in terms of acres, while BLM's PPH map has mapped approximately 220,000 acres as priority habitat in their PPH map, Garfield County's Suitable Habitat map identifies only 59,093 acres of suitable habitat. This is a 73% reduction in habitat in Garfield County. Put another way, the PPH / PGH map was developed with such a broad brush approach, it erroneously captured approximately 160,907 acres of land that does not have GSG habitat characteristics supported by relevant peer-reviewed literature and 'data-verified' field

observations. By doing so, it will have the practical effect of requiring a land owner to consult with CPW and BLM on projects that are clearly cited in areas of non-habitat.

- The DNR and CPW made it clear that the SWH map (PPH / PGH / ADH maps in the DEIS) is intended to be used as a tool for consultation only for projects within its borders and not specifically designed as an actual 'habitat' map to be interpreted as any form of NSO or otherwise by the BLM in developing land use policy. The County has urged CPW and DNR to continue to provide that direction in their comments to the BLM on the draft DEIS. In effect, it should be made clear that the BLM - PPH map (based on CPW's SWH map) should be better defined as a wildlife consult map that should not be confused with defining actual priority or general habitat for which the BLM is required to manage for the survival of the bird. The net result it that, to date, the BLM has yet to provide an actual habitat map in the DEIS upon which it intends to apply its land use policies in a selected alternative.

- The direction provided in the IM 2012-044 is as follows: "*Through the land use planning process, the BLM will refine Preliminary Priority Habitat and Preliminary General Habitat data (defined below) to: (1) identify Priority Habitat and analyze actions within Priority Habitat Areas to conserve Greater Sage-Grouse habitat functionality, or where possible, improve habitat functionality, and (2) identify General Habitat Areas and analyze actions within General Habitat Areas that provide for major life history function (e.g., breeding, migration, or winter survival) in order to maintain genetic diversity needed for sustainable Greater Sage-Grouse populations."* Despite this direction, the BLM has incorporated CPW's 50,000 foot view consultation maps for the basis for applying policy in the EIS rather than actual habitat maps that acknowledge local site variability in Garfield County such as the suitable habitat map contained in the Garfield County GSG Conservation Plan. <u>The BLM's planning process which included multiple cooperator agency meetings did not provide any discussion on habitat mapping as to its origin or intent of use as specifically testified to by Jim Cagney in a Garfield County Coordination meeting</u> despite the BLM Director's direction in IM-044 to consider new mapping information.

  This has effectively resulted in cooperating agencies not having an accurate picture of what the purpose and need of the DEIS is, when on the one hand CPW has indicated that there are large areas of non-habitat captured in PPH/PGH, but then BLM is indicating that policy will be made solely for the protection of GRSG habitats on federal lands. The mapping and policy linkage process is confusing at best, and misleading for cooperating agencies and the public. Further, with the inclusion of habitat cap management maps, the whole issue of what is habitat, what the jurisdictional reach of the BLM will be, and the ability of the public to adequately assess the scope of the DEIS is significantly flawed. We request that the BLM fix the mapping issue in order to cooperating agencies and the public to accurately comment on the DEIS and proposed alternatives.

ES.2 (Page xxvi): "Purpose and Need for the Land Use Plan Amendments"

- This section seems to selectively mention portions of the Instructional Memorandum 2012-044 while omitting other provisions. For example, it fails to mention the following directive from the IM: "*While these conservation measures are range-wide in scale, it is expected that at the regional and sub-regional planning scales there may be some adjustments of these conservation*

measures in order to address local ecological site variability." The DEIS does not comply with FLPMA's requirement that there be coordination with local plans in order to resolve inconsistencies between plans. To date, the BLM has refused to resolve the inconsistencies between the policies in the DEIS and Garfield County's Greater Sage Grouse Conservation Plan and CPW research publications which does address local ecological site variability. We request that the DEIS fully cite IM 2013-044 and not just select sections which limit the public's ability to accurately assess and comment on the DEIS and alternatives. Further, the DEIS does little to acknowledge or discuss how local information will be incorporated into conservation measures, and we believe this is a fatal flaw of the DEIS.

ES.5: (Page xxx) "Planning Criteria": "The BLM and USFS will coordinate with state, local, and tribal governments to ensure that the BLM and USFS consider provisions of pertinent plans, seeks to resolve inconsistencies between state, local, and tribal plans, and provides ample opportunities for state, local, and tribal governments to comment on the development of amendments."

- Garfield County held five (5) coordination meetings with the BLM and CPW staff in order to present and discuss Garfield County's concerns as well as work though inconsistencies between the BLM's DEIS process and address "local ecological site variability". While the BLM has incorporated the County's Plan in the DEIS as a standalone appendix (Appendix D), it has not sought to resolve inconsistencies between the plan and the DEIS; rather, the BLM shifts that responsibility to the public to provide comment on the County's plan rather than comply with their legally required responsibility. Specifically, the BLM states in Section 2.6.2 of Chapter 2 the following:

  "The alternative is presented in Appendix C, Garfield County Greater Sage-Grouse Conservation Plan, but has not been analyzed in detail primarily because it is contained within the existing range of alternatives. The Garfield County alternative is more restrictive and more focused regarding "modeled suitable habitat" than Alternative A. The alternative is less restrictive and identifies less PPH than Alternatives B, C, and D. Given the Garfield County alternative's position within the range of alternatives, the conservation measures contained could be selected, in whole or in part, pending detailed analysis in the final EIS. Consequently, the public is asked to review the Garfield County alternative and provide comments."

- Garfield County has not identified how or where, as stated above, its plan is incorporated within the existing range of alternatives. BLM admits to not providing a detailed analysis of the plan. Further, the BLM shirks its responsibility and direction provided in IM 2012-044 requiring the following: "The BLM must consider all applicable conservation measures when revising or amending its RMPs in Greater Sage Grouse habitat. The conservation measures developed by the NTT and contained in Attachment 1 must be considered and analyzed, as appropriate, through the land use planning process by all BLM State and Field Offices that contain occupied Greater Sage-Grouse habitat. While these conservation measures are range-wide in scale, it is expected that at the regional and sub-regional planning scales there may be some adjustments of these conservation measures in order to address local ecological site variability. Regardless, these conservation measures must be subjected to a hard look analysis (emphasis added) as part of the planning and NEPA processes." The net result is this DEIS has not provided a hard look analysis of the County's plan as an alternative or as information towards local ecological site variability, and thus has directly ignored the direction provided in IM 2012-044. We request

the DEIS be re-done to follow IM 2012-044 and allow the public to reassess the impacts of implementation of the alternatives.

- Ignores the substance of local conservation plans, especially the Garfield County sage grouse plan, in favor of one-size fits all restrictions in its alternatives, in clear contrast to the stated position of the BLM. The DEIS lacks a comprehensive and objectively informative analysis of locally-appropriate conservation alternatives that could be used to guide management of BLM lands, while addressing specific threats to sage grouse. The DEIS is deficient in that it does not include conservation strategy for analyzing threats or their specific cause and effect mechanisms, and then mitigating the mechanisms that underlie each threat within the BLM's adaptive management framework. That approach for sage grouse was clearly articulated in the publication by Ramey, Brown, and Blackgoat (2011). (See ***Exhibit Q***.)

Chapter 1: Introduction

Introduction – Overview 1.1.1 (Page 4): "The report drafted by the NTT, A Report on National Greater Sage-Grouse Conservation Measures (NTT 2011) provides the latest science and best biological judgment to assist in making management decisions relating to the GRSG."

- In the field of science when the observations do not match the predictions of a hypothesis or theory, the hypothesis is falsified (i.e., it is wrong). The BLM cannot rely on research that has been found to be wrong. Holloran (2005) is one of the most widely cited studies in the DEIS, yet his predictions have been unfounded. (See ***Exhibit Q***.)

- Furthermore, the BLM cannot rely on research whose authors relied on belief to reach their conclusions when the results lacked any statistical significance. One of the key studies cited in the NTT Report did exactly that: Lyon and Anderson (2003) erroneously characterized oil and gas development as having a negative effect on sage grouse nest initiation rates. That unsupported opinion, clearly contrary to the available data and analysis, has subsequently been cited by the BLM as a scientifically valid conclusion in the NTT Report, which portrays all oil and gas development in a negative light. The DEIS (page 516) then cites the NTT Report in support of its statements that negative effects have been reported 4-miles from oil and gas development: "*Recent studies have consistently demonstrated that oil and gas development and its infrastructure influence GRSG behavior and demographics at distances of up to 4 miles (NTT 2011). This prompts declines in lek persistence and male attendance, yearling and adult hen survival, and nest initiation rates. It also elicits strong avoidance response in yearling age classes, nesting/brooding hens, and wintering birds*." However, as the following quotation indicates, the study by Lyon and Anderson (2003) relied on belief (rather than statistically significant results) to reach their conclusions: "*Finally, even though nest initiation between disturbed and undisturbed hens was not statistically significant, we believe lower initiation rates for disturbed hens were biologically significant and could result in lower overall sage grouse productivity*." Additionally, Holloran (2005) reported that nest success that was virtually identical and not significantly different between disturbed and undisturbed areas, using a much larger sample size compared to Lyon and Anderson (i.e., n=213 used by Holloran vs. n=77 used by Lyon and Anderson). The BLM cannot base its management decisions on the basis of belief and opinion, while disregarding contrary results. (See ***Exhibit Q***.)

- The DEIS needs to acknowledge the alternative hypothesis that sage grouse, like other animals, may be disturbed by human activity and will sometimes move away from it but that does not mean that they suffer a population decline. The birds may have simply responded by relocating, or coexisting with human activity (i.e. habituation). Neither the DEIS or the NTT Report acknowledge that that there has been no population-level decline reported in any of the cited studies, only decreased lek attendance in affected areas. The DEIS needs to be revised to explicitly acknowledge these facts and alternative hypotheses that are consistent with the data.

- The DEIS and the NTT Report do not acknowledge that Holloran (2005) reported results that the probability of sage grouse survival was higher (61.5 +6.4%) in disturbed areas compared to less impacted areas (29.6 +18.1%), or control areas (48.5 +14.4%). These results refute Holloran's (2005) own statements regarding population impacts. Furthermore, neither the DEIS or the NTT Report acknowledge that Holloran's (2005) predicted sage grouse population declines in the Pinedale area, of -8.7 to -24-4% annually, have not occurred. Instead, publicly available lek count data from the State of Wyoming show the population has been steadily increasing. (See ***Exhibit Q***.)

- The Information Quality Act (IQA) requires that information used by agencies, including the BLM, be based upon verifiable data and reproducible results, and not based upon opinion. Moreover, the NTT Report cannot selectively use results from Lyon and Anderson (2003), or Holloran (2005) to support its recommendations, while failing to state that they were statistically insignificant and/or contrary to more recent and comprehensive data. And finally, Holloran (2005) did not use any hypothesis testing in his research. Instead, Holloran (2005) relied upon interpretation of data and results (rather than hypothesis testing), speculated on potential mechanisms that could cause a population decline, and did not provide any data that a population decline had actually occurred in the population in the Pinedale area. (See ***Exhibit Q***.)

- The following two excerpts from Holloran (2005) best illustrate these issues (the underlining added for emphasis is ours):

"The results from this study <u>suggest</u> that dispersal from developed areas could be contributing to population declines. Although the proportion of <u>potentially</u> displaced adult and yearling males and yearling females breeding and nesting in areas removed from gas field infrastructure is <u>unknown</u>, offsite populations <u>could</u> be artificially enhanced by gas development. Because of potential density-dependent influences on breeding and nesting success probabilities (LaMontagne et al. 2002, Holloran and Anderson 2005), maintenance of these enhanced populations <u>could</u> require increasing the carrying capacity of offsite habitats." And, *"adult male displacement and low juvenile male recruitment <u>appear</u> to contribute to declines in the number of breeding males on impacted leks. Additionally, avoidance of gas field development by predators <u>could</u> be responsible for decreased male survival probabilities on leks situated near the edges of developing fields (i.e., lightly impacted leks). Although site-tenacious adult females did not engage in breeding dispersal in response to increased levels of gas development, subsequent generations avoided gas fields, <u>as suggested</u> by the temporal shift in nesting habitat selection and differences in habitat selection by yearling and adult females. <u>This</u> <u>suggests</u> that the nesting population response is delayed avoidance of natural gas*

development. The results suggest that male and female greater sage-grouse displacement from developing natural gas fields contributes to breeding population declines."

- Rather than being as conclusive as suggested by the DEIS and the NTT Report, this study was speculative (note use of the terms could, suggested, and potentially) and assumed that hypothetical worst-case scenarios would occur. The BLM cannot rely on the speculative opinion of Holloran (2005) as the basis for its DEIS. (Please refer to ***Exhibit M***: "How the NTT Report Changes the Way the BLM Operates" which contains internal BLM emails obtained through FOIA that underscore the BLM's own concern for lack of scientific citations and data to support opinions rather than actual science used in the NTT Report.)

(Pg. xxix: "The BLM/USFS will use will use the Western Association of Fish and Wildlife Agencies Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats (Connelly et al. 2004) and any other appropriate resources (e.g., GRSG scientific literature) to identify GRSG habitat requirements and best management practices (BMPs).")

Pg. 24: "The BLM and USFS will use the WAFWA Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats (Connelly et al. 2004), and any other appropriate resources, to identify GRSG habitat requirements and best management practices (BMPs)."

- The discrepancy between stating that habitat descriptions and BMPs would come from the NTT report, when apparently they will also rely on WAFWA, yet curiously omit other very relevant and contemporary reports that provide additional parameters for habitat descriptions and potential BMPs.

- Relying on those reports as the only basis for habitat descriptions would technically exclude the PPR from having viable habitat as it doesn't meet the minimum patch sizes described, as well as other factors.

- There are many other reports that indicate other factors that influence habitat selection, primarily items like slope, landforms etc. There is also other information that have proven to be highly influential in local populations habitat selection; for example, Dr. Walkers work determined that distance from forested stands was an enormous factor in selection for the PPR population. To the point, while a wealth of information exists to better describe habitat selection, it was not utilized by CPW in their development of the PPH/PGH data set. Ultimately, the PPH/PGH data set conflicts with what is stated in the DEIS and furthermore were aware of much more information specific to NW CO populations that could better delineate habitats.

Pg. 25: "For BLM-administered lands, all activities and uses within GRSG habitats will follow existing BLM Colorado Public Land Health Standards. Standards and guidelines for livestock grazing and other programs that have developed standards and guidelines will be applicable to all alternatives for BLM lands."

- The DEIS does not evaluate how the current BLM Colorado Public Land Health Standards and other laws, regulations and policies address regulatory mechanisms to protect sage-grouse habitat.

Pg. 26: "The most current approved BLM and USFS corporate spatial data will be supported by current metadata and will be used to ascertain GRSG habitat extent and quality. Data will be consistent with the principles of the Information Quality Act of 2000."

- The BLM needs to make the data used to develop the PPH and PGH maps available to be consistent with the Information Quality Act of 2000. The County has attempted to obtain spatial data and metadata through the use of the Colorado Open Records Act for the purposes of verification of our own mapping efforts and to understand the data behind actual bird locations. Unfortunately, the County's request was denied by the BLM and CPW, and the DEIS is not compliant with the Information Quality Act of 2000. Mapping information should be made available to the public for review.

- The BLM should have a clear and full understanding of the data and maps being provided by CPW as it is one of the most critical components of the DEIS because it is those areas which will be subject to the implementation of the BLM's policies. As an example of why this is critically important, in Grand County, the County had GRSG habitat re-mapped and validated with CPW bird location data. This exercise revealed three GRSG radio-telemetry points occurring in open waters in William's Fork Reservoir approximately 280 meters from shore at the farthest point. This contradicts CPW's assertion that their data have a maximum of 50-meter horizontal imprecision, or the alternative is that GRSG have now begun to select large water bodies as habitat and are swimmers. Ultimately, this is why having a clear knowledge of why birds are in certain locations is critical to understanding the meaning of the location data; the simple presence of a bird does not imply habitat. Unfortunately, the County (and the public) was denied this information as it was not provided despite public requests, nor was this data provided in the DEIS.

Chapter 2: Alternatives

The following comments are offered here as they apply to how the alternatives were derived and treat certain uses. Consider the following:

1) The DEIS lacks a comprehensive and objectively informative analysis of locally-appropriate conservation alternatives that could be used to guide management of BLM lands, while addressing specific threats to sage grouse. By ignoring the substance of local conservation plans, especially Garfield County's Greater Sage Grouse Conservation Plan as an alternative, in favor of one-size fits all restrictions, the DEIS elevates speculative benefits of one-size fits all management prescriptions for sage grouse (recommended by the NTT and conservation groups) above other land use activities, in clear violation of the BLM's multiple use mandate. The DEIS is deficient in that it does not include conservation strategy (like that in the Garfield County sage grouse plan) for analyzing threats, their specific cause and effect mechanisms, and then mitigating each threat within the BLM's adaptive management framework.

2) The DEIS relies on recommendations in the NTT Report but does not acknowledge that these recommendations were influenced by special-interest litigants involved in settlement negotiations with the BLM. Publicly available records, including e-mails obtained under FOIA from the State of Idaho (excerpt below from a December 13, 2011 e-mail from the NTT lead for the BLM) reveal that special interest influence, rather than a transparent, inclusive, and scientifically defensible public process, was used in producing the NTT Report's recommendations:

"Our timeframe is to complete the "updated" draft NTT report by COB tomorrow so I can ship it back to DC. Due to concerns by solicitors in DC the NTT report will look different. However the content is generally the same and due to the science review we did make changes to the Goals and Objectives section, some conservation measure in fluid minerals have been updated (i.e. 2.5% has been changed to 3% with rationale). The Policy recommendation change has undergone significant clarification again based on solicitor concerns in DC. ***The solicitor concerns with the Policy recommendation piece stems from ongoing litigation discussions they currently having with litigants over BLM's recently completed LUPs."*** (See ***Exhibit M***.)

The BLM cannot rely on such tainted sources as a basis for its analysis and alternatives in the DEIS.

3) The DEIS presents a negative view of virtually all oil and gas development and is biased in its presentation of outdated information. The DEIS and its cited supporting studies failed to mention the existence of the following:

   a. Up to date information on the extensive mitigation and restoration efforts in the Pinedale Planning Area and elsewhere (see http://www.wy.blm.gov/jio-papo/index.htm);

   b. Advances in technology and efficiency available on the BLM's own website and in the BLM presentations to the NTT ("Managing Oil and Gas" and "Best Management Practices" available in Appendix 5, pp 48-55 of the August 29 to September 2, 2011 NTT meeting summary);

   c. More efficient operations and mitigation efforts further documented in Ramey, Brown, and Blackgoat (2011).

   d. Neither the DEIS nor the NTT Report that the DEIS it relies upon, acknowledges that nearly all of these measures have been implemented in the years since Holloran's (2005) data gathering occurred (from 1997 to 2003). The BLM cannot rely on a selective presentation of outdated information as the basis of its DEIS alternatives. It must rely on data and information that is current. (See ***Exhibit Q***.)

Pg. 38-39: – No Action Alternative – "Goals and objectives for BLM-administered lands and mineral estate would not change. Appropriate and allowable uses and restrictions pertaining to activities such as mineral leasing and development, recreation, construction of utility corridors, and livestock grazing would also remain the same. The BLM would not modify existing or establish additional criteria to guide the identification of site-specific use levels for implementation activities."

- Change to state that goals and objectives already include protecting candidate species including sage-grouse, such that they do not become listed as threatened or endangered.

- Change to explain that under existing law, regulations and policies, appropriate and allowable uses and restrictions may need to be adjusted to assure the habitat conditions for sage-grouse are considered.

- Change to state that BLM has the authority under existing laws, regulations and policies to modify existing and establish additional criteria to guide identification of site-specific use levels for implementation activities.

- Add statement regarding the BLM Colorado's Standards and Guideline - *Standard 4*. Special Status, Threatened, and Endangered Species (state and federal) – BLM is already legally mandated to manage lands to maintain or enhance GRSG by sustaining healthy, native plant and animal communities.

Pg. 73: No Action Alternative: "Colorado River Valley RMP: Make adjustments to grazing management (e.g., AUMs, periods of use, allotments, class of livestock, distribution) based on monitoring. Grand Junction RMP: Manage vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado while taking in to account site potential as determined by ecological site inventories, Range/Ecological Site Descriptions, Soils, completed Land Health Assessments, and site-specific management objectives. Implement changes in livestock use through allotment management plans, grazing use agreements, and terms and conditions on grazing permits for priority allotments based on the current prioritization process and/or land health issues."

- Throughout the DEIS, add thorough and honest discussions of what regulatory authority the agencies have under the No Action Alternative. As stated above, BLM and USFS are currently making adjustments to grazing based on monitoring of sage-grouse habitat.

- In addition, the DEIS fails to mention successes that have been achieved under existing regulations. For instance, there is evidence that GSG populations in NW Colorado (Moffat County) are at least stable if not increasing under current regulations.

Pg. 74-75: No Action Alternative – "Revise or implement allotment management plans/grazing use agreements to resolve conflicts between grazing and management of soils, riparian, and water resources. Kremmling RMP: Standard Operating Procedure (Required by Colorado Public Land Health Standard #4). Little Snake RMP: Identify and initiate restoration and rehabilitation of sagebrush habitat while maintaining a mosaic of canopy cover and seral stages. Special status, threatened and endangered species, and other plants and animals officially designated by the BLM and their habitats

are maintained and enhanced by sustaining healthy, native plant and animal communities Guidelines for Livestock Grazing Management A-3, #7, "Natural occurrences...should be combined with livestock management practices to move toward the sustainability of biological diversity across the landscape, including the maintenance, restoration, or enhancement of habitat to promote and assist recovery and conservation of threatened, endangered, or other special status species by helping provide natural vegetation patterns, a mosaic of successional stages, and vegetation corridors thus minimizing habitat fragmentation." Roan Plateau RMP: Ensure that Land Health Standards are being met through Land Health assessments, and application of the GSFO (CRVFO) Monitoring Plan. Use a combination of administrative solutions (season of use revisions, livestock exclusion, and stocking level adjustments) and rangeland projects (fences, ponds, etc.) to direct livestock use to meet resource objectives and Land Health Standards. White River RMP: Standard Operating Procedure (Required by Colorado Public Land Health Standard #4). Routt National Forest: Manage forage for livestock and wildlife based on specific habitat area objectives identified during allotment management plan revision (Management Area Prescription for 5.11, 5.12, 5.13, p. 2-40, p. 2-43, 2-45). Design livestock grazing prescriptions to include achievement of wildlife goals for deer and elk winter range (Management Area Prescription 5.41, p. 2-48)."

- As discussed above, the BLM and USFS should make it clear to the DEIS readers including USFWS, that the existing RMP and LUP provide a plethora of regulatory mechanisms to manage and protect GRSG habitat as well as other multiple use objectives. This remains a fundamental failure of the DEIS.

- With the implementation of the No Action alternative, GRSG can be effectively protected and their habitats maintained. Currently the DEIS provides only a biased assessment of effects, and presents a skewed position that one of the action alternatives must be selected in order for GRSG to be protected. We request the BLM re-assess the No Action alternative and incorporate the actual laws and regulations it currently is required to operate under.

Pg. 75 – 77: No Action Alternative - Colorado River Valley RMP: "Make adjustments to grazing management (e.g., AUMs, periods of use, allotments, class of livestock, distribution) based on monitoring. Grand Junction RMP: Manage vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado while taking in to account site potential as determined by ecological site inventories, Range/Ecological Site Descriptions, Soils, completed Land Health Assessments, and site-specific management objectives. Implement changes in livestock use through allotment management plans, grazing use agreements, and terms and conditions on grazing permits for priority allotments based on the current prioritization process and/or land health issues Revise or implement allotment management plans/grazing use agreements to resolve conflicts between grazing and management of soils, riparian, and water resources. Kremmling RMP: No similar action. Little Snake RMP: Sustain the integrity of the sagebrush biome to maintain viable populations of GRSG...consistent with local conservation plans. Identify and initiate restoration and rehabilitation of sagebrush habitat while maintaining a mosaic of canopy cover and seral stages. Roan Plateau RMP: Ensure that Land Health Standards are being met through Land Health surveys, and application of the GSFO Monitoring Plan. Use a combination of administrative solutions (season of use revisions, livestock exclusion, and stocking level adjustments) and rangeland projects (fences, ponds, etc.) to direct livestock use to meet resource objectives and Land Health Standards. White River RMP: Monitor, evaluate, and adjust livestock management practices to meet resource objectives. Routt National Forest: Develop site-specific vegetation utilization and residue

guidelines during rangeland planning, and document them in allotment management plans. In the absence of updated planning or an approved allotment management plan, apply the utilization and residue guidelines in Tables 1-2 and 1-3 (Range Guideline, p. 1-9). Table 1-2. Allowable Use Guidelines Table 1-3. Riparian Vegetation Residue Allowances Season of Use and Existing Rangeland Condition ● Spring Use Pasture: Satisfactory=4 Inches, Unsatisfactory=6 inches.● Summer and Fall Use Pasture: Satisfactory=6 Inches and Unsatisfactory=6 Inches Manage forage for livestock and wildlife based on specific habitat area objectives identified during allotment management plan revision (Management Area Prescription for 5.11, 5.12, 5.13, p. 2-40, p. 2-43, 2-45). Design livestock grazing prescriptions to include achievement of wildlife goals for deer and elk winter range (Management Area Prescription 5.41, p. 2-48). Ecological Site Descriptions have not been developed for the Routt National Forest and we are not currently using them in NEPA or Allotment Management Plan revisions. The Routt National Forest completes Rangeland Health Assessments based on the R2 Rangeland Analysis and Management Training Guide (US Department of Agriculture, Rocky Mountain Region 1996) in NEPA and Allotment Management Plan revisions."

- As discussed above the explanation of the No Action Alternative needs to be rewritten to explain every law, regulation, policy, plan and other regulatory mechanism already in place that allows the agencies to adjust livestock grazing and other resource management actions to protect and conserve GRSG habitat. The above statement is one of many that prove the agencies already have all necessary tools. Alternatives B, C and D are unnecessary.

Pg. 75: Alternative B - (ADH) "Work cooperatively on integrated ranch planning within GRSG habitat so operations with deeded/BLM and/or USFS allotments can be planned as single units."

- Existing laws, regulations and policies allow this.

- Add this regulatory measure to the No Action Alternative and do it for both GRSG habitat and non GRSG habitat because it is good land management.

Pg. 77: Alternative B – "(PPH) Prioritize completion of land health assessments (USFS may use other analyses) and processing grazing permits within GRSG PPH areas. Focus this process on allotments that have the best opportunities for conserving, enhancing or restoring habitat for GRSG. Utilize BLM Ecological Site Descriptions (USFS may use other methods) to conduct land health assessments to determine if standards of range-land health are being met."

- Add information to the No Action Alternative explaining that existing RMPs, LUPs, laws, regulations and policies already permit these prioritization and assessments.

Pg. 78: No Action Alternative – "a) the PNC, high seral and healthy mid-seral; b) sagebrush rangelands with a high to mid-seral plant community providing suitable habitat for deer winter range, GRSG, and antelope. 2) Improve the present plant species composition on unhealthy or at risk rangelands to a healthy plant community within 10 years on all areas with a mid-seral and within 20 years on all areas with a low-seral plant community. Routt National Forest: Manage forage for livestock and wildlife based on specific habitat area objectives identified during allotment management plan revision

(Management Area Prescription for 5.11, 5.12, 5.13, p. 2-40, p. 2-43, 2-45). Design livestock grazing prescriptions to include achievement of wildlife goals for deer and elk winter range (Management Area Prescription 5.41, p. 2-48). Ecological Site Descriptions have not been developed for the Routt National Forest and we are not currently using them in NEPA or Allotment Management Plan revisions. The Routt National Forest completes Rangeland Health Assessments based on the R2 Rangeland Analysis and Management Training Guide (US Department of Agriculture, Rocky Mountain Region 1996) in NEPA and Allotment Management Plan revisions."

- Add explanation regarding the fact that BLM has the regulatory authority to accelerate the rangeland improvement under the No Action (Current Management) Alternative and the USFS has the regulatory authority to redesign livestock grazing prescriptions to include achievement of wildlife goals for GRSG.

Pg. 79 – 80: No Action Alternative – "Colorado River Valley RMP: Make adjustments to grazing management (e.g., AUMs, periods of use, allotments, class of livestock, distribution) based on monitoring. Grand Junction RMP: Manage vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado while taking in to account site potential as determined by ecological site inventories, Range/Ecological Site Descriptions, Soils, completed Land Health Assessments, and site-specific management objectives. Implement changes in livestock use through allotment management plans, grazing use agreements, and terms and conditions on grazing permits for priority allotments based on the current prioritization process and/or land health issues Revise or implement allotment management plans/grazing use agreements to resolve conflicts between grazing and management of soils, riparian, and water resources. Kremmling RMP: Common to all -Interpreting Indicators of Rangeland Health Tech Ref 1734-6. Little Snake RMP: Overall habitat goals for the sagebrush biome and GRSG established. Roan Plateau RMP: Ensure that Land Health Standards are being met through Land Health surveys, and application of the GSFO (CRVFO) Monitoring Plan. Use a combination of administrative solutions (season of use revisions, livestock exclusion, and stocking level adjustments) and rangeland projects (fences, ponds, etc.) to direct livestock use to meet resource objectives and Land Health Standards. White River RMP: Livestock and big game management techniques will be used to retain ~50 percent herbaceous growth by weight through September 15, on GRSG brood and nest habitats. Routt National Forest: Manage forage for livestock and wildlife based on specific habitat area objectives identified during allotment management plan revision (Management Area Prescription for 5.11, 5.12, 5.13, p. 2-40, p. 2-43, 2-45). Design livestock grazing prescriptions to include achievement of wildlife goals for deer and elk winter range (Management Area Prescription 5.41, p. 2-48). Ecological Site Descriptions have not been developed for the Routt National Forest and we are not currently using them in NEPA or Allotment Management Plan revisions. The Routt National Forest completes Rangeland Health Assessments based on the R2 Rangeland Analysis and Management Training Guide (US Department of Agriculture, Rocky Mountain Region 1996) in NEPA and Allotment Management Plan revisions."

- Add the fact that both agencies already have regulatory authority under BLM Colorado Public Lands Health Standards, BLM Manual 640 and FSM 2600 to design livestock grazing prescriptions to protect and conserve GRSG habitat.

Pg. 79: Alternative B – "(ADH) Conduct land health assessments that include (at a minimum) indicators and measurements of structure/condition/composition of vegetation specific to achieving GRSG habitat objectives (Doherty et al. 2011). If local/state seasonal habitat objectives are not available, use GRSG habitat recommendations from Connelly et al. 2000b and Hagen et al. 2007."

- We recommend adding this guidance to Alternative A after correcting the reference to Connelly et al. 2000b. According to the references listed on Page 999 of the DEIS, Connelly et al. 2000b refers to a publication titled "Effects of predation and hunting on adult sage-grouse *Centrocercus urophasianus* in Idaho. Wildlife Biology 6:227-32." A thorough reading of that publication did not reveal GRSG habitat recommendations. As a result, the DEIS has misapplied this citation to the DEIS and should be removed.

- To assist the reader in understanding the DEIS recommendation, add: Hagen et al 2007 agreed with the GRSG management guidelines for breeding habitats published by Connelly et al. (2000), recommending 15-25% sagebrush cover, 10% forb cover, 15% grass cover and 18-cm grass height. However, per Hagen et al (2007), citing Bates et al. 2004, because "these measurements are generally recorded over relatively small scales (30 m), identifying the appropriate proportions of these vegetative characteristics in a larger landscape is paramount."

Pg. 80-82: No Action Alternative – "Colorado River Valley RMP: Assess vegetation attributes within grazing allotments to ensure that BLM Colorado Standards for Public Land Health and Guidelines for Livestock Grazing Management are met per established protocols and technical references. Grand Junction RMP: Manage vegetation to meet BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado while taking in to account site potential as determined by ecological site inventories, Range/Ecological Site Descriptions, Soils, completed Land Health Assessments, and site-specific management objectives. Implement changes in livestock use through allotment management plans, grazing use agreements, and terms and conditions on grazing permits for priority allotments based on the current prioritization process and/or land health issues Revise or implement allotment management plans/grazing use agreements to resolve conflicts between grazing and management of soils, riparian, and water resources. Kremmling RMP: No similar action.

Little Snake RMP: ● Manage for a diversity of seral stages within plant communities. ● Restore natural disturbance regimes, such as fire, and vegetation treatments to accomplish biodiversity objectives. ● Establish desired plant communities in coordination with stakeholders across the LSFO. ● Restore a diversity of seral stages within sagebrush communities ● Maintain large patches of high - quality sagebrush habitats, consistent with the natural range of variability for sagebrush communities in northwest Colorado. Roan Plateau RMP: Ensure that Land Health Standards are being met through Land Health surveys, and application of the GSFO Monitoring Plan. Use a combination of administrative solutions (season of use revisions, livestock exclusion, and stocking level adjustments) and rangeland projects (fences, ponds, etc.) to direct livestock use to meet resource objectives and Land Health Standards. White River RMP: Acceptable desired plant communities will be managed in an ecological status of high-seral or healthy mid-seral for all rangeland plant communities. An exception may be provided for wildlife habitat -areas where specific cover types are needed. The required cover type in those wildlife habitat areas will be the desired plant communities. The ecological status of a desired plant community in specified wildlife habitat areas could be lower than high seral. In which case, the desired plant communities will be managed, at a minimum, to maintain an at-risk rating (Table 2-6 of Appendix D [of the White River RMP]) and have a stable to improving

trend in ecological status. Routt National Forest: Develop site-specific vegetation utilization and residue guidelines during rangeland planning, and document them in allotment management plans. In the absence of updated planning or an approved allotment management plan, apply the utilization and residue guidelines in Tables 1-2 and 1-3 (Range Guideline, p. 1-9) as described above."

- As discussed above, the No Action Alternative clearly has regulatory mechanisms in place to protect and conserve GRSG habitat, as demonstrated by the above information as well as the litany of other BLM and FS laws, regulations, policies and manual direction.

Pg. 80: Alternative B – "(ADH) Develop specific objectives to conserve, enhance or restore GRSG PPH based on BLM Ecological Site Descriptions (USFS may use other methods) and assessments (including within wetlands and riparian areas). If an effective grazing system that meets GRSG habitat requirements is not already in place, analyze at least one alternative that conserves, restores or enhances GRSG habitat in the NEPA document prepared for the permit renewal (Doherty et al. 2011b; Williams et al. 2011)."

- Since these tools are available under the No Action Alternative, the DEIS needs to be rewritten to fully define the No Action Alternative. After the No Action Alternative is rewritten, the agencies should be able to conclude that existing RMPs and LUPs have adequate regulatory mechanisms in place necessary to protect and conserve GRSG habitat.

Pg. 82: No Action Alternative - …

- To avoid further repetition, please see above and incorporate those comments into the entirety of Tables 2-3 and 2-4.

Pg. 80: Alternative B – "(ADH) Develop specific objectives to conserve, enhance or restore GRSG PPH based on BLM Ecological Site Descriptions (USFS may use other methods) and assessments (including within wetlands and riparian areas). If an effective grazing system that meets GRSG habitat requirements is not already in place, analyze at least one alternative that conserves, restores or enhances GRSG habitat in the NEPA document prepared for the permit renewal (Doherty et al. 2011b; Williams et al. 2011)."

- Since these tools are available under the No Action Alternative, the DEIS needs to be rewritten to fully define the No Action Alternative. After the No Action Alternative is written, the agencies should be able to conclude that existing RMPs and LUPs have adequate regulatory mechanisms in place necessary to protect and conserve GRSG habitat.

Pg. 130, 132 etc.: Alternative C – "Some bird species prefer to nest in undisturbed cover. In areas where these species are a primary consideration, manage livestock grazing to avoid adverse impacts to nesting habitat."

- Delete this statement throughout the DEIS. Insert - Manage livestock grazing to attain GRSG goals for percent vegetation (sagebrush, other shrubs, grasses and forbs) necessary for shelter, feeding and breeding.

- The use of the word "Some" bird species….is not helpful in reaching any conclusions. Which bird species is the DEIS specifically referring to? What is the objective foundation for this conclusion? (Please refer to ***Exhibit M***: "How the NTT Report Changes the Way the BLM Operates" which contains internal BLM emails obtained through FOIA that underscore the BLM's own concern for lack of scientific citations and data to support opinions rather than actual science used in the NTT Report.)

Pg. 132: Alternative C. – "Hold project proponents, including livestock operators, ROWs holders, and other permittees deemed necessary by the Authorized Officer, responsible for monitoring and controlling noxious weeds that result from any new facilities, improvements or other surface disturbances authorized on BLM land (e.g. roads, communication sites, pipelines, stock ponds, fences). Little Snake RMP: Monitor, prioritize, and treat noxious weeds."

- The RMP should not include provisions that are impossible to implement and enforce. How would the requirement be enforced? Wouldn't it take more time to monitor and enforce the provision than to leave land management agencies in charge of noxious weed control? Would some noxious weed treatments require cultural resource or threatened and endangered species surveys prior to implementation? How would ranchers and others know when these surveys are triggered? Roads, pipelines, fences, etc benefit many users. How would the work be split up? Does the BLM want to make the project proponents responsible and waive sovereign immunity to hold them accountable?

Pg. 133: No Action Alternative – "Require the use of weed free hay and feed for livestock. Require weed control actions for all disturbances, including hose less than 1 acre in size. "

- We suggest the weed free hay statement be deleted as unnecessary. The Colorado BLM and Colorado Forest Service already require weed free hay and feed for livestock.

- Change "hose" to "those"

Pg. 136: Alternative B – "(PPH) During fuels management project design, consider the utility of using livestock to strategically reduce fine fuels (Diamond at al. 2009), and implement grazing management that will accomplish this objective (Davies et al. 2011; Launchbaugh et al 2007). Consult with ecologists to minimize impacts to native perennial grasses consistent with the objectives and conservation measures of the grazing section."

- Add this measure to all alternatives.

Pg. 154: Alternative C - "ADH) Authorize no new water developments for diversion from spring or seep sources within GRSG habitat."

- In general, Alternative C has too many fatal flaws to go into great detail about each one. However, a few comments will be included in this review. The statement above is one of many examples of why Alternative C is not reasonable. Saying "no" to anything perceived as unnatural is not good natural resources management. There are times and places when the authorization of new water development for diversion from spring or seep sources within GRSG habitat will benefit GRSG. As an example, a new water development that diverts water from a badly trampled wild horse spring or seep and uses that water to irrigate a meadow to increase herbaceous vegetation near GRSG nesting habitat could benefit GRSG chicks as well as other wildlife resources.

Pg. 154: Alternative C – "(ADH) Avoid grazing and trailing within lekking, nesting, brood-rearing, and winter habitats during periods of the year when these habitats are utilized by GRSG."

- As discussed above, Alternative C is fatally flawed – natural is not realistic nor is it the best management practice in many cases. Avoiding grazing within leks, nesting, brood-rearing, and winter habitats when GRSG are present goes against science.

- As noted by sage-grouse biologists Gary Back and Donald Klebenow, sage-grouse tend to be found where cattle are present in meadows. Sage-grouse avoid ungrazed meadows. Dense, grassy meadows that are grazed lightly or moderately are attractive to sage grouse. Oakleaf (1971) indicated that grouse seemed to avoid meadows where dense stands of grass or grasslike species were dominant. Controlled grazing was recommended as a tool to prevent grass stands from becoming too dense. Essentially, the logic goes like this: if the DEIS eliminates ranchers, then there is no grazing which then leads to no GSG. Is that the desire of the DEIS?

- Scientific data demonstrate the positive correlation of livestock grazing and sage-grouse habitat health (See Davies, Back, McAdoo, Klebenow, Back, Burkhardt, etc).

- There is a risk in discontinuing livestock grazing during periods when sage-grouse are present if the current GRSG populations are currently healthy. The unintended consequences of this action include driving more ranchers out of business, which results in subdivision of ranchland which increases fire danger, noxious weeds, predators, non-native vegetation, and other factors that could result in harm to existing sage-grouse populations that are acclimated to current conditions.

Pg. 155: Alternative D – "Sagebrush or 15 percent canopy cover of Mountain Sagebrush. Manage for a total disturbance cap of less than 30 percent, to include all loss of sagebrush from all causes including anthropogenic disturbance, wildfire, plowed field agriculture, and vegetation treatments. This cap is applied to PPH that supports sagebrush ecosites in the Colorado MZ. Sites capable of supporting

sagebrush habitat will count against the cap until they have recovered to at least 12 percent canopy cover in Wyoming big sagebrush and 15 percent in mountain big sagebrush dominated areas (Bohne et al. 2007)."

- The DEIS is unclear or completely omits the studies that specifically support the BLM's use of "thresholds" such as 15% sagebrush canopy cover and 30% disturbance cap. Without specific citations from scientific studies, these provisions appear to be completely arbitrary. The DEIS needs to provide information about how and where these thresholds were determined, how they relate to Colorado, and re-evaluate the impacts they will have on other resources in the planning area as well as the socioeconomic impact they will have on the planning area, or else the Final EIS documents will not likely withstand legal or scientific scrutiny. Moreover, we find the DEIS to be arbitrary in that it appears to simply extrapolate the science from one area and apply to another.

Pg. 161:
GRSG PPH NSO-46d. Apply NSO stipulation for fluid mineral leasing in PPH.

- The DEIS states that areas within PPH and PGH "does not contain large continuous sagebrush stands" (Pg 245), and on Pg 256 the DEIS states "Hagen (1999) found GRSG distribution in Piceance Basin to be highly clustered, implying that the availability of suitable habitat was, therefore, also clustered." Also, the DEIS states "Habitat potentially suited for use by Parachute-Piceance-Roan GRSG comprises only 16 percent of the mapped overall range. Although this pattern moderates at lower elevations where ridgeline habitats broaden, bird distribution tends to be confined to higher elevations (greater than 7,400 feet in the east, greater than 7,700 feet in the west) and modeled habitat at lower elevations supports few birds."

  Based on these facts, applying NSO's within non-habitats is essentially disallowing multi-use activities to occur which do not impact sage-grouse habitats. The DEIS indicates that only 16% of the PPR area actually supports GRSG habitat. The use of the PPH and PGH maps in areas of non-habitat is not accurate and unduly burdens non-habitats. Please explain what the intent of the PPH and PGH maps are, if within the PPR area, they encompass is 84% non-habitat. (See Page 256 of the DEIS.)

GRSG ADH NSO-46d. Apply NSO stipulation for fluid mineral leasing in ADH within a minimum distance of 0.6-mile from active leks.

- How often will lek data be updated? Who will update the lek data, and how will this data be made available to the public?

GRSG ADH TL-46d. Within ADH, prohibit surface occupancy within a minimum of 4 miles from active leks during lekking, nesting, and early brood rearing.

- Is this NSO only for suitable GRSG habitats, or does this include non-GRSG habitats?

Pg. 166:
GRSG PPH Notice to Lessees-54d. Within PPH, complete Master Development Plans instead of single-well Applications for Permit to Drill for all but exploratory wells.

- As the DEIS fully discloses that within the Roan Plateau area around 84% of the area mapped as PPH is actually non-habitat, please explain why a MDP is necessary if activities avoid GRSG habitats.

Pg. 186: Alternative C – "(ADH) Avoid sagebrush reduction/treatments to increase livestock or big game forage in occupied habitat and include plans to restore high-quality habitat in areas with invasive species."

- This measure is illogical. GRSG need mosaics of sagebrush, grass and forbs. It vegetative management that increases livestock or game forage also improves GRSG habitat, it should be promoted.

Pg. 189 – Alternative C – "Areas closed to grazing 1,702,800 acres"

- This measure is illogical. What is the rationale for concluding that sage-grouse will benefit from elimination of livestock grazing on over 1.7 million acres? The elimination of grazing would most likely increase the potential for catastrophic fire; which in turn would increase the potential for the spread of invasive species, which would then take decades to restore sagebrush ecosystems after wildfires.

- As detailed in "Saving the sagebrush sea: An ecosystem conservation plan for big sagebrush plant communities' Davies et al (2011) state that "In contrast to heavy grazing, moderate levels of grazing with periods of rest and/or growing season deferment do not negatively impact sagebrush plant communities (West et al., 1984; Courtois et al., 2004; Manier and Hobbs, 2006). Properly managed livestock grazing can also decrease risk, size, and severity of wildfires (Diamond et al., 2009; Davies et al., 2010a) and thereby decrease the risk of post-fire exotic annual grass invasion (Davies et al., 2009). Though appropriately managed grazing is critical to protecting the sagebrush ecosystem, livestock grazing per se is not a stressor threatening the sustainability of the ecosystem. Thus, cessation of livestock grazing will not conserve the sagebrush ecosystem."

Chapter 3: Affected Environment

Pg. 211: "Uncontrolled livestock grazing in riparian areas and degradation of willow shrub riparian systems may adversely affect" Wilson's warbler.

- This statement is purely speculative as it uses the word "may". If the DEIS is unable to state that uncontrolled grazing will actually have an adverse impact, then the argument for limited grazing fails.

- By definition, livestock grazing on BLM and USFS lands is "controlled." This statement needs to be qualified or deleted. Where is there "uncontrolled livestock grazing" within the planning area? Why is there "uncontrolled livestock grazing"? What is "uncontrolled livestock grazing"?

- Later in the DEIS, on pages 334 – 335, authors do recognize that all livestock grazing on BLM lands is controlled: "Active grazing use authorization, management actions, and long term rangeland health in each allotment are monitored and evaluated, based on existing data. Adjustments are made by agreement or decision in accordance with legislation, regulations, and policy to ensure that public land resources are maintained or improved for future commodity and non-commodity values. Resource specialists use a variety of tools to monitor rangeland health including a series of rangeland health indicators that help them make determinations regarding the relationship between livestock grazing and the Colorado Standards for Public Land Health (see **Appendix K**, BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado).

- Later in the DEIS, on pages 336, authors also recognize that livestock grazing on USFS lands is controlled: "All allotments on the Routt National Forest are managed under allotment management plans and annual operation instructions that implement livestock grazing standards and guidelines of the Routt National Forest Revised Forest Plan ROD (USFS 1998)."

Pg. 226: "GRSG are considered a sagebrush ecosystem obligate species. Obligate species are those species that are restricted to certain habitats or to limited conditions during one or more seasons of the year to fulfill their life requirements. GRSG are only found where species of sagebrush exist."

- This statement is contradicted throughout the document. While asserting above that GrSG are only found where sagebrush exists, the document implies the utilization of other habitats by GrSG not considered sagebrush communities. The cap management program describes the potential for other habitat types to be managed similarly if CPW determines the habitat to contribute to the health of the GrSG population, with no explanation of other habitat types that may support the GrSG. If the GSG is actually not a sagebrush obligate, provide the scientific basis that supports its use of other habitat.

Pg. 242: "As a result, the 156 million acres of sagebrush that existed historically were reduced to 119 million acres by 2004 (Connelly et al. 2004). Currently, sagebrush communities and GRSG are at risk from multiple sources across multiple scales (BLM 2004b). About 56 percent of the potential pre-settlement distribution of habitat is currently occupied by GRSG (Connelly et al. 2004)."

- Connelly (2004) used a hypothetical "pre-European sage grouse distribution" but provides no data or evidence of historic sage grouse habitat or populations. The Final EIS must be based on science, not speculation.

- Connelly's 2004 monograph relies on extensive GIS analysis to translate speculative habitat conditions into theoretical historical habitat, which is then compared to current potential sage grouse habitat. The theoretical habitat loss since European settlement is calculated through this exercise. Areas known to be historically occupied by sage grouse were not included, and areas

where there is no data of sage grouse occupancy are included. Speculative models are substituted for lack of historic data on sagebrush extent and sage grouse distribution, and are the basis of a mere guess at what was historic habitat. Thus, Connelly (2004) information is misleading, as are the subsequent analyses BLM and USFS use in reliance on Connelly (2004).

- This DEIS is for NW Colorado. The DEIS does not provide Colorado specific science that establishes the historic range of the GSG. It appears that the authors extrapolate unfounded opinions from Connelly's 2004 monograph and apply them to Colorado without scientific foundation.

Pg. 245: "As is the case with the North Eagle/Southern Routt population on the east side of the CRVFO, the Roan Plateau is at the southernmost part of the range for this species. It is incorporated in the Parachute-Piceance-Roan population. Although the area is mapped as preliminary general habitat (PGH), it does not contain large contiguous sagebrush stands. GRSG habitat use studies are ongoing on the Roan Plateau. Currently, the BLM's only data comes from global positioning system monitoring by the CPW where some use was noted in the Anvil Points area. Overall habitat use by GRSG is most likely transitory in nature."

- Referring to the statement "Although the area is mapped as preliminary general habitat (PGH),…", the statement is false and unfounded based on the current CPW PPH/PGH dataset that delineates priority and general habitats. In fact, within the PPR population which totals approximately 365,052 acres, only 144,567 acres (40%) are mapped as general habitat (PGH), while the remaining 220,485 acres (60%) are mapped as priority habitat (PPH). It appears the authors are confusing a small portion of the "Roan" (aka Naval Oil Shale Reserve) in this statement; instead, the "Roan" is actually the entire area encompassed in the PPR mapped area as stated above consistent with the PPR planning area.

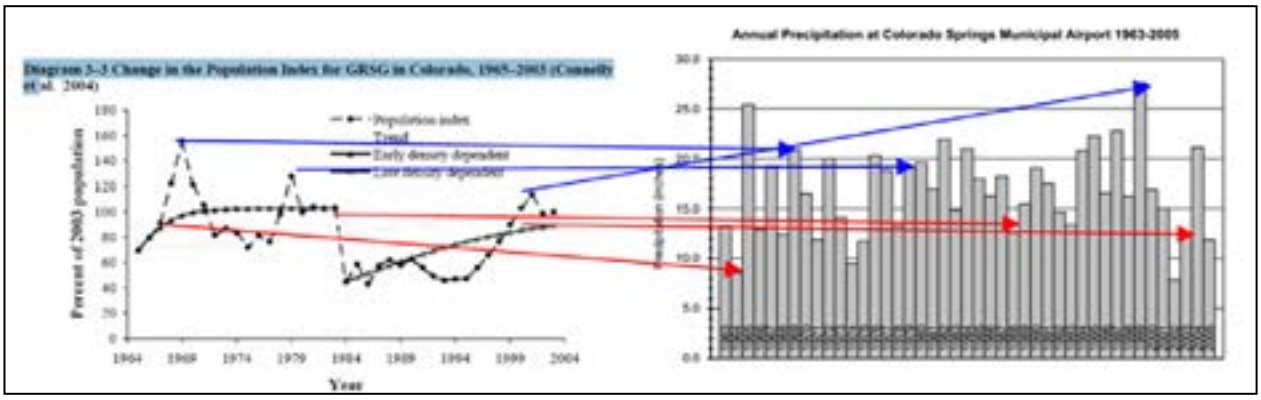
- The last statement of the paragraph reads "Overall habitat use by GRSG is most likely transitory in nature.", which suggests that the PPR population is not permanent in nature. If that is the case, by what means are modeled population results measured to ascertain baseline numbers? In addition, if the very nature of the population is unstable due to the 'transitory' use, how is the stability of future populations measured?

Pg. 246: "WAFWA Management Zone II has the largest regional extent and highest breeding density of GRSG in the western US, with several important populations in the Wyoming Basin, including Jackson and Routt Counties, Colorado. Livestock grazing is ubiquitous across these sagebrush ranges, which also have seasonal importance for native ungulates and wild horses (Manier et al. 2013). Changes in land cover and land use are contributing to population declines in this region (Manier et al. 2013)."

- Where did the Manier get the wording for the statement that livestock grazing is ubiquitous? Did the authors of this DEIS examine anything they cut and pasted to see where it came from? The federal agencies and their consultants appear to have stopped thinking and started cutting and pasting words that seem to fit the subject matter, whether they are true and relevant or not. The best we can determine, the statement comes from the 2008 WildEarth Guardians'

Sagebrush Sea Campaign, which was a nonscientific movement by a special interest group. If assumed to be true where livestock grazing is actually ubiquitous in Colorado, then Colorado livestock have begun mountain climbing.

Pg. 254 – Diagram 3-3 (Figure displayed on the left below)



- Did Connelly (Diagram 3-3) and the authors of the DEIS examine GRSG populations in relation to precipitation (figure in the right above)? See http://geosurvey.state.co.us/water - for the precipitation example above.

- As shown above, low GRSG population years (1964, 1983, and 2003) in the DEIS figure on the left and high GRSG population years (1969, 1979, and 1999) from precipitation data, directly correlate low and high GSG years with corresponding low and high annual precipitation years.

- Though this in only one example and we were unable to determine exactly where in Colorado Connelly's data was collected in relation to the precipitation data, the point is that more information is needed prior to concluding anthropomorphic changes are causing all or most GRSG population fluctuations. Both natural and anthropomorphic factors need to be examined in relation to GRSG populations.

- Predators are known to by cyclic. Predator population numbers in relation to sage-grouse population fluctuations should be included in the NEPA analysis. All data and graphs used in the EIS should be examined to determine whether the author of the publication used unbiased data. BLM and USFS are responsible for the content of the document. Cutting and pasting information does not constitute adequate NEPA analysis.

- Instead of creating broad sweeping policies that adversely affect the nation, the Department of Interior and Department of Agriculture need to start over and determine the veracity of the data they are using in NEPA documents. The DEIS is fatally flawed.

Pg. 256: "Hagen (1999) found GRSG distribution in Piceance Basin to be highly clustered, implying that the availability of suitable habitat was, therefore, also clustered."

"Due to the peculiar configuration of habitat associated with the Parachute-Piceance-Roan population, these GRSG are believed to be particularly vulnerable to development and habitat-related effects. The characteristic pattern of GRSG habitats in the Parachute-Piceance-Roan are such that each parcel of ridgeline habitat (generally 400 to 1,000 feet in width) is separated from adjacent ridgeline habitats by 1,000-to 3,000-foot intervals of habitat unsuited for occupation or ground movement. Habitat potentially suited for use by Parachute-Piceance-Roan GRSG comprises only 16 percent of the mapped overall range. Although this pattern moderates at lower elevations where ridgeline habitats broaden, bird distribution tends to be confined to higher elevations (greater than 7,400 feet in the east, greater than 7,700 feet in the west) and modeled habitat at lower elevations supports few birds."

- Both statements above seem to acknowledge the very fragmented nature of suitable habitat areas currently present within the PPR region and even describe the suitable habitat as areas occurring on the broader ridgelines where sagebrush communities exist. While the distinction between suitable habitats in the PPR region is made in the text, it does not appear to be reflected in the PPH/PGH map, as all areas are considered some degree of suitable habitat per the PPH/PGH delineations. Please provide a rationale why PPH/PGH maps, if so inaccurate, are being used to delineate NSO areas, MDP areas operator required BMPs, but then cap management uses ReGAP data to delineate actual habitats. This places significant burdens on the public and operators to plan and negotiate with the BLM and CPW for activities in non-habitats. Please explain this rationale.

- "…habitat unsuited for occupation or ground movement." This statement seems contradictory; areas that are not suitable for occupation and/or movements should be identified as 'non-habitat'.

Pg. 421: "In addition, various trends threaten the economic viability of livestock grazing and ranching, and the number and size of ranches is decreasing in parts of the Socioeconomic Study Area, especially in Garfield, Grand, and Routt Counties (BLM 2011a, 2011b).

As before, many residents expressed concerns that constraints on energy development, mining, and ranching might create economic hardship within their communities. Additionally, some argued that constraints on livestock grazing would exacerbate existing trends of conversion of ranch lands to agricultural and residential uses, perhaps with the unintended consequence of decreasing available GRSG habitat."

- Garfield County has been uniquely affected by BLM and USFS management actions that continue to decrease the economic viability of ranching, energy development, and mining within the County. (Refer to ***Exhibit D***.)

- We request the DEIS clearly identify benefits livestock grazing provide to GRSG including but not limited to reducing fuel loads, maintaining large expanses of open space that might otherwise be subdivided, increasing vigor of meadows and riparian habitat, etc.

Page 432-434+ – 2007... 2010…2011….2012…

- The economic data for farm, nonfarm, crop and livestock is inconsistent and NOT the "best available science" though the DEIS states on Page 458 that the "best available information pertinent to the decisions to be made was used in developing the LUPA."

- The best available scientific data for socioeconomic analysis is 2012 data. The next version of the DEIS should update all socioeconomic data to 2012.

Environmental Justice (Page 442 – 443) – 1996 and 1998 economic data from BLM and USFS

- It is particularly egregious to state the DEIS contains the best available data, then use BLM and Forest Service wage data that is 17 years old.

- The next version of the DEIS must be updated with the real federal salary data from at least 2012.

Page 446 – "The placement of salt and mineral supplements could lead to cattle concentration in terrestrial wildlife species habitats. This could displace species, cause nests to be trampled, and reduce habitat quality. Impacts could be both short term and long term and could range from minor to major, depending on the grazing intensity, duration, season of use, and local climate"

- Salt and mineral blocks can be placed away from leks. This livestock management strategy is already in Colorado and other western states. Salt and mineral blocks are a tool for encouraging livestock to concentrate in certain areas. Thus, under the No Action Alternative, the impact, if found, can readily be alleviated.

Page 468-469 - "In areas that are available for livestock grazing, there could be more impacts on terrestrial wildlife than in areas where livestock grazing is excluded. The impacts resulting from livestock grazing on wildlife habitat include competition for forage and water and habitat use. Grazing, invariably, reduces the height and ground cover of plants, at least temporarily. This would reduce the cover wildlife species need for protection, escape, feeding (including the availability of prey populations), roosting, breeding, and nesting. Inappropriate grazing, or overgrazing, could change habitat effectiveness and the connectivity of wildlife habitats by changing the structure, composition, or diversity of vegetation. The placement of salt and mineral supplements could lead to cattle concentration in terrestrial wildlife species habitats. This could displace species, cause nests to be trampled, and reduce habitat quality. Impacts could be both short term and long term and could range from minor to major, depending on the grazing intensity, duration, season of use, and local climate."

- These statements are arbitrary and not based on science. A range conservationist with expertise in livestock grazing and sage-grouse needs to rewrite this section. The paragraph demonstrates lack of knowledge and biased instead of the best available science.

- Before stating that there are impacts from grazing due to "competition for forage and water and habitat use" there needs to be the science that demonstrates that any of these factors are limiting to the sage grouse.

- The DEIS needs to explain what sage-grouse eat. They eat a variety of foods including sagebrush, forbs and insects. Of these items, cattle really only have the potential to compete for forbs. Why? Because sagebrush is not nutritious for cattle or other livestock: its characteristic aroma comes from chemicals evolved to poison herbivores. Cattle will eat sagebrush if they have to, but enough of it will make them sick, kill off their gut bacteria, and generally cause them to lose vigor. Livestock don't eat insects so here is no competition there, though there is science to prove livestock increase insect production and benefit sage-grouse chicks. Unless water can be shown to be a limiting factor for sage-grouse in portions of Colorado, this impact is also misstated.

Page 469 – "Alternative A would allow livestock grazing, with no restrictions in place to protect GRSG habitat specifically and therefore would have the greatest impact on terrestrial wildlife."

- This sentence needs to be rewritten as follows: Alternative A requires federal land management agencies to manage livestock and other resources to protect GRSG habitat. BLM and USFS laws, regulations, policy and manual direction make the protection of GRSG habitat mandatory so as not to lead to listing of this or any other candidate or special status species. Under the No Action Alternative, livestock grazing would continue to be managed and monitored to assure GRSG habitat is conserved and maintained such that the GRSG does not need to be listed.

Page 469 – "Alternative B would have the same areas available for livestock grazing as Alternative A; however, more restrictions would be in place to protect GRSG habitat, so it would have fewer impacts on terrestrial wildlife."

- Rewrite to state – Alternative B would have the same areas available for livestock grazing as Alternative A; however, more restrictions would be in place to protect GRSG habitat, so it would have greater adverse impacts on the livestock industry and economy.

Page 469 - "Alternative C would have no areas available for livestock grazing within ADH and therefore would have the fewest impacts on terrestrial wildlife."

- Rewrite to state - Alternative C would have no areas available for livestock grazing within ADH and therefore would violate FLPMA. This alternative would also cause irretrievable and irreversible impacts to ranchers, the local economy and the national economy. As with the timber industry, once it is shut down, the skilled worker base and industry infrastructure deteriorate. This alternative would trigger ranches to be sold, subdivisions to be built, open space to be lost, noxious weeds to increase, catastrophic fires to increase, and the irreversible loss of GRGS and their habitat."

Page 469 – "Alternative D is similar to Alternative B but would be slightly more restrictive. This is because GRSG habitat objectives within grazing allotments would be applied to ADH and not just PPH. This alternative would have fewer impacts than Alternative A and would have greater impacts than Alternative C."

- Rewrite to state - Alternative D is similar to Alternative B but would be slightly more restrictive. This is because GRSG habitat objectives within grazing allotments would be applied to ADH and not just PPH. This alternative would have more adverse impacts to GRSG than Alternative A and would have greater impacts than Alternative C. The alternative would violate FLPMA and create the most significant adverse irretrievable and irreversible impacts to ranchers, the local economy and the national economy. This alternative would cause the greatest irreversible loss of GRGS and their habitat.

Page 493 – "Impacts are most likely to occur in site-specific areas where improper grazing is occurring. Improper livestock grazing could result in direct adverse impacts at site-specific locations to select streams containing sediment-intolerant aquatic species."

- Where is "improper grazing" occurring and why? Under the No Action Alternative, if there is "improper grazing", both BLM and USFS have the ability to correct the problem.

Page 493 – "Livestock grazing could lead to changes in vegetation plant species and functional group composition through vegetation removal, disturbance, and trampling and increased potential for weed introduction and spread. Livestock and wildlife grazing in riparian areas can prevent regeneration of woody and herbaceous riparian vegetation necessary to stabilize stream banks. Grazing can also reduce litter and fine fuel loading, which could alter fire size and severity.

Livestock often use riparian areas for water and shade, which may cause greater impacts on these areas by concentrating livestock use. Livestock could cause impacts by altering stream functionality and vegetation structural diversity. Livestock could also contribute to the spread of invasive species in riparian areas.

Livestock grazing can increase sediment load in streams from animal concentration areas, collapsing banks, stream-channel alteration, and vegetation removal in riparian areas. Increased sediment in streams, rivers, and reservoirs decreases the potential for wild fish to reproduce, fills in pools, leads to channel degradation, and increases stream temperatures. Changes in water temperature also would result from changes in the amount of vegetative cover. Changes in the aquatic habitat would lead fish to alter their uses of the stream, moving to different areas for feeding and spawning, depending on habitat conditions.

Livestock near aquatic systems could change coldwater aquatic habitat quality through nutrient inputs from manure (Larsen et al. 1994). In addition, livestock grazing could change aquatic habitat connectivity when they are allowed next to or within aquatic systems; grazing could alter bank stabilization and water quality and thus alter habitat conditions in certain areas. Water developments near tributary creeks could affect the hydrologic regime of these systems by withdrawing water."

- Rewrite as: Though there are numerous examples of riparian areas being historically overgrazed, federal and state agencies have enacted laws, regulations and policies to stop this practice. In particular, in 1997 Colorado has enacted the BLM Colorado Public Land Health Standards to ensure proper livestock management. Sixteen years later, many grazing management strategies are being used to restore riparian systems in Colorado. Recent experience has shown that with proper grazing, livestock can be present while stream systems are improving.

- Managed livestock grazing could lead to changes in vegetation plant species and functional group composition by maintaining vegetation at a healthier, early seral stage. Livestock and wildlife grazing in riparian areas can prevent degradation and decadence of woody and herbaceous riparian vegetation and stabilize stream banks. Grazing can also reduce litter and fine fuel loading, which could reduce fire size and severity.

Page 494 - "In areas that are available for livestock grazing, there would be more impacts on aquatic wildlife from vegetation management activities and range improvements than in areas where livestock grazing is excluded."

- Rewrite to state: In areas that are available for livestock grazing, there would be more beneficial impacts on aquatic wildlife from vegetation management activities and range improvements than in areas where livestock grazing is excluded. Where livestock are excluded, riparian vegetation can peak at a climax stage that results in low diversity, low palatability and decadent grass and forbs. Fires burn hotter in ungrazed habitat and significant losses of GRSG habitat could occur.

Page 494 - "Areas available for livestock grazing would primarily be associated with vegetation management and range improvements, such as fencing, water developments, weed treatments, chemical, biological, or mechanical vegetation treatments, burning, and seeding of disturbed areas or weed-treated areas. The primary impacts from rangeland vegetation management are habitat alteration and increased sediment loading and turbidity. Where treatments are occurring in watersheds containing occupied habitats of sediment-intolerant species (e.g., trout, sculpin species, and mountain whitefish), there is an increased risk of the identified impacts to occur because these species require cold, clear, well-oxygenated water in which to thrive."

- Rewrite to state that "Areas available for livestock grazing would primarily be associated with vegetation management and range improvements, such as fencing, water developments, weed treatments, chemical, biological, or mechanical vegetation treatments, burning, and seeding of disturbed areas or weed-treated areas. The primary impacts from rangeland vegetation management are short term habitat alteration and increased sediment loading and turbidity followed by long term habitat improvements and decreases in sediment loading and turbidity as vegetative management strategies take hold. Where treatments are occurring in watersheds containing occupied habitats of sediment-intolerant species (e.g., trout, sculpin species, and mountain whitefish), both BLM and USFS laws, regulations and policies require additional best

management practices are used to avoid adverse impacts to species requiring cold, clear, well-oxygenated water in which to thrive."

Page 494 – 496 – To avoid being repetitive, the impact section on livestock grazing needs to be rewritten. Old literature and cut and paste of irrelevant, antiquated statements about all of the negative effects of livestock grazing need to be rewritten by professional range specialists that are knowledgeable about the current state of livestock grazing in Colorado. The old rhetoric needs to be discarded. An honest, objective analysis of livestock grazing, under current laws and regulations is needed.

Page 496 – "In areas that are available for livestock grazing, there would be more impacts on aquatic wildlife from water depletions than in areas where livestock grazing is excluded."

- The entire section on water depletion needs to be rewritten. Unless water is a limiting factor in a certain area, the analysis lacks validity.

- How much water do GRSG need? When? How often?

Chapter 4: Environmental Consequences

Pg. 507: "Not all habitats within mapped priority and general GRSG ranges are capable of supporting GRSG populations."

- The above statement acknowledges that many ecological sites capable of supporting sagebrush present within the mapped priority and general GrSG ranges are not capable of supporting GrSG populations. This seems to imply that the mere presence of sagebrush communities does not, in and of itself, determine suitable habitat for the GrSG. Accepting that statement, will a distinction be made between effective and ineffective ecological sites capable of supporting sagebrush? If so, how will the distinction be made and applied? Will the ineffective sites be a component of the cap management disturbance program? If so, why, if the areas are essentially determined to be of no habitat value to the species?

Page 512 – 513 – Delete the following outdate information, much of which is not data from Colorado:

~~In areas that are available for livestock grazing, there could be more impacts on GRSG than in areas where livestock grazing is excluded.~~

~~Potential impacts of herbivory (plant eating) on GRSG habitat include long-term impacts of historic overgrazing on sagebrush habitat and GRSG habitat changes due to herbivory (Beck and Mitchell 2000).~~

~~By altering habitat components necessary for GRSG habitats, livestock grazing can impact the suitability and extent of GRSG habitats (Wyoming Sage-Grouse Working Group 2003). Holloran et al. (2005) suggest that annual livestock grazing in GRSG nesting habitats may adversely impact the next year's nesting success.~~

Start the section with "Important objectives in managing livestock grazing are … ."

Page 513 and 514 – Comparison of Alternatives –

- To avoid being redundant in these comments, we refer you to comments we made regarding Page 469 comparison of alternatives and we recommend a similar rewrite here.

- Remainder of DEIS – Livestock section is speculative and needs to be updated to reflect current conditions and laws including the BLM Colorado Public Land Health Standards. The antiquated cut and paste analysis perpetuates false claims and an invalid analysis.

Pg. 622: "Operators need predictable continuity of operations before acquiring or developing a lease"

- Understanding that the development/implementation season for many areas of northwestern Colorado is ultimately constrained by weather, particularly at higher elevations, how does adding additional timing stipulations that encumber huge portions of developable land during a very constrained implementation season satisfy the assumption that operators need predictable continuity of operations?

Pg. 897: Table 4.14. One Year Impact of Management Actions Affecting Grazing on Output, Employment, and Earnings by Alternative

- There should not be dollar signs ($) in the rows for employment (Alternative B and Alternative D).

Pg. 898, second paragraph. [Referring to grazing impacts under Alternative C] "The impact of Alternative C may also be greater than estimated, if the closure of federal lands makes some grazing operations no longer viable."

- This is an important observation, which also applies to the other alternatives. Grazing on public lands is an essential component for many ranching operations in western Colorado that would not be financially viable without it. Since grazing on public lands typically occurs during about four months out of the year (which is the component included in the economic impact estimates in the EIS), if the loss of grazing access makes those ranches no longer viable, the actual economic impact could be about three times the figures provided in the EIS.

- Similarly, the same observation should be offered for oil and gas development. The core oil and gas reserves are located in areas that are interwoven public and private lands. Prohibitions on public lands will influence the viability of development on private lands and vice a versa.

Pg. 902: Table 4.16. Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings by Alternative

- We were able to essentially replicate the employment estimates provided in this table based on the assumed total employment impact per well for drilling (13.1 jobs) and completion (8.2 jobs) provided in Table M.21 of Appendix M, and the projected number of wells drilled on the Federal Surface provided in Table M.17 over the 20 year period. Our calculations are within one percent of the numbers provided in Table 4.16.

- The main document (Page 902) notes that "only new wells projected for the future 20 year horizon were considered" and "Existing wells would not be impacted …" It should also note, however, that the employment totals do not include projected new wells on State and Fee Surface, which were evidently also assumed to not be impacted by the management alternatives. However, the text in other areas (such as grazing, on page 896) notes that "although [grazing] on private lands could also be impacted by access restrictions, they are not included in the quantitative estimates but rather discussed qualitatively." The same would seem to apply to oil and gas wells, but this issue is not noted in the text.

- As noted above, Appendix M (Table M.21) provided the employment to well ratios for drilling and completion that appear to have been used to generate Table 4.16. However, Appendix M also provides estimates of the employment associated with ongoing well production (Table M.22). Since we were able to replicate the employment estimates in Table 4.16 based only on the employment ratios for drilling and completion, it appears that the employment associated with ongoing production from the wells was not included in Table 4.16. This would likely be a substantial number of jobs, particularly as the number of operating wells accumulates over the 20 year period. We calculated the annual oil and gas production jobs based on the employment to production ratios provided in Table M.22 and the projected production volumes from Federal Surface wells provided in Table M.18 (after dividing the volumes by 20 to annualize them). That calculation indicates the difference in average annual production jobs between Alternative A and Alternative C could be another 5,325 jobs. Further, these production jobs are high paying, essentially permanent positions in the community.

Pg. 903, third paragraph. "Alternative C -Management under Alternative C …"

- In this section related to effects on oil and gas, the paragraphs for Alternative A, Alternative B and Alternative D each begin with a sentence describing why the alternative would affect oil and gas production. The same type of introduction should be included for Alternative C.

Pgs. 906-907, "Impacts on Tax Revenues and Payments to States and Counties"

- As noted in the first paragraph of this section, "the largest impact of management alternatives on county fiscal revenues would be through taxes paid by the oil and gas sector." However, after making that statement, there is no further discussion about the impacts of the alternatives on county revenues and no comparison of the effects of the alternatives.

- Impacts on county revenues, particularly property taxes, are a major concern for the oil and gas producing counties, where oil and gas properties can be the largest source of county revenues.

On a proportional basis (relative to overall sources of revenue) these effects would be much larger for the affected counties than the changes in state severance tax revenues or federal royalties (which are estimated in this section) would be to the State of Colorado or the federal government. Some effort to quantify these effects on county revenues is crucial in the interest of disclosing the socioeconomic effects of the alternatives.

- To further emphasize the importance of this issue, the Garfield County Assessor's office recently examined the current contribution of oil and gas properties to the local tax base. That analysis revealed that more than 70 percent of the tax base (assessed property value) for the County government and the RE-2 school district was attributable to oil and gas properties, while more than 90 percent of the tax base for School District 16 was attributable to oil and gas. The analysis also identified a number of fire and hospital districts that rely on oil and gas properties for at least 75 percent of their assessed value. All told, oil and gas-related property tax revenues contributed a total of over $90 million in 2012 to the County and at least 10 other local government jurisdictions in Garfield County.

- Consider the graph below to illustrate the tax revenues that almost exclusively support towns and special districts in Garfield County that are not considered in the DEIS socio-economic impact analysis. Despite the fact that the BLM did not coordinate with the special districts and towns listed below in the formation of the alternatives in the DEIS, the analysis itself ignores the tax implications of the proposed alternatives to their districts in terms of property tax revenues that maintain their ability to provide services to the district and citizens.

Taxing Entity	2012% of Assessed value Attributable to Oil and Gas	2012 Revenue Attritutable to Oil and Gas	2013 Estimated % of Assessed Value Attributable to Oil and Gas	2013 Revenue Attritutable to Oil and Gas (Estimated)
Garfield County	73.03%	$ 39,202,342	70.20%	$ 27,766,900
Town of Parachute	27.84%	$ 111,630	22.00%	$ 76,244
City of Rifle	0.16%	$ 1,059	0.49%	$ 2,520
Town of Silt	0.00%	$ -	0.00%	$ -
RE-2 School District	78.80%	$ 16,845,974	76.36%	$ 11,723,957
School District 16	93.73%	$ 8,429,264	92.64%	$ 5,644,774
Burning Mtn Fire Protection District	77.25%	$ 3,025,665	77.84%	$ 2,472,041
Debeque Fire Protection District	94.52%	$ 1,548,867	94.38%	$ 1,326,773
Grand Valley Fire Protection District	93.89%	$ 4,220,698	92.72%	$ 2,801,262
Rifle Fire Protection District	77.71%	$ 3,856,212	72.19%	$ 2,317,445
Grand River Hospital District	88.41%	$ 15,892,975	86.83%	$ 11,287,653
Totals		$ 93,134,686		$ 65,419,569

Pg. 909, third row of initial paragraph. "This 2.95 percent one year impact of Alternative C with respect to Alternative A compares with an average annual employment growth of 1.39 percent in the nine years between 2001 and 2010 …"

- This text is misleading in several ways. First, the difference in employment between Alternative A and Alternative C is not a one year impact, but is the average annual difference throughout the 20 year period.

- The comparison of the employment effects with average annual employment growth over the previous decade also fails to portray an accurate picture of current socioeconomic realities in western Colorado. Year end 2012 data from the Quarterly Census of Employment and Wages published by Colorado Labor Market information shows that the socioeconomic study area has actually lost more than 14,000 jobs and $252 million in annual wage earnings since 2007. This corresponds to an annual average decrease in employment of 1.9% per year and average annual decrease in wage earnings of 0.9% per year over the most recent five year period.

Pg. 911, fourth paragraph. "Alternative A -Current management …"

- The two sentences in this paragraph completely contradict one another. The paragraph needs to be rewritten.

Pg. 912, third paragraph. "Specific communities will also not be impacted in the same way by the management alternatives."

- This is an important point. The rest of this paragraph focuses on the impacts of changes in grazing for the Town of Walden and Jackson County. While this is a valid example, the largest economic impacts associated with the management alternatives relate to oil and gas related employment. Small and medium sized communities heavily dependent on oil and gas employment and activity, including DeBeque, Parachute, Silt, Rifle, Rangely, Meeker and Craig may also be disproportionately affected. Even Grand Junction, though much larger, could be substantially affected since it is the main service center for the oil and gas industry in western Colorado.

Pg. 914-916, Environmental Justice Impacts

- This section again notes concern about potential disproportionate impacts on Walden and Jackson County, citing a commenter from the Economic Strategies Workshop in 2012. However, the quantitative evaluation of potential environmental justice concerns focuses entirely on county level data for the study area. As suggested in the preceding comment, there are specific and identifiable communities within the study area that may be particularly affected due the large role of the oil and gas industry in their economies. A quick review of 2007-2011 data from the American Community Survey indicates that Craig, DeBeque, Glenwood Springs, Grand

Junction and Walden all have poverty rates above the state average. The most important example of a potential environmental justice impact, however, is probably the Town of Parachute. Based on the ACS data, over 39 percent of the residents in Parachute live below the poverty level, more than three times the state average. In summary, the environmental justice analysis should include identification and evaluation of impacts on disadvantaged communities by place of residence, not just county of residence.

Appendix F: Disturbance Cap Management

General fundamental failure of the DEIS regarding the Disturbance Cap Management Program:

The presumed need for a 3% disturbance cap originated with opinion expressed by Walker et al. (2007) in the discussion of their paper. They stated, *"...we believe the conservation strategy most likely to meet the objective of maintaining or increasing sage-grouse distribution and abundance is to exclude energy development and other large scale disturbances from priority habitats, and where valid existing rights exist, minimize those impacts by keeping disturbances to 1 per section with direct surface disturbance impacts held to 3% of the area or less."* However, Walker et al. (2007), like Holloran (2005), who had previously proposed a restriction of one well per section, never actually tested the effectiveness of these disturbance caps. Instead they modeled sage grouse response in lek attendance in terms of distance(s) from potential sources of disturbance. Therefore, the need for a 3% disturbance cap (or 1% or 5% caps, and one-well per section) in the NTT Report and DEIS, represents nothing more than the opinions of Holloran (2005) and Walker et al. (2007) that were stated in the conclusions of their papers, and by the NTT members, at least one of whom was an author of the NTT report. The BLM cannot rely on such untested opinion as a basis for its alternatives in DEIS. If it does, it will have effectively replaced the scientific method in implementation of the NEPA (i.e., data, hypothesis testing, and reproducible results) with the opinions expressed by the authors of the cited studies, especially when those opinions are erroneously represented by the BLM as if they were rigorously tested against the data. **(Please refer to *Exhibit M*: "How the NTT Report Changes the Way the BLM Operates" which contains internal BLM emails obtained through FOIA that underscore the BLM's own concern for lack of scientific citations and data to support opinions rather than actual science used in the NTT Report. This exhibit points directly to BLM's own concerns over a lack of science to support a percentage cap, etc.)**

Pg. F-1: "This cap management approach does not suggest that GRSG use only the most preferred sagebrush habitat."

- This statement (and those quoted below) directly contradicts the statement on page 226 of the main DEIS as true, "*GRSG are considered a sagebrush ecosystem obligate species. Obligate species are those species that are restricted to certain habitats or to limited conditions during one or more seasons of the year to fulfill their life requirements. GRSG are only found where species of sagebrush exist*."

- Page 245 of the main DEIS: "*As is the case with the North Eagle/Southern Routt population on the east side of the CRVFO, the Roan Plateau is at the southernmost part of the range for this species. It is incorporated in the Parachute-Piceance-Roan population. Although the area is*

mapped as preliminary general habitat (PGH), it does <u>not</u> contain large contiguous sagebrush stands."

- Page 256: "*Hagen (1999) found GRSG distribution in Piceance Basin to be highly clustered, implying that the availability of suitable habitat was, therefore, also clustered*."

- Page 256: "*The characteristic pattern of GRSG habitats in the Parachute-Piceance-Roan are such that each parcel of ridgeline habitat (generally 400 to 1,000 feet in width) is separated from adjacent ridgeline habitats by 1,000-to 3,000-foot intervals of habitat unsuited for occupation or ground movement."*

- Page 256: "*Adding to this vulnerability, the Parachute-Piceance-Roan population is distributed in clusters across the Piceance Basin and Roan Plateau. The birds' primary distribution across the Cathedral Bluffs and Roan Plateau is divided into two relatively distinct subcomplexes: the Figure Four area to the west and the Barnes Ridge area to the east. Although CPW monitoring of telemetered birds has established that there is regular, but infrequent, interchange among these groups, the large interval of land separating these subgroups (about 9 miles) is relatively devoid of suitable habitat."*

- Page 507: "*Not all habitats within mapped priority and general GRSG ranges are capable of supporting GRSG populations*."

Pg. F-1: (Lines 22-27, Page F-1) "This cap management approach does not suggest that GRSG use only the most preferred sagebrush habitat. Consequently, the Northwest Colorado habitat map does not attempt to make this localized distinction, and most of the provisions of Alternative D apply to habitat designations on the Colorado map without reference to specific ecological sites. However, under Alternative D, management of the disturbance cap is restricted to this preferred sagebrush habitat."

- This directly conflicts with the direction provided to the BLM in the Instructional Memorandum (IM) 2012-044 which requires the BLM to address local ecological site variability. Specifically: "*While these conservation measures are range-wide in scale, it is expected that at the regional and sub-regional planning scales there may be some adjustments of these conservation measures in order to address local ecological site variability."* As a result, the BLM directly ignored this direction.

- This is further underscored in the IM which states that habitat maps can be refined as new information becomes available. Specifically: *"PPH and PGH data and maps have been/are being developed by the BLM through a collaborative effort between the BLM and the respective state wildlife agency, and are stored at the National Operations Center (NOC). These science-based maps were developed using the best available data and may change as new information becomes available. Such changes would be science-based and coordinated with the state wildlife agencies so that the resulting delimitation of PPH and PGH provides for sustainable populations."* Garfield County has provided this information to BLM numerous times but CPW and the BLM have refused to acknowledge and incorporate the County's habitat mapping despite the fact that it is based on best available data and is science-based.

- The first sentence states: "*This cap management approach does not suggest that GRSG use only the most preferred sagebrush habitat*." This seems to say the GSG use more than what has been defined as "most preferred habitat." However, the last sentence states: "*However, under Alternative D, management of the disturbance cap is restricted to this preferred sagebrush habitat."* This last sentence seems to say the GSG uses only "*preferred sagebrush habitat." To the reader, t*hese two sentences seem to contradict each other. It appears the BLM does not actually know which type of habitat is truly important in applying the disturbance cap management approach. Recall, the DEIS states that areas within PPH and PGH *"do not contain large continuous sagebrush stands"* (Pg 245), and on Pg. 256 the DEIS states *"Hagen (1999) found GRSG distribution in Piceance Basin to be highly clustered, implying that the availability of suitable habitat was, therefore, also clustered."* Also, the DEIS states "*Habitat potentially suited for use by Parachute-Piceance-Roan GRSG comprises only 16 percent of the mapped overall range. Although this pattern moderates at lower elevations where ridgeline habitats broaden, bird distribution tends to be confined to higher elevations (greater than 7,400 feet in the east, greater than 7,700 feet in the west) and modeled habitat at lower elevations supports few birds."* It would seem that the cap program, if used, should be retooled to be consistent with the data cited in the DEIS.

Pg. F-3: "The initial calculations and the analysis in this document are based on sagebrush maps created using the Regional GAP Analysis Project data, but implementation would be based on site-specific information wherever it is useful. Areas currently dominated by sagebrush, or specially identified by CPW as contributing to the health of GRSG populations, would be included in the analysis and calculations, independent of ecological site maps."

- This statement appears to stray from previous statement of "The reference to ecological sites supporting sagebrush is intended to focus disturbance cap management on the most preferred sagebrush habitat." (pg. F-1). The inclusion of the statement, "…or specially identified by CPW as contributing to the health of GRSG populations…" seems to afford great discretion in determining the areas that are managed under the cap management disturbance program, allowing for areas to be managed under the program that are deemed suitable habitat based solely on the judgment of CPW. Accepting the statement on page 226 of the main DEIS as true, "*GRSG are only found where species of sagebrush exist.",* why would other vegetation communities be proposed to be managed under the cap management disturbance program?

- Who would be responsible for providing site-specific information regarding what is truly habitat? If CPW or the BLM, would they re-map habitats? Would a project proponent be responsible to collect site-specific information? Who would determine what is habitat? Would it be data from the WAFWA report? ReGAP? PPH/PGH maps? If a project proponent expends significant time and resources to provide site-specific data, would CPW/BLM accept this information even through CPW did not "specifically identify" the site-specific information? This places a significant burden on project proponents, with no or at least very vague guidance on how site-specific information would be collected, who would review it, and what the definition of effective GRSG habitat actually is, given the DEIS utilizes multiple maps showing significant differences in what habitat really is, but all maps claim to be "defining" habitat.

- The Cap Management program states that implementation of the cap program would be based on Ecological Sites Supporting Sagebrush in PPH maps (Re-GAP data) as well as site-specific information wherever it is useful. Additionally, the same section goes on to say: "*Areas currently dominated by sagebrush, or specially identified by CPW as contributing to the health of GSG populations, would be included in the analysis and calculations, independent of ecological site maps."* As one reads these two passages, it essentially says that more than a map will be considered. However, no criteria or standards are offered or defined for those other opinions leaving total and unchecked discretion to CPW or some unidentified authorized officer to make those decisions which is arbitrary. Ultimately this means that while there is a new map delineating specific areas of sagebrush that would be used as the basis for the cap management program, the BLM and CPW will also include other undefined discretionary information at their whim in the field that has not been evaluated, and there is no method proposed for how these areas of non-habitat would also be tracked in the cap management program.

- As noted in Exhibit P, the map of "Ecological Sites Supporting Sagebrush" fails to differentiate between sagebrush habitat quality or use by GSG. As a result, the agencies may be arbitrarily expanding areas subject to the management restrictions outlined in the DLUPA/EIS to areas that do not actually contain active leks or GSG habitat. In addition, there is no scientific evidence that enforcing rigid, uniform restrictions across thousands of acres will actually benefit the species and its habitat, which is counter to the agencies' objectives for this planning process. These factors undercut the agencies' ability to work with users of public lands to identify site-specific plans that allow for development while protecting the GSG and high-quality habitat.

Pg. F-3 and 4: "The BLM would not inventory private lands, nor does the BLM intend to monitor the activities of private landowners."…"Known disturbance on private surface would be considered using air photos as appropriate and included in disturbance cap calculations."

- The second sentence directly contradicts the first. Merriam-Webster defines the term inventory as "the act or process of making a complete list of the things that are in a place". If the BLM intends to utilize publicly available aerial photography to map and quantify public land disturbance, thereby creating a list of private land disturbances that are subsequently stored and utilized in a database, then by definition, an inventory has been created. Regarding the statement, "…nor does the BLM intend to monitor the activities of private landowners.", how would private land disturbances be tracked in the cap management disturbance program if not monitored?

- Who would be responsible for identifying known disturbances on private surface? Would the BLM conduct the inventory, or would a project proponent be responsible to collect this information? How far out from a project would a proponent or the BLM be looking at activities on private lands? Would this data be available to other project proponents within that area? Who would track the disturbance cap calculations, if different entities are looking at different activities on private lands?

Pg. F-4: Mitigation

- There is no formal "cap and trade" program associated with this EIS; it is left up to individual "authorized officers" to negotiate with operators on a case-by-case basis at their discretion.

- In-direct Mitigation: The EIS does suggest that there can be "indirect" mitigation such as conservation easements or research projects on private land; however these efforts would not positively affect (add back to) the cap. The EIS goes on to say that these types of efforts "may" warrant approval of projects that use cap space. So, even through a private land owner places their land in a permanent conservation easement to preserve sagebrush (removing the possibility for other beneficial uses forever) the BLM refuses to let it count against creating cap space. Moreover, the BLM states that if you do those things, there is no guarantee that you will receive any benefit and that it is left to the unchecked discretion of some "authorized officer" to make that decision.

- Juniper/Pinyon Encroachment Counts Against the Cap: The natural process of JP Encroachment counts against the cap on both public and private land. It is unclear what measures the BLM will take to do their part in treating this encroachment on BLM to create cap space. The County might suggest the BLM must meet or exceed (in equal acreage) JP treatments on BLM as is completed on private and split-estate…in other words, the BLM must match what the private land owners does to create cap space for JP removal.

Pg. F-4: (Lines 6-19) Management of valid existing rights would be similar to the management of private land. The BLM has no authority to deny valid existing rights; consequently, decisions made by entities with valid existing rights would affect what the BLM can authorize for other potential users of land it administers in the management zone.

- This EIS states it will honor valid existing rights on BLM Land or split-estate; however, those existing rights as they are developed (read: disturbed) will count against the cap even if located on private land within the Management Zone. So, as valid existing rights on private land are developed, those will also count against the cap. So, in effect, even through the BLM has already leased valid rights for anticipated development, they will count the resulting disturbance towards the cap in addition to any 'new' leases rights. In this way, the BLM will retroactively apply the provisions of this EIS against already existing valid leases.

Pg. F-4: "Easements on private lands that preserve sagebrush and funding of research are examples of mitigation that would not affect disturbance cap calculations but may warrant approval of projects that use cap space."

- Why are private lands conservation efforts not considered as credits to the cap management disturbance program, yet disturbances occurring on private lands are counted against the program? Considering the fact that enormous portions of effective habitat coincide with private

lands, does the exclusion of private lands not greatly skew the ability to understand forecasted population dynamics as well as habitat quality? In determining potential impacts to GrSG habitats, it is explicitly stated that private lands will be included in the cap management program with the reasoning that animal species do not respect arbitrary legal/political boundaries and that the end goal is conservation of the specie's entire habitat. To that end, it should stand to reason that any objective assessment in managing and understanding future population and habitat dynamics should be inclusive of private land conservation efforts as well, since they will be highly utilized by the GrSG and are an important source of effective habitat to the species.

Pg F-5: "The authorized officer may authorize disturbance in excess of the 5-percent disturbance cap without requiring additional mitigation with concurrence from CPW under the following scenario: Where data-based documentation is available to warrant a conclusion that GRSG populations in the applicable Colorado GRSG MZ are healthy and stable at objective levels, or increasing, and that a specific proposal for development would not adversely affect GRSG populations due to habitat loss or disruptive activities.

This exception standard has been designed to ensure that sufficient data is in place to warrant the exception. In most cases this exception could require project proponents to fund studies necessary to secure the data-based documentation requirement. These contrasts with a standard where data would be required to prove a proposal would adversely affect GRSG. If the authorized officer finds that the data available is insufficient or inclusive, the exception would not be granted."

- Regarding the potential for project proponents required to fund studies to demonstrate current and future population dynamics, how would this be accomplished? It would seem that this requirement encumbers the project proponent with meeting an objective that is not well, if at all, defined. By what threshold are the populations determined to be 'healthy and stable'? What level of population density is required to achieve a 'healthy and stable' population? At what point would population levels exceed the ability of surrounding habitats to support the population, thereby degrading the health of the existing GrSG population? If the population proposed to be studied is predominately transitory in nature, as has been suggested for the PPR population, what is the baseline population by which future populations should be compared? Would the project proponent be required to fund CPW to perform the studies, or would they have the option of consulting with a third-party independent biologist? If the latter, will a defined framework/method exist to guide the biologist in projecting future population numbers, or will the biologist have the freedom to analyze population dynamics by the method of their choice? Would the populations study be applicable to the entire population of a management zone, or to a restricted sub-population?

- How long or how large of an area would need to be studied? An entire Management Zone? Would funding be used to study GRSG off of public lands? Would studies be available to other entities? If so, then one project proponent may end up funding a large study, which others would benefit from? Or would CPW have the ability to extract funds from multiple project proponents? Would the data from studies be available to the general public? What criteria would the authorized officer use to determine if data is insufficient or inclusive? Who would establish what a sufficient study is? Would the public be able to comment or review a proposed study, or would a study be proprietary as CPW currently adheres to?

- If the BLM is going to pass the burden of funding studies for collecting GRSG data on to project proponents, this "unfunded mandate" needs to be better clarified so that a project proponent can determine what financial, time and administrative burdens they will be faced with for a activity which may be related to mineral extraction, recreation, grazing or other activity on public lands.

- Reliance on archaic and statistically invalid lek-count data collection to estimate sage grouse population trends as a basis for management. The lack of resolution in these data, their non-random sampling, and fact that sage grouse populations are known to fluctuate, means that it would be impossible to discern any pattern in the data that could be used to guide management actions in a timely manner, or that would be scientifically defensible. This would result in a virtual state of paralysis imposed on almost all land use activities.

- The BLM's approach is to rely on an undefined assessment of whether sage grouse populations are healthy, stable, or increasing. As an example, none of the population trend diagrams in the DEIS contain any confidence intervals around population estimates. This renders the interpretation of any trends derived from those data as meaningless.

- The DEIS relies on an archaic and statistically invalid lek-count data collection system to estimate sage grouse population trends as a basis for management. The DEIS, under Adaptive Management and Monitoring (page 193), describes an "effectiveness monitoring component" to *"identify any changes in habitat conditions related to the goals and objectives of the plan and other range-wide conservation strategies (U.S. Department of the Interior 2004; Stiver et al. 2006; U.S. Fish and Wildlife Service 2013). When available from WAFWA and/or state wildlife agencies, information about population trends will be considered with effectiveness monitoring data (taking into consideration the lag effect response of populations to habitat changes [Garton et al. 2011]). The information collected through the Monitoring Framework Plan outlined in Appendix J will be used by the BLM/FS to determine when adaptive management hard and soft triggers (discussed below) are met."* However, what the DEIS does not acknowledge is that male lek count data is not randomly sampled and is a statistically invalid measure of population trends, and that the 95% confidence intervals surrounding the estimates are generally larger than the estimates themselves (WAFWA 2008; Ramey et al. *in press*). Therefore, the adaptive management strategy proposed in the DEIS cannot be based upon these statistically invalid measures. (See ***Exhibit Q***.)

- Receiving any mitigation credit is also virtually impossible because it is impossible to produce scientifically defensible trend estimates. Case in point, the DEIS (on page 258) states, *"The populations naturally fluctuate, so it is difficult to determine at any given time if a population is increasing, decreasing, or staying stable."* With this being acknowledged, it is virtually guaranteed that no mitigation credit will be given by the BLM in implementation of the DEIS. Therefore, the DEIS must award mitigation credit based upon the type and extent of mitigation implemented (i.e., see Ramey, Brown, and Blackgoat). (See ***Exhibit Q***.)

- The DEIS adaptive management strategy must take into account the fact that any statistically valid and scientifically defensible trend estimate must also take into account the fact that sage grouse populations naturally fluctuate (i.e., the data must be normalized to account for regional fluctuations). (See ***Exhibit Q***.)

- And finally, the DEIS provides no reproducible, quantitative definition for what is determined to be a "healthy, stable, or increasing" population. This lack of definitional basis puts the BLM squarely in violation of the Information Quality Act and its management decisions under the DEIS are outside the realm of science. (See ***Exhibit Q***.)

Pg. F-5: "A key provision of Alternative D is to limit disturbance in any management zone to less than 5 percent."

- Is this provision applicable to PPH only, or ADH?

- Does this include private lands within a Management Zone? Who would be tasked with collecting surface impact data on private lands? Who would manage a "Management Zone" impact database?

Pg. F-6: "The authorized officer may consider the relative value to society in terms of employment, tax revenue, and project need versus the potential for impacts on GRSG."

- How are defined financial metrics (e.g. employment, tax revenues) and relative assessments (i.e. project need) compared to potential impacts on GrSG? What defines potential impacts? Fragmentation of habitat? Seasonal disruptions? Projected population declines? Is there a dollar value applied to individual birds and/or effective habitats to evaluate the financial benefits of a project compared to the financial loss of impacting GrSG?

- Would each project need to provide a socio-economic report so that an authorized officer can weigh the societal benefits? Is there a threshold at which a project is beneficial to the public? Please explain how this would work.

Pg. F-6: "Proposals that appear to make a disproportionate adverse impact on GRSG, compared to the relative value to society, may be deferred or rejected because the authorized officer determines through environmental documentation that the project is not a prudent use of cap space."

- In the sentence above, the term 'prudent' appears to exist solely at the discretion of the approving officer. What relative assurance exists for project proponents if ultimately the project could be denied not by exceeding proposed cap thresholds or negatively impacting GrSG populations, but solely at the personal opinion of the approving officer who may be biased towards conservation efforts or resource development?

- *This seems to be very arbitrary, could you please provide additional information on how an authorized office would weigh a benefit to society vs.a "disproportionate" impact to GRSG.*

Stated objective of Alternative D:
Pg. F-6: "Independent of the surface disturbance caps, the intent of Alternative D is to avoid, minimize, and mitigate surface-disturbing and disruptive activities that could adversely affect GRSG habitat or the ability of GRSG to use it."

Minimizing surface disturbance is achieved through the use of the surface disturbance cap management program:

Pg. F-1: "Alternative D limits anthropogenic disturbance in PPH to less than 5 percent of ecological sites capable of supporting 12 percent canopy cover of Wyoming sagebrush, or 15 percent canopy cover of mountain sagebrush."

Pg. F-2: "Consequently, the BLM would manage a total disturbance cap of less than 30 percent, to include all loss of sagebrush from all causes, including anthropogenic disturbance, wildfire, plowed field agriculture including upland hay, and vegetation treatments. This cap would be applied to all designated habitat in the entire management zone."

The cap management disturbance program is restricted to ecological sites capable of supporting sagebrush as identified through REGAP:

Pg. F-1: "However, under Alternative D, management of the disturbance cap is restricted to this preferred sagebrush habitat."

The cap management disturbance program may also include areas not dominated by sagebrush, but that may provide benefit to the health of GrSG populations, at the discretion of CPW:

Pg. F-3: "The initial calculations and the analysis in this document are based on sagebrush maps created using the Regional GAP Analysis Project data, but implementation would be based on site-specific information wherever it is useful. Areas currently dominated by sagebrush, or specially identified by CPW as contributing to the health of GRSG populations, would be included in the analysis and calculations, independent of ecological site maps."

The 5% cap threshold may be exceeded under specific conditions:

Pg. F-5: "The authorized officer may authorize disturbance in excess of the 5-percent disturbance cap without requiring additional mitigation with concurrence from CPW under the following scenario: Where data-based documentation is available to warrant a conclusion that GRSG populations in the applicable Colorado GRSG MZ are healthy and stable at objective levels, or increasing, and that a specific proposal for development would not adversely affect GRSG populations due to habitat loss or disruptive activities."

A project should be approved so long as proposed activities do not exceed defined thresholds and not negatively impact GrSG populations:

Pg. F-6: "Surface-disturbing activities that do not exceed the disturbance caps would be approved, subject to program-specific provisions found in Alternative D, with the following stipulation: as long as

there is a reasonable presumption that the proposal and disturbance would not entail a decline of GRSG populations due to habitat loss or disruptive activities."

A potential secondary condition of approval may consider the relative value of the project to society compared to potential impacts of the GrSG population:

Pg. F-6: "The authorized officer may consider the relative value to society in terms of employment, tax revenue, and project need versus the potential for impacts on GRSG. Proposals that appear to make a disproportionate adverse impact on GRSG, compared to the relative value to society, may be deferred or rejected because the authorized officer determines through environmental documentation that the project is not a prudent use of cap space."

Ultimately, the project will be considered by the BLM, in conjunction with all other managed resources, lending preference to GrSG habitats:

Pg. F-6: "In order to preclude unintended consequences, Alternative D uses the following guideline to assign an appropriate priority to GRSG issues: Consider GRSG habitat requirements in conjunction with all resource values managed by the BLM, and give preference to GRSG habitat unless site-specific circumstances warrant an exemption."

- As a project proponent, it would appear the following steps would be necessary to determine if a proposed project will be accepted and approved by the BLM:

    1. *Determine if the proposed project falls within delineated PPH or PGH, regardless if the project is actually within GRSG habitat as defined by WAFWA, or if the project is within "preferred sagebrush habitat".*

    2. *If project occurs within PPH, determine the net amount of project surface disturbance that results from implementation and mitigation within ReGAP mapped ecological sites, and apply to overall cap disturbance to ensure surface disturbance remains below 5% within ecological sites capable of supporting sagebrush within the entire Management Zone. If the Management Zone has not been inventoried for existing disturbances, the project proponent would have to fund someone to inventory the Management Zone, however, it is not specified who would ensure this is accurately tracked, if this work would be accepted by BLM or CPW, or if this information would be available to other project proponents. At this point there is still no validation process for inaccurate ReGAP mapping. If project occurs within PGH, determine the net amount of project surface disturbance that results from implementation and mitigation, and apply to overall cap disturbance to ensure surface disturbance remains below 30% within ecological sites capable of supporting sagebrush, regardless of mapping accuracy.*

    3. *Have site inspected for other potential habitats that may provide benefit to the GrSG population based on CPW consultation. If other suitable habitats are determined to be present, then deduct from cap management program. However, beneficial conservation activities on private lands do not count towards cap management.*

4. *If the project does not exceed the authorized cap threshold of 5%, then the project should be approved, provided that it does not negatively affect GrSG populations through habitat fragmentation or disruption, or at the discretion of a CPW reviewer.*

5. *If the project exceeds the authorized cap threshold of 5%, then the project may still be considered and approved provided that the project proponent proves that the proposed activities would not adversely affect GrSG populations. The burden of proof would likely be achieved by funding studies of GrSG populations, presumably across the entire Management Zone, with no specified time limit or funding limit, or approved based on mitigation (i.e., funding) additional studies for CPW to conduct.*

6. *Lastly, as a final condition of approval, the BLM authorized officer may weigh the relative value of the proposed project to potential impacts to GrSG populations, giving preference to the GrSG habitats.*

- Based on the steps outlined above that would be required of all project proponents, at what point would the proponent have assurance that the project would be accepted? It would appear as though there are a set of fairly defined metrics in terms of surface disturbance allowances; however, they are subsequently obscured by the amount of discretion employed at all steps in the alternative in not only evaluating impacts to GrSG habitats, but also the amount of discretion employed in determining what actually is effective habitat, what amount of fragmentation/disruption may be allowed to occur before being deemed impactful, as well as the discretion employed in assessing the relative value of the proposed project to society. Furthermore, at the BLM's and CPW's discretion, it may be deemed necessary to perform a study that demonstrates the continued stability of the GrSG population, without providing a framework for doing so nor indicating the extent of the population required to be studied. Ultimately, it seems as though a project proponent could stay within the defined surface disturbance cap thresholds and still be denied approval based on discretion in determining impacts to the health of GrSG populations; likewise, it appears a project proponent could exceed the stated cap thresholds and still be approved based on discretion of the BLM. With the amount of discretion available to the BLM to approve or deny proposed projects under Alternative D, what assurances exist that GrSG habitats and populations will be conserved and persist?

  This framework for assessing potential impacts and approving/disapproving projects does not provide assurances that either: a). a project that does not impact habitat would be approved, or b). actual GRSG habitats would be protected. All it assures is that any recreational, agricultural, mineral, or other activity within the PPH/PGH areas would have to go through a lengthy, expensive, and arduous process. The only assurance is that private landowners, a project proponent, or industry would have to significantly fund third party consultants or CPW to conduct large GRSG studies for an indeterminate amount of time or costs, at the discretion of CPW and BLM, with no assurance of the permitting process. The only assurance from the BLM and CPW that they would be reasonable in the application of this process is "trust us". Given the financial implications and time involved to conduct such studies, the BLM needs to provide a clearer process.

- How is the surface disturbance cap management program implemented and maintained? How are the necessary hardware, software and employee resources funded? How current would the

program be maintained to accurately reflect on-the-ground conditions? Will the public, or project proponents, have access to the database? How would the cap management program contribute to understanding the current and projected health and viability of GrSG populations?

- How would the BLM handle areas that do not support sagebrush, but are mapped by ReGAP as being an "ecological site supporting sagebrush"? What is the process for validating the ReGAP mapping?

- Please define "preferred sagebrush habitat", as we now have PPH/PGH, ReGAP ecological sites, site-specific validation, and WAFWA definitions of habitat. And evidently this is all up to further interpretation from CPW or the authorized officer.

- Please provide concrete information on how the CPW will identify habitats "contributing to the health of GRSG populations". Who at CPW would be authorized to make this determination? Are their determinations based on facts and data, or are they a matter of opinion based on an on-site visit?

- Reliance on disturbance caps that have no demonstrable conservation benefit to sage grouse, do not mitigate the cause and effect mechanisms of purported threats, and are based upon opinion rather than data, whether these disturbance caps are 1, 3, or 5%, or one well per section.

Pg. 41: "Birds in this population have been documented to use atypical habitat, including sagebrush/mixed shrub communities where the mountain shrub component is greater than 10 percent (Apa 2010). PPH mapped by CPW has incorporated known seasonal bird movements and habitat use within this population."

- While Apa (2010) and other CPW staff (Walker pers comm. 2013) indicate that GSG utilize sagebrush habitats with mixed mountain shrub communities components with greater than 10% foliar cover; the incorporation of large, contiguous stands of mixed mountain shrublands, Gambel oak woodlands, aspen and coniferous forests, and pinyon/juniper habitats is not consistent with Apa or CPWs work in the area. While it is recognized that this population is different from the national range in how they use habitats, the PPH/PGH maps do not reflect GSG habitats or what GSG actually utilize. Drawing huge "red blobs" around the PPR area does not accurately reflect GSG habitats and does not reflect the best, more recent available science from CPW's own research staff. Further, it ignores numerous studies produced by CPW (CPW 2008, Apa 2010, Walker 2010), and we fail to see how the PPH/PGH maps actually reflect the use of "best available science"

- The statement that PPH have captured "known seasonal bird movements" does not provide evidence that GSG utilize non-habitat types, and does not justify the incorporation of large, continuous stands of aspen, conifer, gamble oak

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Pg. 256: "The characteristic pattern of GRSG habitats in the Parachute-Piceance-Roan are such that each parcel of ridgeline habitat (generally 400 to 1,000 feet in width) is separated from adjacent

ridgeline habitats by 1,000-to 3,000-foot intervals of habitat unsuited for occupation or ground movement."

- This statement acknowledges that the non-habitat areas captured by mapped PPH areas are not utilized for overland movements, directly contradicting previous statements, and introduces ambiguity and multiple confounding baseline conditions which the EIS is based on. We believe that with such conflicting definitions of habitat, the impact analysis in the EIS is flawed at best, and unusable at worst. We request the EIS impact assessment be re-done using an assessment process that accurately identifies suitable GSG habitat, and the likely impacts to actual habitat.

Pg. 256: "Adding to this vulnerability, the Parachute-Piceance-Roan population is distributed in clusters across the Piceance Basin and Roan Plateau. The birds' primary distribution across the Cathedral Bluffs and Roan Plateau is divided into two relatively distinct subcomplexes: the Figure Four area to the west and the Barnes Ridge area to the east. Although CPW monitoring of telemetered birds has established that there is regular, but infrequent, interchange among these groups, the large interval of land separating these subgroups (about 9 miles) is relatively devoid of suitable habitat."

- If this is true, then why is such a large area mapped as PPH/PGH and potentially subject to regulations that would unnecessarily encumber operators? The statement above indicates that these areas are not utilized for ground movement; if the areas are not suitable habitat and not utilized for seasonal movements, why are they included at all?

Pg. 201: "Preclude new surface occupancy on existing leases within PPH."

- The document acknowledges that there are vast areas of non-habitat are captured within mapped PPH (see pg. 256). Will these non-habitat areas also preclude surface occupancy even though these areas provide no substantive benefit for the health and population of the birds? How would precluding surface occupancy in these existing leased areas within non-habitat help GSG if there is admittedly no habitat and no effective GSG use of these areas? How will the BLM compensate leasees who have purchased leases in areas which are being changed to NSO areas? This stipulation introduces significant "takings" of previously leased areas, while not actually protecting GSG or their habitats. This shows that the EIS is definitely flawed in its analysis and application of conservation techniques.

- The idea of limiting surface disturbances (presumably roads and pad sites) to one per section seems to have the unintended consequence of promoting further fragmentation of habitat. Furthermore, the 3 to 5% cap may have the unintended consequence of extending development than typical. As a disturbance cap is reached in an area, operators may have to stop and wait until some areas become reclaimed, and then once an area is reclaimed, operators would then be able to proceed with other operations. This assumes that keeping an area as 95% habitat with much longer periods of ongoing human activities in an area is a greater benefit to GSG. Accepting this, wouldn't a timeline of development that is lengthened be more harmful to the local population given the longer period of displacement? Applying a 3-5% blanket disturbance cap may be over-simplifying the issue, and we request that the BLM do a better job of analyzing

the indirect impacts of applying blanket disturbance caps, and incorporate a better understanding of mineral resource development.

Pg. 201: "If the lease is entirely within PPH, do not allow surface occupancy of any portion within 4 miles around the lek and limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that section."

Pg. 201: " If the entire lease is within the 4-mile lek perimeter, limit permitted disturbances to one per section with no more than 3 percent surface disturbance in that section. Require any development to be placed at the most distal part of the lease from the lek, or depending on topography and other habitat aspects, in an area that is demonstrably less harmful to GRSG, such as based on topography or vegetation."

- States that permitted disturbances should be limited to one per section. One what? One pad, one acre? One continuous area of disturbance regardless of size? What if the disturbance is within one of the "expansive areas of non-habitat"? Please explain how keeping development out of non-habitat areas would benefit GSG, and outweighs the financial and operational impacts to existing leasees?

Pg. 246: "In Grand County, there is a high risk of habitat fragmentation and loss due to urban development and related infrastructure, especially at the east end of the county."

- This is speculation. What evidence supports this statement? There appears only be minimal risks to GSG habitat due to development in the eastern side of the County, where very limited habitat has been mapped. So how did the BLM come up with an assumption of a "high risk" from urban development? Existing human populations near larger GSG blocks of habitats are at a very low density, and are within private lands. Is the BLM suggesting that they should regulate private land developments in the County, as there is a "high risk" of potential impacts on private lands?

Pg. 252: "The overall results indicated that lek size has decreased, but populations have increased in Colorado."

- Does this statement not completely undermine the entire Purpose and Need of the document? Why would an entire environmental analysis be performed to determine appropriate conservation measures on a species whose population is increasing? Given the well documented amount of development (both mineral and exurban) that has occurred in western CO over the last few decades, how do you explain the population growth if development and related disturbances are repeatedly cited as being one of the primary factors contributing to decline in GrSG health and populations?

Pg. 253: "Populations in the late 1960s and early 1970s were approximately 0.7 to 1.6 times the current populations (see diagram 3.3, <u>Change in the Population Index for GRSG in Colorado, 1965-2003 (Connelly et al. 2004)</u>) with relatively large population fluctuations."

- Again, this sentence demonstrates that the CO population has increased over the last several decades, or at least suggests that the whole need for this EIS is in question. During the time period cited (60's and 70's) there was lower population densities and yet the extent of development and related disturbances in western Colorado was lower. Excluding those influences, what explains the large fluctuations in population when those primary threats were absent? If these basic biological issues are unknown, then what confidence does the BLM have that issuing such overarching and financially burdensome stipulations would actually help GSG, given the massive potential impact to western Colorado's financial stability?

Pg. 253: "Although GRSG populations have definitely declined nationwide, the GRSG in Colorado have been increasing for about the last 17 years, and breeding populations have not declined for the last 39 years (see Figure 3-5, Greater Sage Grouse Breeding Bird Density, for current densities in the planning area). However, Braun (1995) reported a long-term decline in GRSG distribution and abundance. Similarly, Connelly and Braun (1997) indicated that GRSG breeding populations declined by 31 percent and production declined by 10 percent when they compared the long-term average of males/lek to the average obtained from the 1985 to 1994 data."

- The last two sentences directly contradict the first, please explain what populations in Colorado are actually doing. Further, how can the impact analysis be done when the BLM doesn't know if populations are increasing or decreasing? What baseline assumptions were used to establish your existing conditions?

- Utilizing lek count data during the time period specified as a means of comparison seems faulty; the next page discusses the inconsistencies and limitations of the data collected by CPW prior to implementing consistent protocols prior to 1998.

Pg. 255: Top Graph - By including 0 counts (presumably years where counts were not collected), the trend is inaccurately shifted down.

Pg. 255: "The present emphasis on developing natural gas reserves on these ranges has the potential to impinge heavily on GRSG habitats and behaviors and contribute substantially to declining trends."

- Yet very intense development has already occurred in the time period graphed above; in spite of the intense development, lek and population counts have increased. How then is the notion that additional development of equal intensity would somehow "contribute substantially to declining trends"? Furthermore, the graph above seems to defy the notion of declining trends within the PPR population.

- The literature used as a basis of impact from natural gas development comes from high-density natural gas and oil fields in Wyoming, where pad density is around one pad per 10 acres. Please provide an analysis of why using this literature is relevant in Colorado, given the extremely low pad densities in many areas of GSG habitat. This is speculation. (See ***Exhibit Q***.)

Pg. 256: "Due to the peculiar configuration of habitat associated with the Parachute-Piceance-Roan population, these GRSG are believed to be particularly vulnerable to development and habitat-related effects."

- This statement should not be accepted as it is asserting an opinion that is directly contradicted by the data shown on the previous page. The statement is speculative and completely unsupported. (See ***Exhibit Q***.)

- The statement indicates that habitats within the PPR area are not likely as extensive as the PPH/PGH mapping suggests, and further introduces confusion into the habitat issue within the PPR.

- The DEIS needs to acknowledge the alternative hypothesis that sage grouse, like other animals, may be disturbed by human activity and will sometimes move away from it but that does not mean that they suffer a population decline. The birds may have simply responded by relocating, or coexisting with human activity (i.e. habituation). Neither the DEIS or the NTT Report acknowledge that that there has been no population-level decline reported in any of the cited studies, only decreased lek attendance in affected areas. The DEIS needs to be revised to explicitly acknowledge these facts and alternative hypotheses that are consistent with the data. (See ***Exhibit Q.)***

- Connelly (2004) used a hypothetical "pre-European sage grouse distribution" but provides no data or evidence of historic sage grouse habitat or populations. The Final EIS must be based on science, not speculation.

- Connelly's 2004 monograph relies on extensive GIS analysis to translate speculative habitat conditions into theoretical historical habitat, which is then compared to current potential sage grouse habitat. The theoretical habitat loss since European settlement is calculated through this exercise. Areas known to be historically occupied by sage grouse were not included, and areas where there is no data of sage grouse occupancy are included. Speculative models are substituted for lack of historic data on sagebrush extent and sage grouse distribution, and are the basis of a mere guess at what was historic habitat. Thus, Connelly (2004) information is misleading, as are the subsequent analyses BLM and USFS use in reliance on Connelly (2004).

Pg. 253: "Population trends based on counts of male GRSG at leks decreased over the assessment period, regardless of the parameter used, with a significant decline in males per lek; see diagram 3–2 below."

Pg. 253: "A decline in lek size was also reflected in the distribution of leks among size classes, with medium and large leks each comprising over 30 percent of the leks sampled from 1965 through 1979, but for the remainder of the period, the proportion of medium and especially small leks increased."

- The graph referenced on pg. 253 (Diagram 3-2) shows a significant population decline since 1964 based on inferring population trends by male lek counts. However, there is no indication that the data are accounting for potential dispersal to other leks. In fact, the very next bulleted point (directly above) indicates that while the number of large leks decreased, the number of small and medium-sized leks increased, supporting the idea that the birds were dispersing to other leks, and not necessarily supporting the notion of a declining population.

Pg. 258: "GRSG populations have fluctuated greatly since 1984 in both Middle Park and North Park. The CPW counted GRSG males on strutting grounds consistently and reliably since the 1970s in North Park and the 1990s in Middle Park. According to these counts, 1984 GRSG populations were at their lowest levels recorded between 1984 and 1997 in North Park. GRSG males counted in 1984 totaled 466. From 2000 to 2005, counts in North Park were above 1,000 male GRSG. Currently, the 3-year running average for North Park (2010 to 2012) is 755 males. Lek count effort has been fairly consistent in North Park since 1973, and the entire data set was used to generate the North Park Population MZ in the Colorado GRSG Conservation Plan (2008). Diagram 3–6, <u>Annual Male High Count for the North Park GRSG Population</u>, illustrates that the annual male high count for the North Park GRSG population has fluctuated through time, but the population has remained fairly stable for the past 40 years. The 2010 to 2012 3-year average is close to the long-term median (1973 to 2012) for the population and well within the North Park Population MZ (639 to 1,214) recommended in the Colorado GRSG Conservation Plan (2008)."

- Do the lek counts account for potential dispersal to other leks during lower years? If the birds dispersed to other leks during lower years then the high counts at leks may decline at some leks while increasing at other leks. The stability of the long term trend at 800 males seems to support this notion.

Pg. 258-259: "The Middle Park population has fluctuated around and within the population MZ recommendations (185 to 286) provided in the Colorado GRSG Conservation Plan (2008) and could be considered stable."

- Again, if the population is demonstrated as being stabile and meeting existing population objectives, why are additional conservation measures being considered?

Pg. 266: "There are no pending land acquisitions within the planning area."

- Please provide documentation that this statement is accurate, as given a review of BLM NEPA reviews for potential land exchanges, this statement appears to be inaccurate.

NTT Report Comments

The DEIS relies on recommendations in the NTT Report but does not acknowledge that these recommendations were influenced by special-interest litigants involved in settlement negotiations with the BLM. Publicly available records, including e-mails obtained under FOIA from the State of Idaho (excerpt below from a December 13, 2011 e-mail from the NTT lead for the BLM) reveal that special interest influence, rather than a transparent, inclusive, and scientifically defensible public process, was used in producing the NTT Report's recommendations:

> *"Our timeframe is to complete the "updated" draft NTT report by COB tomorrow so I can ship it back to DC. Due to concerns by solicitors in DC the NTT report will look different. However the content is generally the same and due to the science review we did make changes to the Goals and Objectives section, some conservation measure in fluid minerals have been updated (i.e. 2.5% has been changed to 3% with rationale). The Policy recommendation change has undergone significant clarification again based on solicitor concerns in DC.* ***The solicitor concerns with the Policy recommendation piece stems from ongoing litigation discussions they currently having with litigants over BLM's recently completed LUPs."***

Clearly, the BLM cannot rely on such tainted sources as a basis for its analysis and alternatives in the DEIS.

Pg. 227: "With respect to maintaining viability of GrSG populations in the presence of oil and natural gas extraction, we conclude that the impacts of well-field development and production are most effectively mitigated by, in order of decreasing efficacy,

- ***Maximizing the extent of sage-grouse demographic recovery to near levels observed before the onset of well-field development;***
- ***Minimizing the time period of maximum demographic impact (D);***
- ***Minimizing the time period over which demography recovery is achieved (T2)."***

- Regarding the first bullet, CPW has indicated that across much of Colorado, GSG populations are increasing, or at least are stable. How would the BLM force operators and applicants to comply with this recommendation?

- The last two bullet points regarding effective mitigation certainly seem reasonable, essentially implying that minimizing the duration of the development phase for gas infrastructure minimizes impacts on local bird populations. However, applying an arbitrary annual surface disturbance cap (e.g. the 3-5% surface disturbance cap) seems to run contrary to that idea, effectively forcing the development phase to be extended and prolonged. To illustrate, let's assume that "ABC Gas Company" has just approved an MDP for a 30,000 acre unit proposed to have 80 pads at build out. In the first year, ABC would like to implement an aggressive construction schedule and build 16 of the pads that are linked together along a common gathering system and road network to utilize resources efficiently and ultimately reduce costs. However, the amount of surface disturbance that would be caused by the development effort would exceed the allowable surface disturbance cap amount, thereby limiting the operator's ability to proceed with those plans. So, what are the consequences? Most obviously, the disturbance phase required to construct those 16 pads is prolonged, not due to technical

constraints or lack of resources, but rather due the arbitrary surface disturbance cap. This directly contradicts the bullet points above. Secondarily, the operator is forced to incur greater development costs as the implementation effort would be required to occur over a much longer duration. Stipulations should allow for a case-by-case analysis of potential impacts to GSG habitats, as some situations may prove to be less impactive to GSG and their habitats, rather than simply applying disturbance caps.

Predation

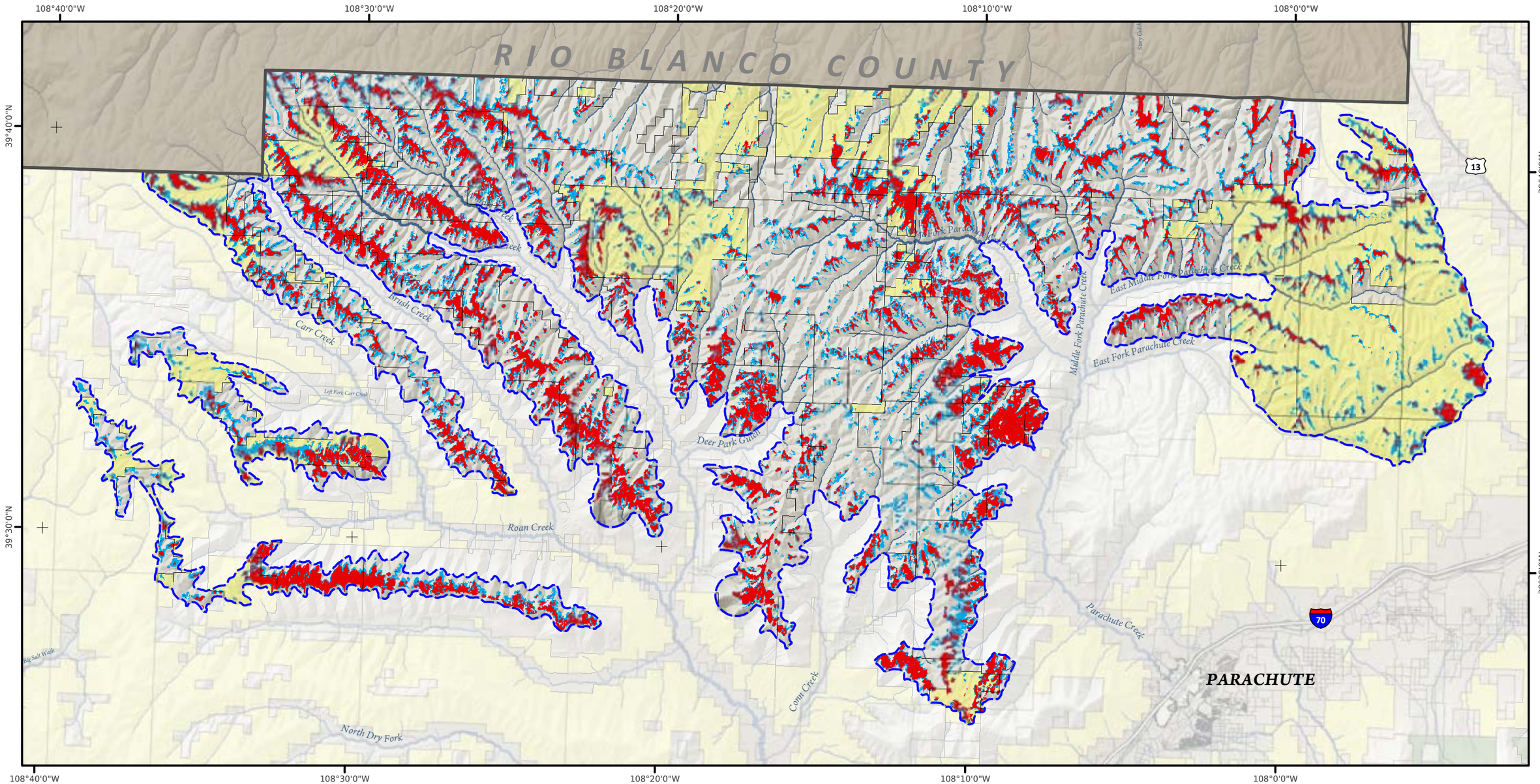
- The DEIS Ignores predation as the primary demonstrable source of mortality to sage grouse, in favor of an approach that relies on a series of land use setbacks, disturbance caps, and restrictions based around speculative benefits to sage grouse that have not been shown to be effective by any data. (See ***Exhibit Q***.)

- The DEIS ignores management of raven predation on sage grouse eggs and broods as a conservation strategy despite the fact that predation has been shown to be a major issue for sage grouse and that the State of Wyoming, in collaboration with the USDA-APHIS, has recently undertaken a major raven management program. (See ***Exhibit Q***.)

- Sage grouse eggs are preyed upon by a wide variety of predators including red foxes, coyotes, badgers, black-billed magpies, and ravens. Juvenile and adult sage grouse predators include golden eagles, prairie falcons, coyotes, badgers, and bobcats. Sage grouse broods are preyed to ravens, red foxes, raptors, ground squirrels, snakes, and weasels. However, of the predators above, ravens are the most ubiquitous. Research (Coates 2007; Coates and Delehanty. 2004; Coates et al. 2008; Coates and Delehanty 2010; Christiansen 2011) and more recent data gathered by the USDA, has shown that ravens have the greatest impact on sage grouse and that their numbers are far in excess of historic levels (Christiansen 2011). (See ***Exhibit Q***.)

- The DEIS and NTT Report ignore the management of ravens as a conservation priority to reduce predation on sage grouse eggs and broods (and thereby a viable management strategy to increase overall survivorship and recruitment of sage grouse). The only mention of ravens in these documents is that their numbers are the result of human activities, and that transmission lines and tanks provide predator roosting opportunities (and therefore sage grouse avoid these structures.) There is an implicit assumption that ravens can be managed indirectly through the regulation of human activities. This is an unproven strategy and is unlikely to be effective at reducing raven predation on sage grouse unless coupled with active / lethal control of ravens to reduce the size their populations (Coates and Delehanty 2010). There is abundant research on raven predation on sage grouse and other species, yet the DEIS all but ignores the importance of this threat (Boarman 1993; Boarman 2003; Boarman et al. 1995; Boarman and Heinrich 1999; Boarman et al. 2006; Bedrosian and Craighead 2010; Bui 2009; Cagney et al. 2010; Coates 2007; Coates and Delehanty 2004; Coates et al. 2008; Coates and Delehanty 2010; Conover et al. 2010; Cote and Sutherland 1997; DeLong 1995; Gregg et al. 1994; Heinrich et al. 1994; Moynahan et al. 2007; Preston 2005: Ramey, Brown, and Blackgoat 2011; Schroeder and Baydack 2001; Snyder et al. 1986, Sovada et al. 1995; Watters et al. 2002; and Webb et al. 2009). The DEIS must include in each alternative a raven management program such as the one undertaken by the USDA-APHIS Animal Damage Control at landfills across southern Wyoming at the request of the

Wyoming Game and Fish Dept. (Wyoming Game and Fish 2012, USDA/APHIS/Wildlife Services 2013). (See ***Exhibit Q***.)



Analysis Area Boundary	220,967 Ac.	BLM Lands		Municipal Boundary	
Prioirty Habitat	31,070 Ac.	USFS Lands		County Boundary	
General Habitat	28,023 Ac.	Private Lands		Interstate	
				State Highway	

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0 1 2 4 Miles

0 7,500 15,000 30,000 Feet

1 inch = 15,000 feet

Date: July 2013

PENDO Solutions

Garfield County

Modeled Habitats for Greater Sage Grouse

Suitable Habitat Results

[Model v1: Revised Vegetation]

Economic Impacts of Sage-Grouse Management: Supplemental Report

Piceance Basin Development Analysis

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BBC RESEARCH & CONSULTING

SECTION I.
Background & Objectives

This report is a supplement to BBC Research & Consulting's detailed comments on the specific economic assumptions and calculations presented in The Northwest Colorado Greater Sage-Grouse Draft Land Use Plan and EIS (Sage-Grouse EIS), published in August 2013.

The objective of this report is to demonstrate the potential economic consequences for Garfield County of BLM's implementing the proposed Sage-Grouse habitat preservation plan and thus restricting the development of natural gas reserves in the Piceance Basin.

This presentation is not meant as a substitute analysis for the BLM's study, but rather a demonstration of the order of magnitude economic impacts to Garfield County that were not documented or revealed in the EIS.

It is hoped that representation presented here can illuminate the EIS's shortcomings and the magnitude of the document's missing information.

The Garfield County Commissioners, independent observers and consultants reviewing the Sage-Grouse EIS, have raised concerns about the reliability of the EIS document's economic impact assessment given the lack of clarity on how oil and gas extraction—and to a lesser degree grazing and recreation—might be affected by these new management systems. The failure to acknowledge and reveal the significant consequences to Garfield County is a notable shortcoming of this document.

SECTION II.
Sage-Grouse EIS Background and Issues

This section summarizes the economic impact findings within the Greater Sage-Grouse EIS and associated issues raised by Garfield County reviewers.

The Northwest Colorado Greater Sage-Grouse Draft Land Use Plan and EIS

The Northwest Colorado Greater Sage-Grouse Draft Land Use Plan and EIS (Sage-Grouse EIS) identifies the environmental and socioeconomic impacts of alternative management strategies for preserving habitat and species population for the Greater Sage-Grouse (GRSG).

The Sage-Grouse EIS document was published in August, 2013 and covers a planning area of approximately 15 million acres of public and private property across 10 counties in northwest Colorado. The Planning area is approximately 57 percent public lands. According to the document this area includes approximately 1.7 million acres of BLM-administered and National Forest System lands, and approximately 2.8 million acres of BLM-administered subsurface federal mineral estate that may lie beneath other surface ownership[1].

Habitat designations. The Sage-Grouse EIS identifies areas of Greater Sage-Grouse habitat in northwest Colorado along a long spectrum of habitat suitability[2]. Designations include:

- 2.4 million acres of designated **Preliminary Priority Habitat** (PPH): areas identified as having the highest conservation value, including breeding, late brood-rearing, and winter concentration areas;
- 1.5 million acres of **Preliminary General Habitat** (PGH): seasonal or year-round habitat outside of priority habitat;
- 295,800 acres of **Linkage/Connectivity Habitat**: areas that have been identified as broader regions of connectivity important to facilitate the movement of GRSG and maintain ecological processes.

NEPA regulations require that the BLM/USFS formulate a reasonable range of alternatives for accomplishing habitat protection and managing use of the subject BLM properties. In the Sage-Grouse EIS, the BLM offers four alternatives, A-D, which include a continuation of current management alternative (Alternative A).

Garfield County has approximately 148,000 acres of PPH property, 72,000 of PGH property, and about 7,600 acres of linkage habitat.

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[1] Sage-Grouse EIS Section 1.3.1 page 6.

[2] Acreage figures for subsurface federal mineral estate include public and private surface ownership.

Alternatives and management practices. NEPA regulations require the BLM to formulate a reasonable range of alternatives that offer feasible and distinct management options. In this instance, the BLM Planning Team developed one no action alternative (A) and three action alternatives (B, C, and D). Each of the action alternatives includes a collection of management strategies designed to protect Sage-Grouse habitat and the broader mission of BLM property management.

Five specific Sage-Grouse management measures were identified as potentially reducing economic use of BLM lands and subsurface resources managed by BLM. These management strategies are:

- Closure of Federal Mineral Estate Lands to Leasing;
- No Surface Occupancy (NSO) Stipulations on All or Parts of New Leases;
- Right of Way (ROW) Exclusions on Lands Needed for Road and Utility Access;
- Restrictions on Amount or Location of Surface-Disturbing Activities (Well Pads, Access Roads, Pipelines, Power Lines) on New or Existing Leases; and
- Seasonal Closures, Undergrounding of Electric Distribution Lines, Noise Abatement, Visual Screening, Higher Reclamation Costs, Specialized Fencing.

The BLM contemplates managing resources under a *disturbance cap* concept that would allow more stringent controls as habitat losses exceed certain threshold levels for identified zones of activity. This strategy would place a 5 percent cap on human disturbances on ecological sites that support sagebrush. The disturbance calculations would apply to both public and private lands, such that reduction of habitat on private property could trigger the more stringent regulatory efforts on public lands. New projects would generally not be approved if a disturbance cap for a particular zone has been exceeded. How such caps would be measured, monitored, and imposed is characterized but not specifically detailed in the EIS document.

Acreages affected. The Sage-Grouse EIS states that although the planning area includes private and public lands, management decisions would only apply to BLM-administered surface properties and BLM-administered federal mineral estate that may lie beneath other surface ownership within designations PPH, PGH, and linkage/connectivity habitat.

The following Figure II-1 (derived from Section 2 of the Sage-Grouse EIS) shows the acreage of habitat by designation category and the acreage closed to Fluid Mineral leasing under each Alternative. The Sage-Grouse EIS acknowledges significant economic effects associated with Sage-Grouse management strategies, principally stemming from reduced recreation, grazing, and mineral extraction activity. Under the most restrictive scenario, the anticipated effect of these actions will be to close a significant amount of public lands to fluid mineral leasing.

Figure II-1
Comparative Summary of Alternative (Acres)

Resource or Resource Use	Alternative A	Alternative B	Alternative C	Alternative D
GRSG Habitat Areas*				
Preliminary Priority (PPH)	0	1,576,900	1,576,900	1,576,900
Preliminary General (PGH)	0	1,134,800	1,134,800	1,134,800
Linkage/Connectivity	0	181,900	181,900	181,900
Fluid Mineral Leasing				
Closed to Fluid Mineral Leasing	100,200	1,347,400	2,473,000	100,200

Note: *BLM/USFS surface and federal mineral estate, including coal.

Source: Table 2.2, page 42, Sage-Grouse EIS.

Other economic use of these properties for grazing, recreation, or other mineral extraction would also be restricted.

Current federal oil and gas leases comprise 653,700 acres, or 26 percent, of the total subsurface federal mineral estate in the planning area. Unleased subsurface federal mineral estate within areas of high potential for oil and gas comprises an additional 521,600 acres, or 19 percent, of the total federal mineral estate within the planning area.

Oil and gas drilling reductions. Figure II-2 shows the number of anticipated oil and gas wells (20 years) completed in the Socioeconomic Planning Area for each alternative. Alternative A is a baseline scenario that assumes a continuation of current leasing and regulatory practices. Alterntive A anticipates 34,694 wells, or approximately 1,734 wells per year, will be completed in the multi-county Planning Area.

Figure II-2.
Oil and Gas Well Numbers: 20-Year Forecast

Source: Elaborated by BLM staff based on field office Reasonable Foreseeable Development Scenarios and available information. Sage-Grouse EIS, Appendix M page 35; Table M-17.

Federal, State, and Fee Surface	Anticipated Wells in Primary Study Area
Alternative A - Completed Wells	34,694
Alternative B - Completed Wells	33,091
Alternative C - Completed Wells	28,704
Alternative D - Completed Wells	33,893

Alternative C, which is the most comprehensive habitat preservation alternative, still anticipates 28,704 wells. This is a reduction of about 6,000 wells over a 20-year period in comparison with Alternative A.

Mineral production. Similarly, Table II-3 shows expectations of the projected quantity of oil and gas production over the 20-year forecast period on federal surface and on federal, state, and fee surface.

Figure II-3.
Projected Oil and Gas Production, 20-Year Period

Alternative A		Alternative B		Alternative C		Alternative D	
Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)
Federal Surface							
52,650	17,424	38,994	15,702	27,069	12,478	45,822	16,563
Federal, State, and Fee Surface							
96,211	36,108	82,556	34,386	70,631	31,162	89,384	35,247

Source: Sage-Grouse EIS Table M.17

These production forecasts by alternative anticipate impacts to oil and gas production over time in similar proportions to the drilling effects shown in prior Figure II-2.

Economic Impact. The economic analysis published as part of the Sage-Grouse EIS (Figure II-4) offers a summary of the economic effects associated with oil and gas operations under each management scenario. Alternative A is a continuation of current practices. Alternatives B, C, and D reflect variations of increased regulation for Sage-Grouse management objectives.

As noted below, the Sage-Grouse EIS authors anticipate $2.974 billion of oil and gas output and 19,073 jobs will be supported by oil and gas activities (average annual over 20-year forecast period) in the primary study area under current management practices (Alternative A). Under the most stringent Sage-Grouse habitat practices, the corresponding figures are $2.108 billion in output and 13,532 jobs. This represents a loss of $866 million in economic output and 5,541 jobs on an average annual basis.

Table II-4
Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings by Alternative

	Alternative A	Alternative B	Alternative C, Primary Study Area	Alternative D
Output (2011)	$2,974,932,481	$2,683,008,735	$2,108,789,332	$2,828,970,608
Employment	19,073	17,215	13,532	18,144
Earnings (2011)	$1,078,265,304	$973,088,057	$764,866,305	$1,025,676,680
Average Earnings per Job (2011)	$56,533	$56,526	$56,522	$56,529

Source: Greater Sage-Grouse EIS; Table 4.16 Calculated using the IMPLAN model as explained in the text and in Appendix M, Socioeconomics.

Based on known reserves and worker commuting patterns, most of this impact would occur in Garfield County. This job loss happens against an assumed backdrop of robust oil and gas development. These losses do not appear to include the lost jobs associated with operating wells. Although the Methodological Appendix M includes an explanation of the operating employment calculation process, it does not appear that the final projections are included in the EIS impact projections (see BBC specific comments).

Similarly proportioned, but more modest, economic losses are associated with grazing, recreation, and other activities restricted from access to federal lands.

EIS Conclusions

In essence, the Sage-Grouse EIS suggests that even under the most aggressive habitat management option, gas production will be diminished by only about 300 wells per year, causing a reduction in employment of about 5,500 jobs (annual average). Presumably, economic losses would be largely, but not exclusively, in Garfield County.

Conceptual Issues Underlying Calculations of Economic Impacts

The Draft Sage-Grouse EIS describes habitat management philosophy and general approach under each alternative, but lacks detail on how the collective management strategies contemplated would be measured, monitored, and implemented. Economic impacts are largely determined by these detailed management determinations. The Garfield County Commissioners, local officials, industry representatives, and the planning staff working on the review of the Sage-Grouse EIS have expressed concerns about the validity of the document's economic impact calculations given the lack of clarity on how oil and gas—and to a lesser degree, grazing and recreation—might be affected.

BBC has identified a number of technical issues with the Sage-Grouse economic impact analysis that have been detailed and forwarded to the BLM separately. From the broadest approach perspective, Garfield County's concerns regarding the EIS's representation of economic effects fall into four areas:

> **Concentration of effects.** The Sage-Grouse EIS covers a very large geographic area and a sizeable and diverse economic base. The economic impact analysis does not recognize the concentration of effects in smaller areas within this region. The great majority of northwest Colorado oil and gas activity anticipated in the coming years will occur in the Roan Plateau area and the broader Piceance Basin, which is primarily in Garfield and Rio Blanco counties. The effects of a diminished oil and gas industry will not be spread over a large planning area as represented in the Sage-Grouse EIS analysis, but instead will be sharply focused on Garfield County and to a lesser degree Rio Blanco and Mesa counties.
>
> **Impacts on private lands**. The BLM analysis states that only new mineral leases on public lands, or on split estates with minerals managed by BLM, will face additional regulatory constraints with more pervasive Sage-Grouse habitat management. In this area of the country, it is very common to have federal land interspersed with private lands, and for energy companies to pursue leases that have both public and private lands. Even if private lands are not the target of new regulations, in many instances it may be impossible to use these properties without crossing federal lands or using federal lands for staging and piping. While the BLM does not have the authority to restrict development on private land, they could preclude or limit project authorizations on public lands in order to compensate for habitat disturbances on private land. Consequently, decisions made on private lands might affect what the BLM can authorize on public lands. The EIS shows a

misunderstanding of the realities of public land management and its impact on private land uses.

Impacts to existing leaseholders. While the Sage-Grouse EIS acknowledges valid existing leaseholder rights, habitat management restrictions could in practicality undermine the development of existing leaseholds. For example, the disturbance cap concept proposed by BLM could result in the denial of projects simply because other disturbances have decreased available cap space, ultimately denying valid existing lease rights. Or conversely, activity on existing leases may quickly exceed the disturbance caps and effectively preclude development on remaining federal lands subject to Grouse management efforts.

On split-estate lands with federal minerals and private surface, BLM would apply disturbance cap restrictions to federal mineral leaseholders as lease terms and conditions of approval (COAs), regardless of ownership or lease rights on the surface property.

Impacts on financial viability of drilling activity. Seemingly minor changes in drilling requirements can fundamentally alter the economic viability of pursuing resource reserves. Investments in Piceance Basin are generally large scale projects that are planned and executed over many years, often decades, and typically incorporate state and federal and private lands in large multi-year drilling units. The cost of getting rigs into the area and efficiently pursuing the resource requires some predictability and flexibility so that long term operating efficiencies can be realized. Vague standards for drilling practices can be as punitive as complete prohibitions against activity. Many properties will very likely face significant new barriers to resource development, such as limitations on seasonal activities, pipeline locations, road access or changes in accepted drilling practices, any of which that will effectively reduce or eliminate drilling viability on a wide range of private and non-BLM properties.

In sum, the cumulative impact of the closures and designations in the DEIS could effectively preclude or significantly diminish energy resource development on hundreds of thousands of acres across northwest Colorado, greatly reducing the development potential of the Piceance Basin reserves, one of the major natural gas reserves areas in the country. The extent of these prospective impacts is not disclosed in the EIS document.

The following section offers an economic analysis that demonstrates the potential losses of jobs, investment and assessed value, assuming the practical impacts of the proposed new management regulations have a more restrictive combined effect than suggested or represented in the Sage-Grouse EIS.

SECTION III.
Illustrative Example: Economic Impacts of Reduced Oil and Gas Development on Garfield County

Some of the most promising gas resources in Colorado and in the nation as a whole are in and around the Roan Plateau and adjoining portions of the Piceance Basin, north and west of the Roan Plateau. This area also contains prime and secondary Grouse habitat subject to BLM management proposals, although the extent of such habitat is uncertain. The area contains a patchwork of private, public, and federal fee lands and contains many existing drilling leases.

This section examines the oil and gas development prospects in Garfield County and the potential property value and jobs at risk with the proposed BLM Sage-Grouse habitat management plans.

Example of Garfield County Development Prospects

By way of example, BBC has developed an illustrative economic impact analysis that focuses on Garfield County, but uses many of the production, employment, and valuation assumptions underlying the Sage-Grouse EIS report.

The objective of this exercise is to demonstrate the order of magnitude of economic development opportunities associated with development of the Piceance Basin and thus the potential economic value jeopardized if habitat management limits the development of these reserves.

Summary of impacts. The results of this process are summarized in Figure III-1. Additional details on assumptions underlying these projections are provided in the accompanying text or in attached Appendix A.

Over a 20-year development period, approximately 25,000 wells are reasonably foreseeable in Garfield County—about 70 percent of the 34,700 wells that are projected in the Sage-Grouse EIS for northwest Colorado. Based on Sage-Grouse EIS multipliers, this level of development in year 20 would result in over $12.3 billion in annual resource production value, 48,000 annual jobs, and nearly $10 billion in new county assessed value. The county's current mill levy (13.66 mills) would produce over $130 million in annual county general fund tax revenue by year 20. Applicable school, fire and special districts would have similar outsized revenue benefits.

This is the level of economic activity is put at risk by the proposed Sage-Grouse habitat management plans, a concern that is not disclosed or discussed in the Final Draft Sage-Grouse EIS.

Figure III-1 shows annual and cumulative economic impacts associated with Piceance Basin resource development. The assumptions underlying Figure III-1 are largely drawn from the EIS and described in the remainder of this report.

Figure III-1.
Potential Oil and Gas Development in the Piceance Basin and Resultant Economic Effects

	Year 1	Year 5	Year 10	Year 15	Year 20	Cumulative
Number of Wells						
Annual New Wells in NW Colorado	1,750	1,750	1,750	1,750	1,750	35,000
Annual New Wells in Garfield County	1,250	1,250	1,250	1,250	1,250	25,000
Cumulative Wells in Garfield County	1,250	6,250	12,500	18,750	25,000	
Production Value in Garfield County						
Annual Value from Wells ($millions)	$1,409	$5,769	$9,176	$11,187	$12,375	$170,380
Assessed Value ($millions)	$1,127	$4,615	$7,341	$8,950	$9,900	$136,304
Annual County Property Tax ($millions)	$15	$63	$100	$122	$135	$1,861
Employment from Garfield Co Wells						
BLM DEIS-based						
Annual Drilling and Completion	26,625	26,625	26,625	26,625	26,625	N/A
Annual Operating Jobs	2,520	10,320	16,414	20,013	22,138	N/A
Total Annual Jobs	29,145	36,945	43,039	46,638	48,763	N/A
Leeds Statewide-based						
Annual Drilling and Completion	15,998	15,998	15,998	15,998	15,998	N/A
Annual Operating Jobs	2,662	10,902	17,339	21,140	23,385	N/A
Total Annual Jobs	18,661	26,900	33,337	37,139	39,383	N/A
2008 AGNC Study-based						
Annual Drilling and Completion	8,387	8,387	8,387	8,387	8,387	N/A
Annual Operating Jobs	516	2,581	5,161	7,742	10,322	N/A
Total Annual Jobs	8,903	10,968	13,548	16,129	18,709	N/A

Source: BLM Sage-Grouse EIS; BBC Research & Consulting, 2013. Note: three sources of job multipliers are shown to demonstrate variations in multipliers; see text. All job estimates are by place of work (wells in Garfield County) a share of these workers will live outside the county, most likely in Mesa County.

The current value of all Garfield natural resource properties is about $2.0 billion. The above data indicate new energy resource assessed valuations in the country could rise to nearly $10 billion with development of the Piceance reserves. At this level of assessed value, the Garfield County general fund mill levy would produce over $130 million per year in property tax receipts. Local school, fire and hospital districts would witness similar proportional increases.

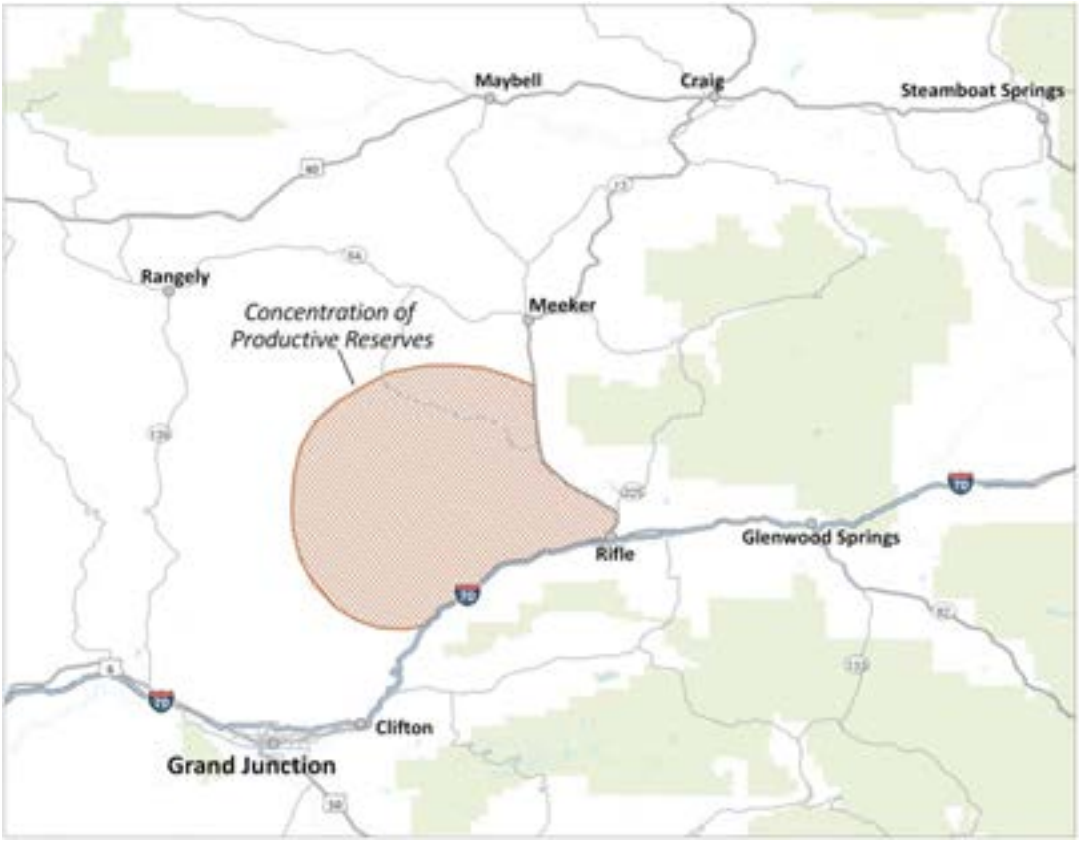
These jobs and tax consequences, or some significant share of these estimates, are in jeopardy under all of the action scenarios in the Sage-Grouse EIS. This is the type of economic impact that the EIS is required to analyze and reveal.

Modeling Approach

The following offers more detail on the modeling approach and assumptions underlying the prior Figure III-1.

Drilling activity. Figure III-2 shows the general location of the most promising gas development prospects. The pace of future development of the region's oil and gas reserves is uncertain. Exploration and production will ultimately depend on competitive influences, regulatory practices, and natural gas prices. The projections presented here are based entirely on the drilling expectations in the Sage-Grouse EIS.

Figure III-2.
Piceance Basin Area of High Oil and Gas Production Prospects



Source: BBC Research & Consulting

A large share of the productive mineral resource in the Piceance Basin is owned by the federal government, either as federal lands or federal mineral rights below private surface rights. Private property is interspersed throughout the area. There are multiple existing lease holders in the area, including Encana Corporation, Bill Barrett Corporation, and WPX. Private property owners in this area include Chevron, Shell, and Exxon.

Reserves. The amount of natural gas reserves in the Piceance Basin is uncertain. Estimates vary widely but significant reserves have been proven and are currently in development. The following are recent estimates (with references):

- 300 trillion cubic feet of natural gas in the basin (http://oilshalegas.com/piceancebasin.html)
- Estimates from the central part of the basin, where reserves are greatest, range from 60 to 120 billion cubic feet per square mile, decreasing nearer the edges of the basin.

(http://gvinsider.com/2011/understanding-the-geology-of-piceance-basin-natural-gas/).

- 200 to 300 trillion cubic feet within the basin (http://www.api.org/~/media/Files/Policy/Exploration/Energy-Resources/SER_PiceanceBasin.pdf)
- 300 trillion cubic feet of natural gas in the basin (http://www.energyandcapital.com/articles/investing-in-the-piceance-basin/3752)

Development expectations. Estimate of likely gas production in the Piceance Basin and related development activity are derived from the Sage-Grouse EIS estimates.

- According to the Sage-Grouse EIS, estimates of the number of wells drilled and the number of wells completed under the No Action Alternative (Alternative A) were based on the n*umber of wells expected to be drilled and completed* per year in each BLM field office's current reasonably foreseeable development scenario (Appendix M, page 34).

- As noted previously, the Sage-Grouse EIS anticipates 34,694 completed wells on "Federal State and Fee Surface" properties over the next 20 years in the full Sage-Grouse Planning Area. Approximately 70-80 percent of this activity is expected to be concentrated in Garfield and Rio Blanco counties and the Piceance Basin, suggesting about 25,000 new wells on public lands and federal fee properties in these counties. It appears that the Sage-Grouse projections do not include private lands with private minerals, but it is unclear what is intended. The Sage-Grouse EIS indicates that private lands would be subject to the development caps.

- These estimates may be conservative. There are three known levels of natural gas reserves in the Piceance Basin. Most wells have been drilled into the Mesaverde formation, but recent exploration has shown very high productivity from the deeper Upper Mancos formation, which could provide many decades of additional gas production.

- One example of the industry's interest in this area, which corroborates this level of likely drilling activity, involves Encana Corporation and Nucor Steel Company, who have entered an agreement for a joint natural gas drilling program on leased lands known as the Big Jimmy. According to the Oil and Gas Journal[3], if allowed to proceed, the partners are committed to spend over $3.6 billion, producing 3,500 wells on about 55,000 acres. This project alone could produce over 34 billion in resource value over a 20-25 year period.

For the purposes of this exercise, BBC has used the EIS projection of wells in northwest Colorado and modeled 1,250 wells per year in the primary drilling area within the Piceance Basin, which is subject to the prospective BLM restrictions. Additional wells will occur elsewhere in the

[3] Confirmed by communication with Jason Oates, Group Leader Regulatory, South Rockies Business Unit Encanna Oil and Gas, October, 2013.

county. This pace of well development is conservative, less than the drilling level that occurred in 2007/2008 period in Garfield County.

Production costs and value. Sage-Grouse EIS Appendix M, Table M-19 indicates $2.7 million per well for drilling and completion costs. BBC has used these estimates and assumed that each well will produce about 2.5 billion cubic feet over a 20-year period, slightly less than the expectations used in the EIS. We have incorporated a production decay cure that mirrors the very high, early years' productivity and the diminishing production over time that characterizes shale gas wells. This productivity curve explains the flattening of production in later years. By year 20, the Piceance could be producing over $12.0 billion in the market value of gas production.

Employment. The authors of the Sage-Grouse EIS rely on a commonly used economic impact model (IMPLAN) to forecast economic activity associated with this level of resource recovery investment and development. The Sage-Grouse EIS assumes 11.7 direct construction jobs per well and 9.6 indirect and induced jobs per well (drilling and completion but not operations) or about 21 jobs per well drilled (Appendix M, Table M21). It does not appear that the production workers were actually included in the Sage-Grouse EIS modeling.

The multipliers used in the EIS produce very high employment estimates, forecasts that strain credibility. As a check against these estimates, BBC derived additional employment ratios from the 2013 *Assessment of Colorado Oil and Gas Industry—Industrial and Fiscal Contributions in Colorado*, conducted by the Business Research Division, Leeds School of Business at the University of Colorado, 2013. In addition, BBC used its own calculations that were developed in the 2008 Energy Study for the Associated Governments of Northwest Colorado. This later study relied largely on traditional horizontal wells and likely produces lower estimates than more recent analyses that use more current information. By year 20, this new gas production could readily employ over 30,000 workers, or as many as 48,700 according to the EIS calculations

State & federal revenues. Oil and gas activity produces revenues accruing to the federal government (from mineral leasing on federal lands) and state government (from severance taxes and state sharing of federal lease revenues). For local governments, property taxes are the most important source of ongoing tax receipts although there are other share back provisions from federal and state resources.

The EIS takes a very broad brush approach to lost tax revenues. Property taxes in particular are unspecified by location.

Property taxes. Property tax revenues reflect a property's taxable assessed value and applicable tax rates. An oil and gas property's taxable assessed value is based on its production. The prior year's primary production values are assessed at 87.5 percent. Equipment, buildings, fixtures, and leasehold improvements are assessed at the commercial property assessment ratio (29% of actual value). The appropriate tax rates (mill levies) are then applied to the assessed property value.

BBC has employed the same methodology used in the EIS to calculate production related assessed valuation (annual production X market value X assessment ratio in %). We have

reduced the EIS assessment ratio for 87.6 % to 80% to reflect various allowed value adjustments. Results are shown in prior the prior Summary Table III-1 and the following Figure III-3.

The importance of property taxes to Garfield County and related service providers is readily documented below. In 2013, despite lower gas values and reduced assessed values, the energy industry represented over 70 percent of the county's assessed value base and even higher proportions of the county's two associated school districts and the Grand River Hospital District. Current levels of assessed value for Garfield County and oil and gas affected districts is shown in Figure III-3.

Garfield County currently has more than $2.0 billion of assessed mineral value, but this value will diminish as well production slows. BBC's analysis indicates that Piceance Basin drilling activity alone would push that assessed value to about $9.9 billion.

The location of drilling versus individual district boundaries will ultimately determine which districts are beneficiaries of this increased value of Garfield County. Some districts are also subject to the Tabor Amendment, which limits realized increases in tax revenues. Property taxes from resource development are substantial. As noted above, the increase in mineral assessed value projected for this area is far in excess of the entire valuation of the existing county.

Figure III-3.
Current Garfield County Assessed Value

Taxing Entity	2012 Mill Levy	2013 Oil & Gas Assessed Value	2013 Total Assessed Value	% Assessed Value Attributable to Oil & Gas	2013 Estimated Revenue Attributable to Oil and Gas
Garfield County	13.66	$2,033,460,260.00	$2,896,661,540.00	70.20%	$27,766,899.85
RE-2 School District	13.76	$851,907,900.00	$1,115,636,270.00	76.36%	$11,723,956.52
School District 16	6.77	$834,285,190.00	$900,613,910.00	92.64%	$5,644,773.60
Town of Parachute	13.56	$5,621,910.00	$25,548,360.00	22.00%	$76,244.34
City of Rifle	5.26	$478,960.00	$98,516,850.00	0.49%	$2,519.81
Town of Silt	8.97	$0.00	$22,692,110.00	0.00%	$0.00
Burning Mtn Fire	6.10	$405,119,870.00	$520,432,670.00	77.84%	$2,472,041.45
Debeque Fire	3.93	$337,601,310.00	$357,706,100.00	94.38%	$1,326,773.15
Grand Valley Fire	3.27	$857,441,670.00	$924,731,600.00	92.72%	$2,801,261.94
Rfile Fire	6.10	$379,784,460.00	$526,060,910.00	72.19%	$2,317,444.77
Grand River Hospital	5.60	$2,016,732,740.00	$2,322,671,040.00	86.83%	$11,287,653.15

Source: Garfield County Assessor, 2013 and BBC, 2013

Production in the Piceance Basin offers an opportunity to continue the county's well funded, low tax rate structure for many decades to come. The county's oil and gas assessed value has the prospect of rising about five fold above current levels. Similar increases would occur in the school, hospital and fire districts and the affected municipalities.

APPENDIX A.

Piceance Basin Development Assumptions

	Constant Value		Year 1	Year 5	Year 10	Year 15	Year 20
Development							
Annual New Wells in NW Colorado Region by Year	1,750	BLM/BBC	1,750	1,750	1,750	1,750	1,750
% of Wells in Garfield County	71%	BBC					
Annual New Wells in Garfield County			1,250	1,250	1,250	1,250	1,250
Cumulative New Operating Wells in Garfield County			1,250	6,250	12,500	18,750	25,000
Investment per Well	$2,800,000						
Production & Value							
Production per Well (BCF Over 20-year Life)	2.5	BBC					
Annual Production from Cumulative New Wells (BCF)			355.8	1,456.8	2,317.1	2,825.1	3,125.0
Value per MCF	$3.96	BLM M.23					
Annual Value of Total Production (in $millions)			$1,409	$5,769	$9,176	$11,187	$12,375
Assessed Value (of Production Value)	80.0%	BLM	$1,127	$4,615	$7,341	$8,950	$9,900
Annual County Property Tax (in $millions)	13.65 Mill Levy		$15	$63	$100	$122	$135
Labor Force							
Using BLM DEIS Assumptions							
Drilling and Completion Workers per Well	**21.3**	**BLM**	**26,625**	**26,625**	**26,625**	**26,625**	**26,625**
Direct	11.7	BLM	14,625	14,625	14,625	14,625	14,625
Indirect and Induced	9.6	BLM	12,000	12,000	12,000	12,000	12,000
Operating Workers per BCF Production	**7.08**	**BLM**	**2,520**	**10,320**	**16,414**	**20,013**	**22,138**
Direct	0.78	BLM	279	1,142	1,817	2,215	2,450
Indirect and Induced	6.30	BLM	2,241	9,178	14,598	17,798	19,688
Total Employment Effect			**29,145**	**36,945**	**43,039**	**46,638**	**48,763**
Using Assumptions Based on 2012 Leeds Study							
Drilling and Completion Workers per Well	**12.8**	**Leeds/BBC**	**15,998**	**15,998**	**15,998**	**15,998**	**15,998**
Direct	5.2	Leeds/BBC	6,455	6,455	6,455	6,455	6,455
Indirect and Induced	7.6	Leeds/BBC	9,543	9,543	9,543	9,543	9,543
Operating Workers per BCF Production	**7.48**	**Leeds/BBC**	**2,662**	**10,902**	**17,339**	**21,140**	**23,385**
Direct	3.02	Leeds/BBC	1,074	4,399	6,996	8,530	9,435
Indirect and Induced	4.46	Leeds/BBC	1,588	6,503	10,343	12,611	13,950
Total Employment Effect			**18,661**	**26,900**	**33,337**	**37,139**	**39,383**

Source: BBC Research & Consulting, October 2013.

Garfield County

October 21, 2013

Mike King, Executive Director
Colorado Department of Natural Resources
Executive Director's Office
1313 Sherman Street, Room 718
Denver, CO 80203

RE: Meeting held on Monday, September 16th, 2013 regarding the Greater Sage Grouse habitat mapping in Garfield County

Dear Director King,

Thank you for taking the time to meet with myself and members of our team working on behalf of Garfield County regarding Greater Sage Grouse (GSG) habitat mapping and policy issues in Garfield County. We very much appreciate the effort you made in convening key staff from your office as well as from Colorado Parks and Wildlife (CPW) in order to talk candidly about habitat mapping concerns raised by Garfield County. As you can understand, the impact of proposed federal policy via the pending Bureau of Land Management's (BLM) Environmental Impact Statement (EIS) on GSG in Northwest Colorado will have a dramatic, if not crippling socio-economic affect on some counties in NW Colorado. It is critical that local and state government be aligned as much as possible relying on best available and reproducible science to support a realistic response to the US Fish and Wildlife Service (USFWS) as a listing decision hangs in the balance that works for both Garfield County and northwest Colorado. To this latter point, we very much appreciate your willingness to work with Garfield County.

To revisit and memorialize the outcome from our meeting, we understand that CPW has developed and primarily uses two maps regarding the management of Greater Sage Grouse in Colorado which include the Sensitive Wildlife Habitat (SWH) map and the Restricted Surface Occupancy (RSO) map. It was made clear that the SWH map does not accurately delineate

actual habitat; rather, it is used as a reference tool intended to require consultation for potential development within its boundaries and should not be construed as a map depicting any form of a "No Surface Occupancy" (NSO) policy. Additionally, the RSO map is intended to define a 0.6 mile buffer round an active lek with the purpose of prohibiting development activity. We also understand that the SWH map has been sent to the BLM in the form of the Preliminary Priority Habitat (PPH) map for use in their EIS. Further, CPW intends to adjust this Preliminary Priority Habitat (PPH) map with the very recent data collected by Dr. Brett Walker which is anticipated to reduce / shrink the PPH boundaries. Once this has occurred, CPW will resubmit that revised map to the BLM for use in the EIS. (CPW staff also reaffirmed that the acceptable margin of error for distance from plotted bird locations was no greater than 50 meters.)

While the County certainly appreciates the efforts on the part of CPW to continue to refine their mapping, we will continue to advocate for our habitat mapping efforts in our comments 1) to the BLM on the draft EIS on GSG in Northwest Colorado, 2) in our comments to the Colorado Oil and Gas Conservation Commission's (COGCC) rulemaking hearings on wildlife mapping, and 3) in future coordination meetings with the USFWS. As discussed in our meeting, one the County's primary concerns is there appears to be a fundamental disconnect between how CPW designed and uses the SWH map as a basis for consultation versus how the BLM is using the PPH map for project-specific land management policies and "in-the-field" decisions.

As explained to the County by CPW staff on September 5, 2012 in a County Coordination meeting, this BLM - PPH map (which is CPW's SWH map) was generated at a *50,000-foot level* not intended for specific "on-the-ground" land use management. Again, the County urges CPW and DNR to continue to provide that comment and direction to the BLM on the draft EIS. In effect, it should be made clear that the BLM - PPH map (based on CPW's SWH map) should be better defined as a *Wildlife Consult Map* that should not be confused with actual habitat for which the BLM is to manage for the survival of the bird.

As a matter of background and in the context of the BLM's EIS, the County has analyzed CPW's SWH map and found it to be problematic if it is used for localized land use decisions. First, the habitat model designed by Dr. Mindy Rice was done so using vegetation data on a 1-kilometer scale (0.6 mile grid cells). In doing so, it inaccurately typed large amounts of vegetation that do not include any vegetation communities known to support Greater Sage Grouse such as pinion-juniper, fir, and aspen groves. Furthermore, numerous other criteria that are known to directly influence suitable greater sage-grouse habitats were, admittedly by design, excluded from the habitat model, including slope parameters, relevant landforms, percent canopy cover, etc. Again, this model approach is too coarse to be used as an effective local habitat management tool which Dr. Rice specifically notes in her paper.

Second, in the design of the SWH map, CPW has applied an arbitrary four-mile buffer (eight-mile diameter) around active leks. (The four mile distance is believed to be the distance from the lek where 80% of the hens will nest.) However, this distance also assumes the birds will be nesting in their commonly understood habitat as is commonly found to be true in large expanses of gently rolling sage brush communities in Wyoming, Montana, etc. Garfield County does not have these same expanses of rolling sage brush communities; conversely, the habitat is severely fragmented in a scattered patchwork of sage brush on hill tops intermixed with large areas of non-habitat vegetation communities such as aspen, conifer, pinion-juniper, etc. Moreover, the area in Garfield County also contains large areas of slopes (in excess of 30%) that are not known to support Greater Sage Grouse. So, the County opposes an arbitrary application of a four-mile buffer around an active lek in this landscape because it captures thousands of acres of non-habitat where development and activity could / should occur without requiring any involvement from government agency oversight.

Third, CPW's SWH map (which is used by the BLM as the PPH map) is based on the agency's "Occupied Range" map which appears to be an internal map maintained primarily by research staff and updated based on field-observations over time. This is problematic because the data used to inform this map is specific to individual professional opinion which may vary from time to time depending on individual field personnel and is not reproducible. In recent discussions with CPW staff, it became apparent that these opinions stray far from data that is cited in the literature from CPW biologists as to the accepted criteria for what defines habitat and where the Greater Sage Grouse are commonly located within that habitat.

In response to this, the County recently spent considerable resources to produce a highly accurate Suitable Habitat Map which is attached as ***Exhibit A*** to this letter. This map is a result of creating two distinct models (a weighted overlay model and a fuzzy overlay model). These models were driven by criteria developed from an exhaustive literature search using CPW's own researcher criteria (including slope, distance to forest, canopy cover, landforms and vegetation community). In addition, the Garfield County habitat model utilized a vegetation dataset that maps existing vegetation communities with a much higher degree of accuracy, based on performing a supervised image classification process on 2-meter cell resolution color-infrared photography. Moreover, in recent meetings with CPW to validate our mapping, it became clear that our mapping had a high degree of correlation to relevant / recent bird location data points collected by CPW's Dr. Brett Walker. In doing so, our model captured 92 percent of the bird locations within 100 meters of our habitat model. An important additional correlation is made with a high degree of accuracy when CPW's RSO map is overlaid on Garfield County's Suitable Habitat map which is attached as ***Exhibit B*** to this letter. It should also be understood; the County's Suitable Habitat map was created with a transparent process and is reproducible. To the contrary, after considerable effort, we found that the CPW SWH map is

not reproducible and is based on data that the agency refuses to release to the public in order that it is verified.

The net result proved that CPW's proposed SWH map has inaccurately mapped large areas of non-habitat (pinion-juniper, fir, and aspen groves) on the Roan Plateau in Garfield County as priority habitat. As understood in terms of acres, while CPW has mapped approximately 220,000 acres as priority habitat in their PPH map, Garfield County's Suitable Habitat map identifies only 59,093 acres of suitable habitat. This is a 73% reduction in habitat in Garfield County. Put another way, CPW's SWH map was developed with such a broad brush approach, it erroneously captured approximately 160,907 acres of land that does not have Greater Sage Grouse habitat characteristics supported by relevant peer-reviewed literature and 'data-verified' field observations. By doing so, it will have the practical effect of requiring a land owner to consult with CPW on projects that are clearly cited in areas of non-habitat.

We want to thank you for convening staff from both DNR and CPW and taking time to discuss these issues and providing clear direction regarding the intent and use of the Sensitive Wildlife Habitat map (BLM - PPH map) in the BLM's EIS. We appreciate your clarity and direction on how the SWH map is intended to be used as a tool for consultation only for projects within its borders and not specifically designed as an actual 'habitat' map to be interpreted as any form of NSO or otherwise by the BLM in developing land use policy. The County urges CPW and DNR to continue to provide this direction in their comments to the BLM on the draft EIS. In effect, it should be made clear that the BLM - PPH map (based on CPW's SWH map) should be better defined as a wildlife consult map that should not be confused with defining actual priority or general habitat for which the BLM is required to manage for the survival of the bird.

We look forward to continuing to work with you and CPW so that our collective comments to the BLM will be as aligned as possible. It is our hope that these comments are both realistic and effective to ensure protection of the bird and its habitat so that realistic policies are put in place by the BLM that help avoid a listing without severely impacting the socio-economics of northwest Colorado counties. Do not hesitate to contact us if you have any questions or comments.

Very truly yours,

John Martin, Chairman

Garfield County Board of County Commissioners

Mike Samson, Commissioner

Garfield County Board of County Commissioners

Tom Jankovsky, Commissioner

Garfield County Board of County Commissioners

Cc The Honorable John Hickenlooper, Governor, Colorado

The Honorable Scott Tipton, US House of Representatives

Representative Bob Rankin, State House of Representatives, Colorado

Representative Randy Baumgardner, State House of Representatives, Colorado

Steve Yamashita, Colorado Parks and Wildlife, Acting Director

James Cagney, BLM Northwest Colorado District Manager

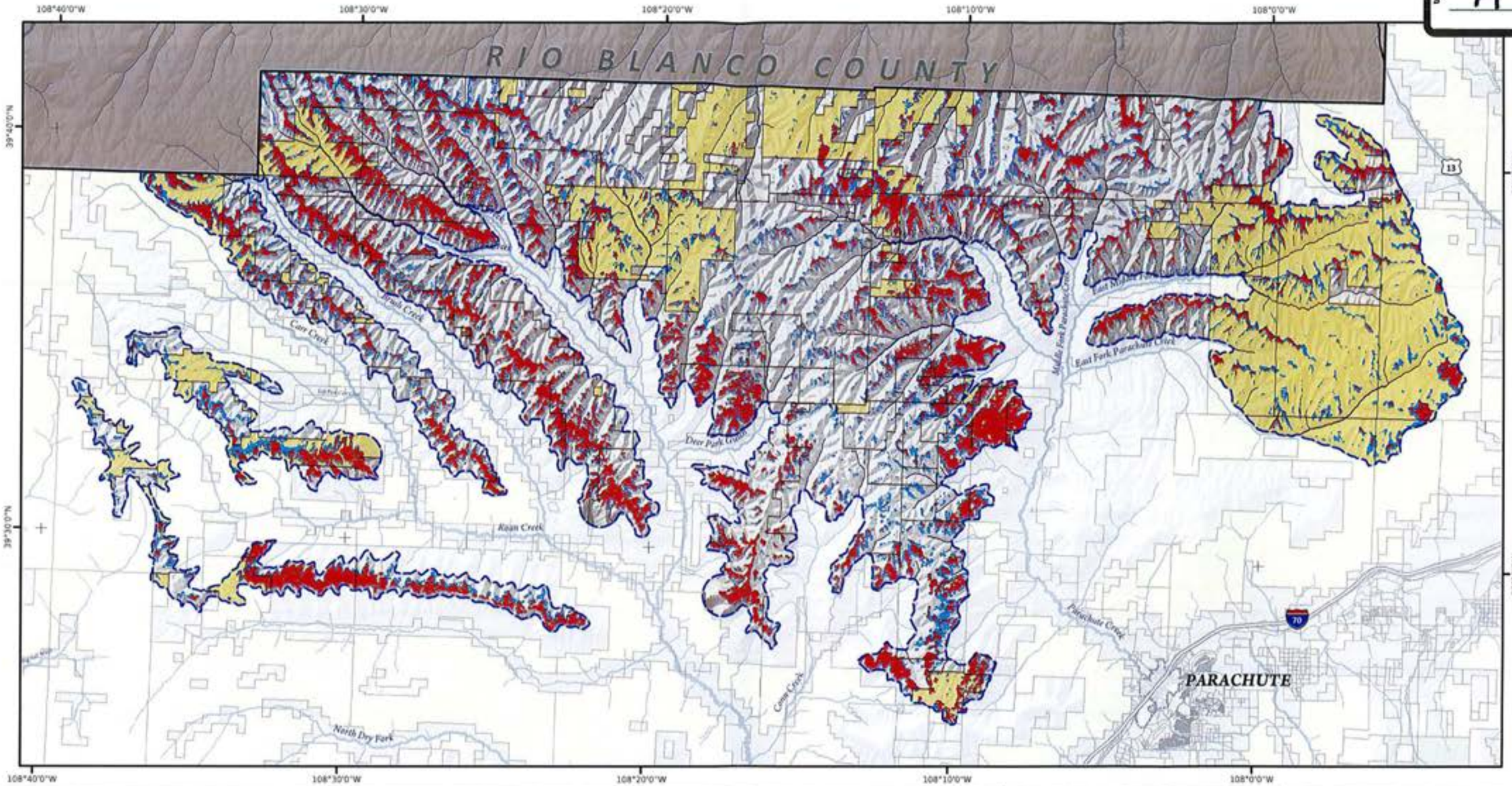
Andrew Gorgey, Garfield County Manager

Frank Hutfless, Garfield County Attorney

Fred Jarman, Director, Community Development Department

EXHIBIT

A



Analysis Area Boundary	220,967 Ac.	BLM Lands		Municipal Boundary	
Prioirty Habitat	31,070 Ac.	USFS Lands		County Boundary	
General Habitat	28,023 Ac.	Private Lands		Interstate	
				State Highway	

Disclaimer:
This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. The maps are distributed "AS-IS" without warranties of any kind, either expressed or implied, including but not limited to warranties of suitability to a particular purpose or use.

0 1 2 4 Miles

0 7,500 15,000 30,000 Feet

1 inch = 15,000 feet

Date: July 2013

PENDO Solutions

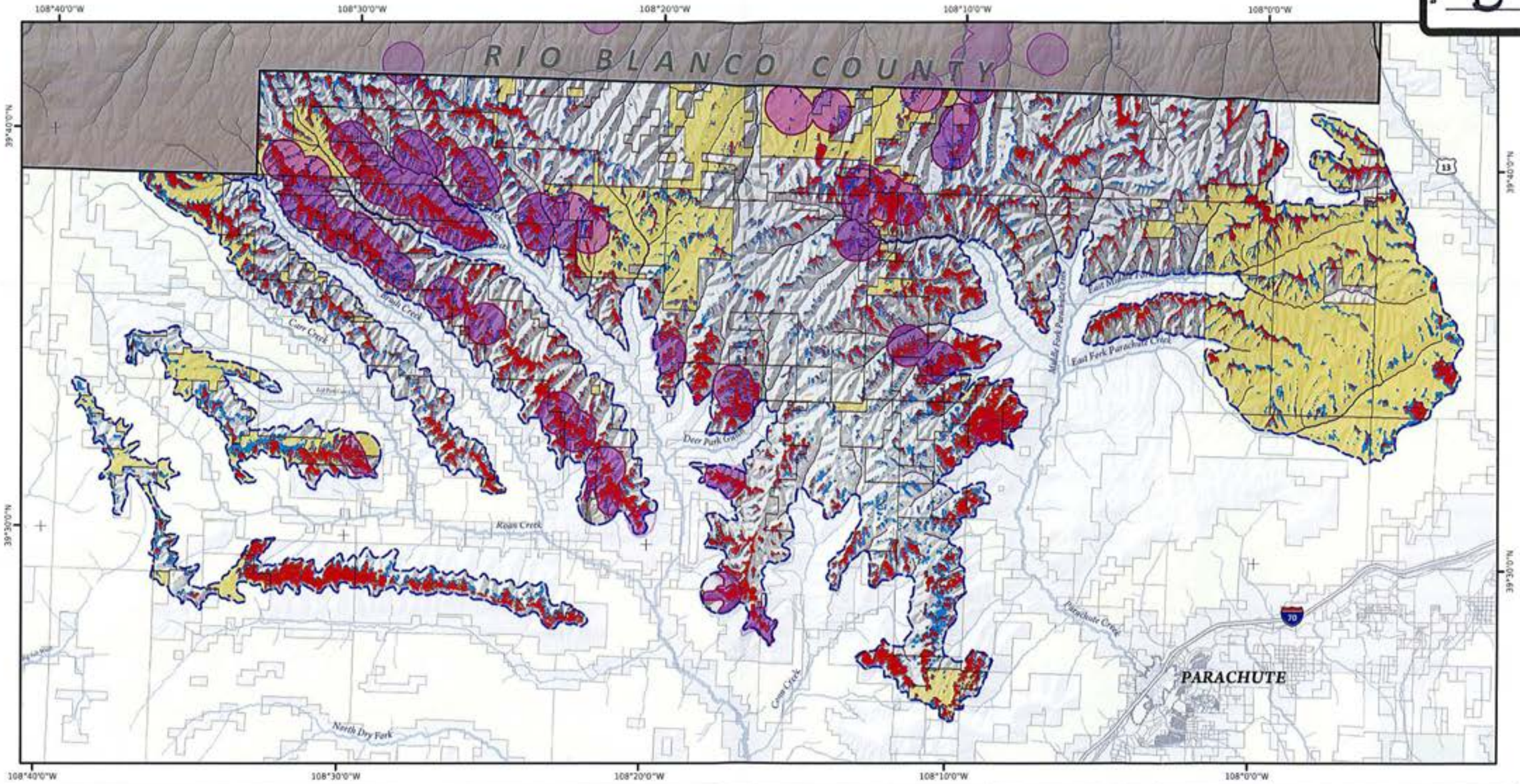
Garfield County

Modeled Habitats for Greater Sage Grouse

Suitable Habitat Results

[Model v1: Revised Vegetation]

EXHIBIT
B



Analysis Area Boundary	220,967 Ac.	BLM Lands		Municipal Boundary	
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Greater Sage-grouse Restricted Surface Occupancy				State Highway	

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1 inch = 15,000 feet

Date: July 2013
PENDO Solutions

Garfield County

Modeled Habitats for Greater Sage Grouse

Suitable Habitat Results
[Model v1: Revised Vegetation]

Colorado River Fire Rescue

Serving the Communities of New Castle, Rifle & Silt

Telephone (970) 625-1243 • Fax (970) 625-2963 • www.crfr.us
1850 Railroad Avenue • Rifle, Colorado 81650

November 20, 2013

Mr. Jim Cagney
Northwest Colorado Director
Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

RE: Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement

Dear Mr. Cagney,

The Colorado River Fire Rescue is a Regional Fire Authority (RFA) established in 2012. The RFA is comprised of the Rifle Fire Protection District, founded in 1976 and Burning Mountains Fire Protection District. We are dedicated to protection life, home and property through leadership, education and partnerships. Safety is our highest priority. One of those partnerships includes the Bureau of Land Management.

We serve approximately 780 square miles in Garfield County from mile marker 81.5 on I-70 to mile marker 108 on I-70, west to east, and County line to County line, not including U.S. Forest Service property in the jurisdiction. However, we do cover EMS calls in those areas North and South, as well as, all Bureau of Land Management (BLM) land within our jurisdiction.

Since December, 2011, the Bureau of Land Management has been preparing a Draft Environmental Impact Statement (DEIS) for the Greater Sage-Grouse to amend and update your Land Use Plan and Land Management Plan. As Title 32 Special Districts for Fire and Rescue created by the Colorado Legislature, we hereby notice the BLM of your failure to coordinate the DEIS with our RFA.

Our charge is to protect the health, safety and welfare of the people, specifically from fire hazards. In order to carry out this charge, we have policies that require human life be prioritized above all other concerns. None of the policies related to wildfire in any of the alternatives carried forward in the DEIS were coordinated with our RFA. As a result, there are unresolved conflicts with our policies that have not been addressed in the document and brought to the public light for further consideration by the public and decision makers. The impacts of these alternatives to human life are devastating, but they

> have not been considered and, therefore, could not be properly weighed in the analysis as to which of the alternatives would be preferable.

Because of this failing, the RFA formally requests that a supplemental statement be prepared to ensure that the environmental consequences of the four alternatives are properly analyzed by including the RFA, indirect and cumulative impacts on our RFA and the health and safety of the people we protect.

Failure to Coordinate:

The Federal Land Policy and Management Act specifically directs your agency to coordinate "planning" with local governments (43 USC 1712(c)(9)). Both Rifle Fire Protection District and Burning Mountains Fire Protection District, which make up the Colorado River Fire Rescue Regional Fire Authority, are political subdivisions of the state of Colorado entitled to coordination with your agency in your planning efforts.

The National Environmental Policy Act (NEPA) (42 USC 4321) and corresponding regulations requires coordination with local governments to "improve and coordinate Federal plans, functions, programs and resources." The RFA is entitled to have its policies considered and resolved by you prior to the release of the now public DEIS.

Your agency's planning rules require that you coordinate this effort with the RFA as well, making it clear that you have a duty to ensure this coordination takes place with us above and beyond the public process.

> "In addition to the public involvement prescribed by Sec. 1610.2, the following coordination is to be accomplished with other Federal agencies, state and local governments, and federally recognized Indian tribes. The objectives of the coordination are for the State Directors and Field Managers to:

(1) Keep apprised of non-Bureau of Land Management Plans;
(2) Assure that BLM considers those plans that are germane in the development of resource management plans for public lands;
(3) Assist in resolving, to the extent practicable, inconsistencies between Federal and non-governmental plans;
(4) Provide for meaningful public involvement of other Federal agencies, State and local government officials, both elected and appointed, and federally recognized Indian tribes, in the development of resource management plans, including early public notice of final decisions that may have a significant impact on non-Federal lands;" (43 CFR 1610.3-1)

Further, in the Federal Register notice initiating the preparation of this environmental impact statement (Vol. 76, No. 237/ Friday, December 9, 2011), your agency is directed to make the proposed conservation measures consistent with our policies:

> "As described by law and policy, the BLM and FS will strive to ensure that conservation measures are as consistent as possible with other planning jurisdictions within the planning area boundaries."

No such effort has been made.

Even though the laws and policies that direct your agency to prepare this DEIS require you to do so in coordination with our RFA, for the purpose of resolving conflicts with our RFA, to ensure consistency with our policies, and ultimately to ensure that the health, safety and welfare of the public is fully considered in this process, your agency has failed to do so. Yet, we now have a public document issued for review without these critical concerns being considered. For this reason a supplemental statement should be prepared taking into account the impact of these proposed conservation measures on the health, safety and welfare of the people and in coordination with the Colorado River Fire Rescue Regional Fire Authority.

Failure to Consider Financial Impact to RFA

Our RFA is made up of a combination of federal land and private property, with nearly 77.5 percent of our revenue being directly attributed to oil and gas exploration.

Specifically, should the BLM enact the current alternatives being considered and restrict or prevent oil and gas exploration and/or production in our County and RFA, irreparable harm would come to the RFA and the citizens we serve. All of the action alternatives in the DEIS will severely curtail oil and gas production in our RFA. Even if only half of the production is stopped, our RFA would not be able to survive. If future development of these lands is stopped, our RFA will not survive as current operations have a finite life span. Additional resources must be developed today in order ensure we have sufficient revenue to continue to operate and provide the fire protection and emergency services entitled to our citizens.

Last year, revenue directly attributed from oil and gas production to the RFA was $6,881,877. As stated above, this was 77.5% of our total revenue. The income we have derived from oil and gas production within our RFA has allowed us to hire 47 fulltime firefighters/employees and 27 part-time employees. In addition, we have 40 "on-call" volunteer firefighters. This level of staffing is necessary to ensure we can protect the lives, homes, lands and wildlife within our 780 square-mile RFA. Without this revenue, we could not properly respond to emergencies and this area would be vulnerable to unforeseen disasters.

Since our inception in 2012, nearly 70 percent of our operations, which include our facilities, fire equipment and salaries, has been funded from oil and gas revenues. For the past 10 years, revenues from oil and gas have funded seven fire stations and over 50 pieces of apparatus and equipment for our RFA. And, just as our RFA has benefited from oil and gas production, so have the BLM and U.S. Forest Service. The fact of the matter is, all of the inter-agency fire fighting resources for both federal agencies are housed in a building owned by the RFA that was built with energy impact grants and local/federal funding from oil and gas revenues.

This equipment makes it possible for us to have the resources necessary to protect our citizens and our land from fires and emergencies. Without these resources, we could not properly respond to emergencies and fulfill our charge from the Legislature.

Our support, however, goes beyond protecting citizens and their private property. It also protects the federal lands and ultimately the greater sage-grouse. Our RFA is the first responder for all emergencies, including fires that are initiated on federal lands as well as private. When we arrive on the scene of a fire emergency, we assess whether it is on private or federal lands. If it is on federal lands, we report this to the BLM. Through our Annual Operating Plan (AOP), we have a mutual aide agreement with the BLM that allows us to extinguish the fire immediately if so authorized by the agency.

Portions of the Roan Plateau, habitat for the greater sage-grouse, are within our jurisdiction. If a single stump fire or any other fire hazard was in this area, we could act immediately to protect the grouse if so authorized by the agency on federal land, rather than losing valuable time waiting for BLM to arrive with its resources.

Additionally, we immediately extinguish fires of private property when we arrive on the scene, which your agency is precluded from doing. As your DEIS points out, much of the greater sage grouse habitat is on private property. Without our continued services, great harm could come to this species. Yet, this was not considered or analyzed in the DEIS.

The Roan Plateau is also where the primary oil and gas production takes place within our RFA. Should production be curtailed, as is being proposed through all the action alternatives, we will not be able to provide the normal emergency services we now provide to the federal government or the people, leaving all fire suppression on federal land to be provided solely by your Agency, and none available to those on private land.

If our budget is diminished as a result of the greater sage-grouse conservation measures, not only will the grouse be harmed, but the people as well since we provide all structural, emergency medical, tech rescue, hazardous material and other responses. No consideration of this impact was discussed in the DEIS. No discussion was made with us as to how you will resolve this conflict. None of this harm has been brought to the attention of the public or decision makers making the DEIS incomplete and fatally flawed. A supplemental statement should be prepared to fully analyze the impact of the action alternatives on the financial resources of our RFA and other Special Fire Districts and how this will jeopardize the health and safety of the people.

Unresolved Conflicts with RFA Policy

The DEIS is required to discuss the environmental consequences of all the alternatives in comparative form so that the public and decision makers can properly weigh the impacts of conserving habitat for the greater sage-grouse. Included in this analysis is "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources …" (40 CFR 1502.16).

This includes analysis of the direct effects, indirect effects and cumulative effects. It also specifically directs that this analysis include conflicts with local government objectives.

> "Possible conflicts between the proposed action and the objective of Federal, regional, State, and local … land use plans, policies and controls for the area concerned." (40 CFR 1502.16(c))

Further, "Where an inconsistency exists, the statement should describe to the extent to which the agency would reconcile its proposed action with the plan or law." (40 CFR 1506.2(d))

Very concerning to the RFA is the policy being proposed in the DEIS to prioritize fire resources to be pre-positioned for the protection of greater sage-grouse during critical fire weather days. This is found under the "Required Design Features" (Appendix I-14) for Alternative B, which is the National Technical Team (NTT) conservation measures the Secretary of the Department of Interior has mandated be included as an alternative in the analysis. It states that the preferred policy of the DOI is, "On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in GRSG habitat areas."

This places the sage-grouse above people and is in direct conflict with our RFA's policies, which places life and property above all other considerations. The preferred alternative D also leaves the door open for this conflict. It requires that the agency "Pre-position fire suppression resources based on all resource values-at-risk." (Appendix I-14) Alternative D makes protecting the sage-grouse the highest value, giving the species preference over the protection of life and property.

As a practical matter, if the protections under the BLM Plan are put into place to protect the sage grouse, that will minimize, and potentially eliminate, the revenue sources we utilize to extinguish fires in our jurisdiction. This places undue burden on our RFA to protect the life and property of the people if the BLM pre-positions its fire resources in the remote areas that contain grouse habitat.

Currently, we depend on and enjoy a mutually beneficial relationship with the BLM fire operations and our jurisdiction. If a major fire event occurs, we currently call on the BLM's air drop services and sometimes ground services to help us protect the community. If these resources are pre-positioned in remote areas or simply unavailable to us because they have been pre-designated to protect the sage-grouse, our ability to protect human life from catastrophic fire is severely curtailed.

This consideration was never taken into account in the DEIS, nor was the conflict such policy creates with our RFA ever discussed or resolved. It was through our communication with Garfield County that we were made aware of the BLM's proposed policies. It is of greatest concern that the local governments most affected by this potential change in policy were not informed directly by the BLM nor coordinated with on this and other issues.

Failure to Consider Reasonable Alternative:

Earlier this year, Garfield County adopted the Garfield County Greater Sage-Grouse Conservation Plan. This Plan was developed to ensure the conservation measures implemented were appropriate for the unique landscape and culture of the county, which is unlike any other habitat in the 11 state ranges of the grouse. The County also developed this Plan so there would be coordination among all of the agencies and governments with jurisdictional responsibilities for the habitat and the species. This includes coordination with our RFA.

NEPA regulations require your agency to "study, develop and describe alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." (40 CFR 1507.2) It is concerning to us that after reviewing the Garfield County Plan, it was not carried forward as a reasonable alternative for the lands within the jurisdictional boundaries of Garfield County. The Plan, properly compared with the other alternatives, provides the most protection to the greater sage-grouse, while also ensuring the productive use of the land will continue. Under the Garfield County Plan, our RFA could continue to operate fully funded well into the future and continue to ensure the protection of our citizens, their property and the greater sage-grouse from fire events. The County Plan demonstrates that the grouse and the people can be fully protected without sacrificing human protection. It should have been fully considered and not summarily dismissed.

Rigorous analysis and comparison of the Garfield County Plan would have helped to sharply define the issues, "providing a clear basis of choice among options by the decision makers and the public," (40 CFR 1502.14) as required under the NEPA rules. This currently does not exist in the comparison of alternatives carried forward. The action alternatives (B-D) vary only slightly from each other. They are all a variation of the NTT approach mandated to be included by the Secretary of Interior as the policies preferred. Alternative B is the NTT alternative where these conservation measures are specifically carried forward. Alternative C is a more restrictive version of these same NTT polices. Alternative D is a slightly less restrictive alternative based on the same NTT principles. There are no sharply defining issues that show clear distinctions between the three action alternatives. They all carry forward the NTT approach in some fashion.

Only the Garfield County Plan offers any distinction in how to develop and implement conservation measures for the protection of the grouse. However, you failed to analyze or consider this reasonable and preferable alternative.

Summary

For this reason, as well as, the others stated above, a supplemental statement should be prepared to properly consider the local impact of the proposed action on the human and natural environment. This supplemental statement should be prepared in coordination with our RFA for the purpose of resolving the conflicts with our policies and to ensure all reasonable alternatives are considered which would include a rigorous analysis of the Garfield County Greater Sage-Grouse Conservation plan.

If implemented, the proposed action would represent a violation of BLM's multiple use mandate and a violation of the public trust in that agency to protect human life and property as its first priority. In addition, the exclusion of coordinating with the Colorado River Fire Rescue

Regional Fire Authority and not even considering the restrictions your actions will place on our ability to assist your agency is inconceivable and inexcusable.

Just as it is the BLM's mission to "sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations," it is our mission to protect the health, safety and welfare of our citizens during emergencies and disasters.

Your failure to coordinate your DEIS with our RFA has placed us in a very difficult and dangerous situation should you not consider our needs. We appreciate how the BLM and our RFA currently work together. However, the proposed action will harm our current working relationship and could be the demise of our RFA, as well as, be the direct cause of potential fire disasters in our jurisdiction. We implore the BLM to delay approval of the proposed action and instead prepare a supplemental statement which takes these concerns into account.

These comments are only a summary of our concerns and not a complete analysis of the conflicts we find in the DEIS. Also, please include as a part of our comments those submitted by the Garfield County Board of Commissioners.

Sincerely,

Rex Rhule
Board President

Michael C. Morgan
Fire Chief

grand river Health

HOSPITAL SERVICES | FAMILY MEDICINE | WOMEN'S HEALTH | INTERNAL MEDICINE | SPECIALTY SERVICES
LONG TERM CARE | OCCUPATIONAL HEALTH SERVICES | SCHOOL BASED HEALTH

November 19, 2013

Mr. Jim Cagney
Northwest Colorado Director
Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

RE: Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement

Dear Mr. Cagney,

In 1961, voters approved the formation of a special taxing district known today as the Grand River Hospital District (District) to ensure the availability of local healthcare. One year later, the District opened Clagett Memorial Hospital and began serving patients.

Since that time, our District serves families and citizens in Garfield County through the following facilities:

- Grand River Hospital and Medical Center;
- Grand River Medical Clinics in Rifle;
- Battlement Mesa Medical Center;
- E. Dene Moore Care Center (our long-term care facility in Rifle);
- Grand River Health and Safety Center (our occupational health and physical therapy facility in Battlement Mesa);
- Grand River Student Health Center in Parachute and Rifle servicing local school districts.

Grand River Hospital District serves 27,000+ individuals within our 1,500 square-mile service territory. The District accomplishes this through the dedication of over 300 employees and over 55 affiliated physicians.

The Grand River Hospital District provides:

- Emergency Services as a trauma level IV with emergency physicians, general surgeons, nurses and other medical specialists;

- Acute Care round-the-clock for patients with complex medical conditions or surgical concerns;
- Imaging Services, which include the nation's first revolutionary 3D breast tomosynthesis mammography technology providing diagnostic accuracy for women, x-rays, bone mineral density, ultrasound, echocardiography, CT, MRI and nuclear medicine;
- Laboratory Services, Mayo Clinic affiliated, that provide phlebotomy, histology, blood bank, chemistry, immunochemistry, hematology/urinalysis, coagulation, newborn testing and microbiology;
- Cardiopulmonary Services that provide respiratory specialist in airway management and administer diagnostic, non-invasive tests such as an EKG, pulmonary function test and treadmill stress tests;
- Perioperative Services that perform relevant diagnostic tests prior to any surgical procedure, administer IVs and any required advance medications, and after surgery, provide any Post Anesthesia Care; and
- Pharmacy Services that are patient focused and include medication delivery, therapeutic recommendations and promotion of optimal drug therapy

The District is governed by an elected Board of Directors made up of seven dedicated individuals who care about the well-being of the community.

It has come to our attention that the Bureau of Land Management (BLM) has been preparing a Draft Environmental Impact Statement (DEIS) for the Greater Sage-Grouse to amend and update your Land Use Plan and Land Management Plan since December, 2011. As a political subdivision of the State of Colorado, we hereby notice the BLM of your failure to coordinate the DEIS with our District and our seven-member Board of Directors.

Our charge is to provide the best affordable healthcare to the citizens of this region. In order to carry out this charge given to us by the citizens of this community, we have the responsibility to provide the community we serve with exceptional health care now and into the future that's affordable and efficient.

None of the proposed conservation measures for the Greater Sage-Grouse carried forward in the DEIS were coordinated with our District. As a result, the harm that will come to our District as a result of these policies have not been addressed in the document and brought to the public light for further consideration by the public and decision makers. The impacts of these alternatives to human life are devastating, but they have not been considered and, therefore, could not be properly weighed in the analysis as to which of the alternatives would be preferable.

Because of this failing, the Grand River Hospital District formally requests that a supplemental statement be prepared to ensure that the environmental consequences of the four alternatives are properly analyzed by including the direct, indirect and cumulative impacts on our District and the health and safety of the people we protect.

Failure to Coordinate:

Our District falls squarely within the jurisdictional boundaries of your planning area and we are dependent upon and impacted by the use of federal lands managed by your agency. Therefore, every policy you implement has a direct impact on all the services our District provides.

Your agency is specifically directed through your planning rules to take the impacts to our District into account in your analysis presented in the DEIS.

> *"The development, approval, maintenance, amendment and revision of resource management plans will provide for public involvement and shall be consistent with the principles described in section 202 of the Federal Land Policy and Management Act of 1976. Additionally, the impact on local economies and uses of adjacent or nearby non-Federal lands and on non-public land surface over the federally-owned mineral interests shall be considered." (43 CFR 1601.0-8)*

Section 202 of the Federal Land Policy and Management Act includes the statutory direction for your agency to coordinate "planning" with local governments (43 USC 1712(c)(9)). As a political subdivision of the State of Colorado, the Grand River Hospital District is entitled to coordination with your agency in your planning efforts.

The National Environmental Policy Act (NEPA) (42 USC 4321) and corresponding regulations requires coordination with local governments to "improve and coordinate Federal plans, functions, programs and resources." The District is entitled to have its policies and economic effects considered and resolved by you prior to the release of the now public DEIS.

Even though the laws and policies that direct your agency to prepare this DEIS require you to do so in coordination with the District, for the purpose of resolving conflicts with our District, to ensure consistency with our policies, and ultimately to ensure that the health and welfare of the public is fully considered in this process, your agency has failed to do so.

As a result, the direct, indirect and cumulative impacts the proposed action will have on our District have not been considered, analyzed so that these impacts can be weighed with the benefits and negative effects of this action. For this reason, a supplemental statement should be prepared taking into account the impact of these proposed conservation measures on the health and welfare of the people of our community in coordination with our District.

This analysis is not something that should be done at a later date when you prepare site specific environmental statements. The policies that will impact our District are being considered now, and will be put into place through this environmental statement. Therefore the harm that will come to the District should be considered in this analysis.

Economic Facts and Impacts You Failed to Consider

In 2012, the Grand River Hospital District received $15,892,975 in tax revenues attributable to oil and gas production in Garfield County. Land within the jurisdiction of our District had a total assessed value of $3,211,857,600, of which $2,839,552,470 was directly attributable to oil and

gas resulting in the percentage of 88.41% or $15,892,975 of our total District property tax revenues.

This obviously is a major source of our income and any curtailing of oil and gas production in Garfield County will have devastating effects to our District and bring economic destruction to our community and our ability to provide affordable health care.

In fact, revenues to our District, generated by oil and gas production, allowed us to: build the Rifle campus, which includes the hospital, in 2003; build the Medical Office building and conference center in 2009; build our new Medical Office Building currently being constructed in Battlement Mesa; and, create the Occupational Health and Safety Center.

In 2009, Grand River Hospital District attempted to pass a bond issue to build a new care center, but that effort failed. There are plans to go before the voters again in 2017, to attempt to pass another bond issue to build an OB unit, ICU and new care center. Even if the bond issue passes, it would only provide enough revenue for these projects, but only if there is continued oil and gas production activity in the region.

Without that production, any future growth of our medical campus and services available for our community in western Garfield County will greatly depend upon the continued production of oil and gas in our County.

If our budget is diminished as a result of the greater sage-grouse conservation measures, not only will the grouse be harmed, but the people and our District will be irreversibly harmed as well. No consideration of this impact was discussed in the DEIS. No discussion was made with us as to how you will resolve this conflict. None of this harm has been brought to the attention of the public or decision makers making the DEIS incomplete and fatally flawed.

A supplemental statement should be prepared to fully analyze the impact of the action alternatives on the financial resources of our District and how this will jeopardize the health and welfare of our patients and our citizens.

Failure to Consider Reasonable Alternative:

Earlier this year, Garfield County adopted the Garfield County Greater Sage-Grouse Conservation Plan. This plan was developed to ensure the conservation measures implemented were appropriate for the unique landscape and culture of the county, which is unlike any other habitat in the 11 state ranges of the grouse. The county also developed this plan so that there would be coordination among all of the agencies and governments with jurisdictional responsibilities for the habitat and the species. This includes coordination with our District.

NEPA regulations require your agency to "study, develop and describe alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." (40 CFR 1507.2) It is concerning to us that after reviewing the Garfield County Plan, it was not carried forward as a reasonable alternative for the lands within the jurisdictional boundaries of Garfield County.

The plan, properly compared with the other alternatives, provides the most protection to the greater sage-grouse, while also ensuring the productive use of the land will continue. Under the Garfield County Plan, our District could continue to operate from current funds derived from oil and gas exploration and production well into the future and continue to ensure our patient's health needs, as well as, protect the greater sage-grouse. This plan demonstrates that the grouse and the people can be fully protected without sacrificing human needs and protection. It should have been fully considered and not summarily dismissed.

Rigorous analysis and comparison of the Garfield County plan would have helped to sharply define the issues, "providing a clear basis of choice among options by the decision makers and the public," (40 CFR 1502.14) as required under the NEPA rules. This currently does not exist in the comparison of alternatives carried forward. The action alternatives (B-D) vary only slightly from each other.

They are all a variation of the NTT approach mandated to be included by the Secretary of Interior as the policies preferred. Alternative B is the NTT alternative where these conservation measures are specifically carried forward. Alternative C is a more restrictive version of these same NTT polices. Alternative D is a slightly less restrictive alternative based on the same NTT principles.

There are no sharply defining issues that show clear distinctions between the three action alternatives. They all carry forward the NTT approach in some fashion. Only the Garfield County Plan offers any distinction in how to develop and implement conservation measures for the protection of the grouse.

However, you failed to analyze or consider this reasonable and preferable alternative.

Summary

For this reason, as well as, the others stated above, a supplemental statement should be prepared to properly consider the local impact of the proposed action on the human and natural environment. This supplemental statement should be prepared in coordination with our District for the purpose of resolving the conflicts with our policies and to ensure all reasonable alternatives are considered, which would include a rigorous analysis of the Garfield County Greater Sage-Grouse Conservation Plan.

If implemented, the proposed action would represent a violation of BLM's multiple use mandate and a violation of the public trust in that agency to protect human life and property as its first priority.

In addition, the exclusion of coordinating with the Grand River Hospital District and not even considering the restrictions your actions will place on our ability to provide adequate and quality health needs of our citizenry is inconceivable and inexcusable.

Just as it is the BLM's mission to "sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations," it is our mission to provide the best healthcare for our citizens at the most reasonable and efficient cost possible.

Your failure to coordinate your DEIS with our District has placed us in a very difficult and dangerous situation should you not consider our needs. We implore the BLM to delay approval of the proposed action and instead prepare a supplemental statement which takes these concerns into account.

These comments are only a summary of our concerns and not a complete analysis of the conflicts we find in the DEIS. Also, please include as a part of our comments those submitted by the Garfield County Board of Commissioners.

Sincerely,

James C. Coombs, Jr.
Chief Executive Officer

Date November 14, 2013

Mr. Jim Cagney
Northwest Colorado Director
Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

RE: Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement

Dear Mr. Cagney,

The Town of Parachute was incorporated in 1908, and is a political subdivision of the State of Colorado. We are a Home Rule Municipality, effective May 18, 2007, and as such, enact and provide for the enforcement of all town ordinances necessary to protect the life, health, safety and property of our citizens.

It has come to our attention that the Bureau of Land Management (BLM) has been preparing a Draft Environmental Impact Statement (DEIS) for the Greater Sage-Grouse to amend and update your Land Use Plan and Land Management Plan since December, 2011. As a political subdivision of the State of Colorado, we hereby notice the BLM of your failure to coordinate the DEIS with our Town and our seven-member Board of Trustees.

Our charge is to protect the health, safety and welfare of the citizens of our Town. In order to carry out this charge, we have policies and ordinances that require human life and economic well-being of our citizens to be prioritized above all other concerns.

None of the proposed conservation measures for the Greater Sage-Grouse carried forward in the DEIS were coordinated with our Town. As a result, the harm that will come to our Town as a result of these policies have not been addressed in the document and brought to the public light for further consideration by the public and decision makers. The impacts of these alternatives to human life are devastating, but they have not been considered and, therefore, could not be properly weighed in the analysis as to which of the alternatives would be preferable.

Because of this failing, the Town of Parachute formally requests that a supplemental statement be prepared to ensure that the environmental consequences of the four alternatives are properly analyzed by including the direct, indirect and cumulative impacts on our Town and the health and safety of the people we protect.

A. The BLM Failed to Coordinate its Planning Efforts and this DEIS with Parachute:

Although the Town of Parachute is not within the jurisdictional boundaries of your planning area, we are dependent upon and impacted by the use of federal lands managed by your agency. Therefore every policy you implement has a direct impact on all the services our Town provides.

Your agency is specifically directed through your planning rules to take the impacts to our town into account in your analysis presented in the DEIS.

> *"The development, approval, maintenance, amendment and revision of resource management plans will provide for public involvement and shall be consistent with the principles described in section 202 of the Federal Land Policy and Management Act of 1976. Additionally, the impact on local economies and uses of adjacent or nearby non-Federal lands and on non-public land surface over the federally-owned mineral interests shall be considered." (43 CFR 1601.0-8)*

Section 202 of the Federal Land Policy and Management Act includes the statutory direction for your agency to coordinate "planning" with local governments (43 USC 1712(c)(9)). As a political subdivision of the State of Colorado, the Town of Parachute is entitled to coordination with your agency in your planning efforts.

The National Environmental Policy Act (NEPA) (42 USC 4321) and corresponding regulations requires coordination with local governments to "improve and coordinate Federal plans, functions, programs and resources." The Town of Parachute is entitled to have its policies and economic effects considered and resolved by you prior to the release of the now public DEIS.

Even though the laws and policies that direct your agency to prepare this DEIS require you to do so in coordination with Parachute, for the purpose of resolving conflicts with Parachute, to ensure consistency with our policies, and ultimately to ensure that the health, safety and welfare of the public is fully considered in this process, your agency has failed to do so.

As a result, the direct, indirect and cumulative impacts the proposed action will have on our Town have not been considered, analyzed so that these impacts can be weighed with the benefits and negative effects of this action. For this reason a supplemental statement should be prepared taking into account the impact of these proposed conservation measures on the health, safety and welfare of the people and in coordination with our Town.

This analysis is not something that should be done at a later date when you prepare site specific environmental statements. The policies that will impact our town are being considered now, and will be put into place through this environmental statement. Therefore, the harm that will come to our Town should be considered in this analysis.

B. Economic Facts and Impacts You Failed to Consider

1. Direct Effects you Failed to Consider

In 2012, the Town of Parachute received $111,829 in tax revenues directly attributable to oil and gas production in Garfield County. Land in the Town of Parachute had a total assessed value of $29,567,220, of which $8,231,070 was directly attributable to oil and gas resulting in the percentage of 27.84% or $111,829 of our total Town revenues. The Town of Parachute would not be able to continue to function without these tax revenues.

In 2013, the Town of Parachute received $117,600 from Federal Mineral Lease and $144,696 in Severance Tax Direct Distribution for a total of $322,296.

Under the Federal Mineral Leasing Act, approximately 49 percent of those rentals and royalties from mineral production on federal lands are returned back to the state of origin for planning, construction and maintenance of public facilities in areas socially and economically impacted by the mineral leasing development that occurs on federal lands.

The General Assembly of Colorado has determined that a portion of the state's share of these federal royalty payments are to be directly distributed back to those counties, municipalities and school districts impacted by mineral production on federal lands.

Two factors determine the allocation of federal mineral lease revenue to each county pool for further distribution, of which our Town is a recipient. Those two factors include: 1) the proportion of residents in the county employed in mineral extraction, and 2) the proportion of the moneys credited to the mineral leasing fund generated in the county to the total generated statewide.

From those county "pools," further allocation is determined and our Town receives a proportional share based on: 1) the proportion of residents in the unincorporated areas or municipalities employed in mineral extraction to the total employed in the county; 2) the proportion of population of unincorporated areas or municipalities to the total county population; and 3) the proportion of road miles in unincorporated areas or municipalities to the total road miles in the county.

Severance tax funds are distributed to counties and municipalities based on factors of mining and well permits, mineral production, population and road miles to determine how direct distribution funds are allocated to municipalities and counties.

Fifty percent of the State's receipts from the severance tax on minerals and mineral fuels are credited to the Local Government Severance Tax Fund. The State allocates 70 percent of these funds to local governments through discretionary grants and loans. The remaining 30 percent is placed in a county pool and distributed directly to municipalities and counties economically and socially impacted by mineral production based on similar factors under the Federal Mineral Leasing Act above.

The Town of Parachute receives almost one-third of our annual revenue directly from oil and gas production on the lands within your planning jurisdiction. The conservation measures proposed in the DEIS will either diminish or eliminate this production and correspondingly our revenue and ability to provide sufficient services. While the DEIS attempts to consider this impact at the county level, it fails to even address this impact at the most basic and local level where the people will be directly impact; our town.

2. Indirect Effects You Failed to Consider

Another major portion of our revenue is from the sales tax generated by those who reside and conduct business in our town as a function of servicing the oil and gas industry.

We have hundreds of citizens employed in the energy industry that live and work in Parachute. This not only impacts our tax revenues, but the multiplier effect of their families and spouses who work and shop in our Town bring much more in sales tax revenues that would be lost to our Town if your proposed action were to be approved.

While the DEIS attempts to quantify this impact at the County level, it fails to consider the impact at the local level, specifically as it will harm our Town. However, even at the County level there is no discussion as to "how" the loss of jobs and revenue will impact the community.

For instance, the discussion of the "Impact on Tax Revenues and Payments to States and Counties," is less than one page in the 1,000 page document. The most robust part of this discussion is the following paragraph:

> *"Other than fiscal revenues from federal royalties and state severance taxes, other revenue sources such as real property taxes, municipal sales and use taxes, revenues from leases and fees, whether through mining, recreation or grazing activities, would all tend to decrease with the lesser economic activity expected in the study area under Alternatives B, C, and D when compared to Alternative A, with the lease revenues expected under Alternative C."*

We are struggling to see how this discussion conveys the true impact that a 27% reduction in our revenue will have on our police services, utility services, health care services, and many other critical and essential services to our community. This is the pertinent and real impact of the potential action that NEPA calls to be brought forward. The NEPA analysis was not meant to be a useless stack of statistics and data. However, that is what this analysis has become.

3. Cumulative Effects You Failed to Consider

In addition, the Town of Parachute is home to the second largest field office in the U.S. for Encana Oil and Gas (USA) Corporation. Encana is investing billions of dollars into the local economies of Garfield and Rio Blanco Counties, as well as, the Town of Parachute. These investments directly affect our community and our city budget.

Encana figures it will double the number of wells it has on Colorado's Western Slope during the next several years due to a $3.64 billion joint venture the company signed in late 2012, with Nucor Energy Holdings, one of the largest steel manufacturers in the nation.

Through this agreement, Encana expects to invest approximately $542 million over the next three years in new wells in Colorado's Piceance Basin near Rifle, and about $3.64 billion over the life of the agreement, estimated to last between 13 and 22 years.

This means more drilling rigs and crews operating in the Piceance Basin, which means more business and families locating in our Town. Currently, Encana has nearly 1,000 employees and contractors working in Colorado, with nearly 25 percent of those living and working in the Town of Parachute.

If the proposed action is approved, the future production Encana is now planning for will be stopped. Not only will we miss the opportunity to improve the quality of our services with a more robust budget, but we will also risk the immediate loss of a potential 250 residents, people who will be forced to leave our town because their job has been killed through your efforts to protect the greater sage-grouse. This is precisely the analysis you should be forthrightly presenting in the DEIS. The true harm that will come to our people should be compared and

weighed with the benefits of saving the grouse. NEPA requires this analysis to be made and specifically directs agencies not to bury or avoid discussing these truths.

No consideration of this impact was discussed in the DEIS. No discussion was made with us as to how you will resolve this conflict. None of this harm has been brought to the attention of the public or decision makers making the DEIS incomplete and fatally flawed.

A supplemental statement should be prepared to fully analyze the impact of the action alternatives on the financial resources of our Town and how this will jeopardize the health and safety of our citizens.

C. Failure to Consider Reasonable Alternative:

Earlier this year, Garfield County adopted the Garfield County Greater Sage-Grouse Conservation Plan. This plan was developed to ensure the conservation measures implemented were appropriate for the unique landscape and culture of the county, which is unlike any other habitat in the eleven state ranges of the grouse. The county also developed this plan so that there would be coordination among all of the agencies and governments with jurisdictional responsibilities for the habitat and the species. This includes coordination with our Town.

NEPA regulations require your agency to "study, develop and describe alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." (40 CFR 1507.2) It is concerning to us that after reviewing the Garfield County Plan, it was not carried forward as a reasonable alternative for the lands within the jurisdictional boundaries of Garfield County.

The plan, properly compared with the other alternatives, provides the most protection to the greater sage-grouse, while also ensuring the productive use of the land will continue. Under the Garfield County plan, our Town could continue to operate from current funds derived from oil and gas exploration and production well into the future and continue to ensure the protection of our citizens, their property and the greater sage-grouse. This plan demonstrates that the grouse and the people can be fully protected without sacrificing human protection. It should have been fully considered and not summarily dismissed.

Rigorous analysis and comparison of the Garfield County plan would have helped to sharply define the issues, "providing a clear basis of choice among options by the decision makers and the public," (40 CFR 1502.14) as required under the NEPA rules. This currently does not exist in the comparison of alternatives carried forward. The action alternatives (B-D) vary only slightly from each other.

They are all a variation of the NTT approach mandated to be included by the Secretary of Interior as the policies preferred. Alternative B is the NTT alternative where these conservation measures are specifically carried forward. Alternative C is a more restrictive version of these same NTT polices. Alternative D is a slightly less restrictive alternative based on the same NTT principles.

There are no sharply defining issues that show clear distinctions between the three action alternatives. They all carry forward the NTT approach in some fashion. Only the Garfield

County Plan offers any distinction in how to develop and implement conservation measures for the protection of the grouse.

However, you failed to analyze or consider this reasonable and preferable alternative.

Summary

For this reason, as well as, the others stated above, a supplemental statement should be prepared to properly consider the local impact of the proposed action on the human and natural environment. This supplemental statement should be prepared in coordination with our Town for the purpose of resolving the conflicts with our policies and to ensure all reasonable alternatives are considered which would include a rigorous analysis of the Garfield County Greater Sage-Grouse Conservation plan.

If implemented, the proposed action would represent a violation of BLM's multiple use mandate and a violation of the public trust in that agency to protect human life and property as its first priority.

In addition, the exclusion of coordinating with the Town of Parachute and not even considering the restrictions your actions will place on our ability to protect our citizens is inconceivable and inexcusable.

Just as it is the BLM's mission to "sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations," it is our mission to protect the health, safety and welfare of our citizens.

Your failure to coordinate your DEIS with our Town has placed us in a very difficult and dangerous situation should you not consider our needs. We implore the BLM to delay approval of the proposed action and instead prepare a supplemental statement which takes these concerns into account.

These comments are only a summary of our concerns and not a complete analysis of the conflicts we find in the DEIS. Also, please include as a part of our comments those submitted by the Garfield County Board of Commissioners.

Sincerely,

Judith Beasley, Mayor
Town of Parachute

Garfield County School District No. 16

0460 Stone Quarry Road
Parachute, CO 81635
Dr. Ken Haptonstall, Superintendent
Brian Berg, Director of Curriculum and Student Achievement
Rose H. Belden, Director of Business Services
(970) 285-5701 FAX: (970) 285-5711

Friday, November 22, 2013

Mr. Jim Cagney
Northwest Colorado Director
Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

RE: Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement

Dear Mr. Cagney,

The Garfield County School District No. 16 (District) has been in existence since the early 1900's. The District covers the western portion of Garfield County and provides a nurturing environment to nearly 1,000 students and 175 staff members.

Our mission is to provide the best education so that all students will be successfully prepared for life, in a safe and nurturing environment. The District is governed by an elected Board of Directors made up of five, locally elected individuals who care about the well-being of the community.

Our District covers approximately ___ square miles, of which a considerable amount is Bureau of Land Management land. We do receive a nominal amount of revenue from the federal Payment in Lieu of Taxes (PILT) program, but most of our funding comes from local property tax, which includes business property tax derived from oil and gas production within our District and an offset from the State of Colorado.

Over the past four years, we have lost a total of 390 students representing over 30% of our population primarily due to loss of production in the oil and gas industry. We have also cut over 35% of our staff because of the loss of students. District wide, one-third of our student body is directly tied to the oil and gas industry.

It has come to our attention that the Bureau of Land Management (BLM) has been preparing a Draft Environmental Impact Statement (DEIS) for the Greater Sage-Grouse

Board of Directors: Megan Alstatt, Dr. Kevin Coleman, Cheralea Medina

to amend and update your Land Use Plan and Land Management Plan since December, 2011. As a political subdivision of the State of Colorado, we hereby notice the BLM of your failure to coordinate the DEIS with our District and our five-member Board of Directors.

Our charge is to provide the best affordable education to the children of our District. In order to carry out this charge given to us by the State and citizens of this community, we have policies and the responsibility to provide the community we serve with exceptional educational programs now and into the future that adheres to strict accreditation and performance standards.

None of the proposed conservation measures for the Greater Sage-Grouse carried forward in the DEIS were coordinated with our District. As a result, the harm that will come to our District as a result of these policies have not been addressed in the document and brought to the public light for further consideration by the public and decision makers. The impacts of these alternatives to human life are devastating, but they have not been considered and, therefore, could not be properly weighed in the analysis as to which of the alternatives would be preferable.

Because of this failing, the Garfield County School District No. 16 formally requests that a supplemental statement be prepared to ensure that the environmental consequences of the four alternatives are properly analyzed by including the direct, indirect and cumulative impacts on our District and the welfare of the students we educate.

Failure to Coordinate:

Our District falls squarely within the jurisdictional boundaries of your planning area and we are dependent upon and impacted by the use of federal lands managed by your agency. Therefore, every policy you implement has a direct impact on all the programs and educational services our District provides.

Your agency is specifically directed through your planning rules to take the impacts to our District into account in your analysis presented in the DEIS.

> *"The development, approval, maintenance, amendment and revision of resource management plans will provide for public involvement and shall be consistent with the principles described in section 202 of the Federal Land Policy and Management Act of 1976. Additionally, the impact on local economies and uses of adjacent or nearby non-Federal lands and on non-public land surface over the federally-owned mineral interests shall be considered." (43 CFR 1601.0-8)*

Section 202 of the Federal Land Policy and Management Act includes the statutory direction for your agency to coordinate "planning" with local governments (43 USC 1712(c)(9)). As a political subdivision of the State of Colorado, the Garfield County School District No. 16 is entitled to coordination with your agency in your planning efforts.

The National Environmental Policy Act (NEPA) (42 USC 4321) and corresponding regulations requires coordination with local governments to "improve and coordinate Federal plans, functions, programs and resources." The District is entitled to have its policies and economic effects considered and resolved by you prior to the release of the now public DEIS.

Even though the laws and policies that direct your agency to prepare this DEIS require you to do so in coordination with the District, for the purpose of resolving conflicts with

our District, to ensure consistency with our policies, and ultimately to ensure that the welfare of the public is fully considered in this process, your agency has failed to do so. As a result, the direct, indirect and cumulative impacts the proposed action will have on our District have not been considered, analyzed so that these impacts can be weighed with the benefits and negative effects of this action. For this reason, a supplemental statement should be prepared taking into account the impact of these proposed conservation measures on the welfare of the people of our community in coordination with our District.

This analysis is not something that should be done at a later date when you prepare site specific environmental statements. The policies that will impact our District are being considered now, and will be put into place through this environmental statement. Therefore, the harm that will come to the District should be considered in this analysis.

Economic Facts and Impacts You Failed to Consider

In 2012, the Garfield County School District No. 16 received $8,429,264 in tax revenues attributable to oil and gas production in Garfield County. Land within the jurisdiction of our District had a total assessed value of $1,329,116,570, of which $1,245,826,770 was directly attributable to oil and gas resulting in the percentage of 93.73% or $8,429,263 of our total District revenues.

This obviously is a major source of our income and any curtailing of oil and gas production in Garfield County will have devastating effects to our District and bring economic destruction to our community and our ability to provide affordable educational programs.

If our budget is diminished as a result of the greater sage-grouse conservation measures, not only will the grouse be harmed, but our students, parents, teachers and District will be irreversibly harmed as well. No consideration of this impact was discussed in the DEIS. No discussion was made with us as to how you will resolve this conflict. None of this harm has been brought to the attention of the public or decision makers making the DEIS incomplete and fatally flawed.

A supplemental statement should be prepared to fully analyze the impact of the action alternatives on the financial resources of our District and how this will jeopardize the welfare of our students, teachers and parents.

Failure to Consider Reasonable Alternative:

Earlier this year, Garfield County adopted the Garfield County Greater Sage-Grouse Conservation Plan (Plan). This Plan was developed to ensure the conservation measures implemented were appropriate for the unique landscape and culture of the county, which is unlike any other habitat in the 11 state ranges of the grouse. The county also developed this Plan so that there would be coordination among all of the agencies and governments with jurisdictional responsibilities for the habitat and the species. This includes coordination with our District.

NEPA regulations require your agency to "study, develop and describe alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." (40 CFR 1507.2) It is concerning to us that after reviewing the Garfield County Plan, it was not carried forward as a reasonable alternative for the lands within the jurisdictional boundaries of Garfield County.

The Plan, properly compared with the other alternatives, provides the most protection to the greater sage-grouse, while also ensuring the productive use of the land will continue. Under the Garfield County Plan, our District could continue to operate from current funds derived from oil and gas exploration and production well into the future and continue to ensure our students receive the best education possible, as well as, protect the greater sage-grouse.

This Plan demonstrates that the grouse and the people can be fully protected without sacrificing human needs and protection. It should have been fully considered and not summarily dismissed.

Rigorous analysis and comparison of the Garfield County plan would have helped to sharply define the issues, "providing a clear basis of choice among options by the decision makers and the public," (40 CFR 1502.14) as required under the NEPA rules. This currently does not exist in the comparison of alternatives carried forward. The action alternatives (B-D) vary only slightly from each other.

They are all a variation of the NTT approach mandated to be included by the Secretary of Interior as the policies preferred. Alternative B is the NTT alternative where these conservation measures are specifically carried forward. Alternative C is a more restrictive version of these same NTT polices. Alternative D is a slightly less restrictive alternative based on the same NTT principles.

There are no sharply defining issues that show clear distinctions between the three action alternatives. They all carry forward the NTT approach in some fashion. Only the Garfield County Plan offers any distinction in how to develop and implement conservation measures for the protection of the grouse.

However, you failed to analyze or consider this reasonable and preferable alternative.

Summary

For this reason, as well as, the others stated above, a supplemental statement should be prepared to properly consider the local impact of the proposed action on the human and natural environment. This supplemental statement should be prepared in coordination with our District for the purpose of resolving the conflicts with our policies and to ensure all reasonable alternatives are considered, which would include a rigorous analysis of the Garfield County Greater Sage-Grouse Conservation Plan.

If implemented, the proposed action would represent a violation of BLM's multiple use mandate and a violation of the public trust in that agency to protect human life and property as its first priority.

In addition, the exclusion of coordinating with the Garfield County School District No. 16 and not considering the restrictions your actions will place on our ability to provide adequate and quality educational programs to our community is inconceivable and inexcusable.

Just as it is the BLM's mission to "sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations," it is our mission to provide the best education for our citizens at the most reasonable and efficient cost possible.

Your failure to coordinate your DEIS with our District has placed us in a very difficult and dangerous situation should you not consider our needs. We implore the BLM to

delay approval of the proposed action and instead prepare a supplemental statement which takes these concerns into account.

These comments are only a summary of our concerns and not a complete analysis of the conflicts we find in the DEIS. Also, please include as a part of our comments those submitted by the Garfield County Board of Commissioners.

Sincerely,

Dr. Ken Haptonstall
Superintendent

Board of Directors: Megan Alstatt, Dr. Kevin Coleman, Cheralea Medina

TOWN OF SILT
RESOLUTION NO. 27
SERIES OF 2013

A RESOLUTION TO IMPLEMENT COORDINATION BY THE TOWN OF SILT REGARDING THE PROPOSED DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE GREATER SAGE-GROUSE, GARFIELD COUNTY, COLORADO

WHEREAS, the Town of Silt is a political subdivision under the Constitution and laws of the State of Colorado, and

WHEREAS, it is the responsibility of our Board of Trustees to enact and provide for the enforcement of all town ordinances necessary to protect the life, health, safety and property of our citizens, and

WHEREAS, it has come to our attention that the Bureau of Land Management (BLM) has been preparing a Draft Environmental Impact Statement (DEIS) for the Greater Sage-Grouse to amend and update their Land Use Plan and Land Management Plan since December, 2011, and

WHEREAS, as a political subdivision of the State of Colorado, we hereby notice the BLM of their failure to coordinate the DEIS with our Town and our seven-member Board of Trustees, and

WHEREAS, none of the proposed conservation measures for the Greater Sage-Grouse carried forward in the DEIS were coordinated with our city and as a result, the harm that will come to our city as a result of these policies, have not been addressed in the document and brought to the public light for further consideration by the public and decision makers, and

WHEREAS, the Town of Silt lies within the jurisdictional boundaries of BLMs planning area and is dependent upon and impacted by the use of federal lands managed by the BLM and every policy implemented by BLM has a direct impact on all services provided by the Town of Silt, and

WHEREAS, the direct, indirect and cumulative impacts of BLMs proposed Plan have not been taken into consideration or analyzed to determine the benefits or negative effects on our Town, and

WHEREAS, any curtailment of oil and gas production or exploration in Garfield County will bring an economic burden to the Town of Silt, and

WHEREAS, the Town of Silt receives a significant amount of revenue from oil and gas properties through sales tax revenues, much of which is derived from businesses and citizens directly employed with or doing business with the oil and gas industry, and

WHEREAS, many of our citizens are employed in the energy industry who live and work in our Town creating a multiplier effect through their families, spouses, friends and businesses bringing sales tax revenues that potentially will be lost if the BLM implements their current Plan, and

WHEREAS, the Town of Silt has many tourists, rock climbers and Off Highway Vehicle riders who patronize our local businesses and retail shops that all will be detrimentally affected should

restrictions be placed on lands within the BLM areas where they claim Greater Sage-grouse exist, and

WHEREAS, no consideration of these impacts have been discussed in the DEIS and no discussion was made with us as to how the BLM will resolve these conflicts, and

WHEREAS, the Board of Trustees finds that it is in the best interests of the Town of Silt to perform its duties by asserting coordination with federal and state agencies mandated by federal and Colorado law, and

WHEREAS, federal agencies are mandated to coordinate planning and management actions with local government by statutes including the Federal Land Policy and Management Act, 43 U.S.C. §1701 and 43 U.S.C. §1712, the National Forest Management Act, 16 U.S.C. 1604 the National Environmental Policy Act, the Clean Water Act, the Clean Air Act, the Homeland Security Act, and the Endangered Species Act, by regulations and rules implementing those statutes and by Executive Orders directing intergovernmental cooperation and coordination,

NOW, THEREFORE BE IT RESOLVED that the Town of Silt hereby asserts legal standing as a unit of local government of Colorado to formally assert it coordination status with all federal agencies maintaining jurisdiction over lands and/or resources located within Garfield County and conducting planning and management activities that affect and impact the residents, businesses, and industry of the Town of Silt and surrounding lands within Garfield County affecting the well-being of our citizens,

BE IT FURTHERED RESOLVED that because none of this harm has been brought to the attention of the public or decision makers, the DEIS is incomplete and fatally flawed,

BE IT FURTHERED RESOLVED that the Town of Silt demands a supplemental statement be prepared to ensure that the environmental consequences of the four alternatives are properly analyzed by including the direct, indirect and cumulative impacts on our Town and the health and safety of the people we protect

BE IT FURTHER RESOLVED that the Clerk of the Town of Silt shall cause a copy of this Resolution to be transmitted to the proper federal agencies through its local, regional, state or federal offices and to all federal and state elected officials representing the residents and governments of the Town of Silt,

ADOPTED BY THE BOARD OF TRUSTEES OF THE TOWN OF SILT ON THIS THE 25TH DAY OF NOVEMBER, 2013.

TOWN OF SILT SEAL COLORADO

TOWN OF SILT

David C. Moore

Mayor, David C. Moore

ATTEST:

Sheila M. McIntyre

Town Clerk, Sheila M. McIntyre, CMC

(11-5-13)

Mr. Jim Cagney
Northwest Colorado Director
Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

RE: Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement

Dear Mr. Cagney,

The De Beque Fire Protection District (District) was formed in 2008, to provide emergency medical service and fire support for the I-70 corridor and Roan Plateau located in Garfield and Mesa Counties, Colorado. We cover an 800 square-mile area that serves the City of De Beque and surrounding rural lands, which include federal land and private property.

Since December, 2011, the Bureau of Land Management (BLM) has been preparing a Draft Environmental Impact Statement (DEIS) for the Greater Sage-Grouse to amend and update your Land Use Plan and Land Management Plan. As a Title 32, Special District for Fire and Rescue created by the Colorado Legislature, we hereby notice the BLM of your failure to coordinate the DEIS with our District.

Our charge is to protect the health, safety and welfare of the people, specifically from fire hazards. In order to carry out this charge, we have policies that require human life be prioritized above all other concerns. None of the policies related to wildfire in any of the alternatives carried forward in the DEIS were coordinated with our District. As a result, there are unresolved conflicts with our policies that have not been addressed in the document and brought to the public light for further consideration by the public and decision makers. The impacts of these alternatives to human life are devastating, but they have not been considered and, therefore, could not be properly weighed in the analysis as to which of the alternatives would be preferable.

Because of this failing, the District formally requests that a supplemental statement be prepared to ensure that the environmental consequences of the four alternatives are properly analyzed by including the direct, indirect and cumulative impacts on our District and the health and safety of the people we protect.

Failure to Coordinate:

The Federal Land Policy and Management Act specifically directs your agency to coordinate "planning" with local governments (43 USC 1712(c)(9)). The De Beque Fire Protection District is a political subdivision of the state of Colorado entitled to coordination with your agency in your planning efforts.

The National Environmental Policy Act (NEPA) (42 USC 4321) and corresponding regulations requires coordination with local governments to "improve and coordinate Federal plans, functions, programs and resources." The De Beque Fire Protection District is entitled to have its policies considered and resolved by you prior to the release of the now public DEIS.

Your agency's planning rules require that you coordinate this effort with the De Beque Fire Protection District as well, making it clear that you have a duty to ensure this coordination takes place with us above and beyond the public process.

> "In addition to the public involvement prescribed by Sec. 1610.2, the following coordination is to be accomplished with other Federal agencies, state and local governments, and federally recognized Indian tribes. The objectives of the coordination are for the State Directors and Field Managers to:

(1) Keep apprised of non-Bureau of Land Management Plans;
(2) Assure that BLM considers those plans that are germane in the development of resource management plans for public lands;
(3) Assist in resolving, to the extent practicable, inconsistencies between Federal and non-governmental plans;
(4) Provide for meaningful public involvement of other Federal agencies, State and local government officials, both elected and appointed, and federally recognized Indian tribes, in the development of resource management plans, including early public notice of final decisions that may have a significant impact on non-Federal lands;" (43 CFR 1610.3-1)

Further, in the Federal Register notice initiating the preparation of this environmental impact statement (Vol. 76, No. 237/ Friday, December 9, 2011), your agency is directed to make the proposed conservation measures consistent with our policies:

> "As described by law and policy, the BLM and FS will strive to ensure that conservation measures are as consistent as possible with other planning jurisdictions within the planning area boundaries."

No such effort has been made.

Even though the laws and policies that direct your agency to prepare this DEIS require you to do so in coordination with our District, for the purpose of resolving conflicts with our District, to ensure consistency with our policies, and ultimately to ensure that the health, safety and welfare of the public is fully considered in this process, your agency has failed to do so. Yet, we now have a public document issued for review without these critical concerns being considered. For this reason a supplemental statement should be prepared taking into account the impact of these proposed conservation measures on the health, safety and welfare of the people and in coordination with our District.

Failure to Consider Financial Impact to District:

Our District is made up of a combination of federal BLM land and private property, with nearly 95 percent of our revenue being directly attributed to oil and gas exploration.

Specifically, should the BLM enact the current alternatives being considered and restrict or prevent oil and gas exploration and/or production in our District, irreparable harm would come to our District and the citizens we serve. All of the action alternatives in the DEIS will severely curtail oil and gas production in our District. Even if only half of the production is stopped, our District would not be able to survive. If future development of these lands is stopped, our District will not survive as current operations have a finite life span. Additional resources must be developed today in order ensure we have sufficient revenue to continue to operate and provide the fire protection and emergency services entitled to our citizens.

Last year, revenue directly attributed from oil and gas production to our District was $1,548,866. As stated above, this was 95% of our total revenue. The income we have derived from oil and gas production within our District has allowed us to hire seven fulltime staff and six part-time "on-call" firefighters. This level of staffing is necessary to ensure we can protect the lives, homes, lands and wildlife within our 800 sq. mile District. Without this revenue, we could not properly respond to emergencies and this area would be vulnerable to unforeseen disasters.

In 2009, utilizing nearly $4 million from our oil and gas revenue, the De Beque Fire Protection District purchased nine of our 11 fire and rescue vehicles that include: 1) Rescue 81, a 2009 Dodge Ram, 4X4 Light Rescue; 2) Engine 81, a 2009 Spartan metro star chassis with a 1250 gpm pump by Rosenbauer; 3) Engine 82, a 2010 Workstar International chassis with a 1000 gpm pump, Timber wolf by Rosenbauer; 4 & 5) Ambulance 81 & 82, 2009 Ford F450 Chassis Type 1 4X4 ambulance; 6) Brush 83, a 2009 Polaris 700 UTV with a fire, rescue and plow package; 7) Tender 81, a 2009 Navistar International Chassis with a 500 gpm pump and a 3,700 gallon tank; 8) Command, a 2009 Toyota Tacoma command vehicle; and 9) Rescue 82, a 2009 GTD330 International chassis Medium Rescue unit.

These units make it possible for us to have the resources necessary to protect our citizens and our land from fires and emergencies. Without these resources we could not properly respond to emergencies and fulfill our charge.

Our support, however, goes beyond protecting citizens and their private property. It also protects the federal lands and ultimately the greater sage-grouse. Our District is the first responder for all emergencies, including fires that are initiated on federal lands as well as private. When we arrive on the scene of a fire emergency we assess whether it is on private or federal lands. If it is on federal lands we report this to the BLM. Through our Mutual Aide agreement we can extinguish the fire immediately if so authorized by the agency.

The Roan Plateau, habitat for the greater sage-grouse, is within our jurisdiction. If a single stump fire or any other fire hazard was in this area, we could act immediately to protect the grouse if so authorized by the agency on federal land, rather than losing valuable time waiting for BLM to arrive with its resources.

Additionally, we immediately extinguish fires of private property when we arrive on the scene, which your agency is precluded from doing. As your DEIS points out, much of the greater sage grouse habitat is on private property. Without our continued services great harm could come to this species. Yet, this was not considered or analyzed in the DEIS.

The Roan Plateau is also where the primary oil and gas production takes place within our District. Should production be curtailed as is being proposed through all the action alternatives, we will not be able to provide the normal emergency services we now provide to the federal government or the people, leaving all fire suppression on federal land to be provided solely by your Agency, and none available to those on private land.

If our budget is diminished as a result of the greater sage-grouse conservation measures, not only will the grouse be harmed, but the people as well. No consideration of this impact was discussed in the DEIS. No discussion was made with us as to how you will resolve this conflict. None of this harm has been brought to the attention of the public or decision makers making the DEIS incomplete and fatally flawed. A supplemental statement should be prepared to fully analyze the impact of the action alternatives on the financial resources of our District and other Special Districts and how this will jeopardize the health and safety of the people.

Unresolved Conflicts with District Policy:

The DEIS is required to discuss the environmental consequences of all the alternatives in comparative form so that the public and decision makers can properly weigh the impacts of conserving habitat for the greater sage-grouse. Included in this analysis is "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources ..." (40 CFR 1502.16).

This includes analysis of the direct effects, indirect effects and cumulative effects. It also specifically directs that this analysis include conflicts with local government objectives.

> "Possible conflicts between the proposed action and the objective of Federal, regional, State, and local ... land use plans, policies and controls for the area concerned." (40 CFR 1502.16(c))

Further, "Where an inconsistency exists, the statement should describe to the extent to which the agency would reconcile its proposed action with the plan or law." (40 CFR 1506.2(d))

Very concerning to the District is the policy being proposed in the DEIS to prioritize fire resources to be pre-positioned for the protection of greater sage-grouse during critical fire weather days. This is found under the "Required Design Features" (Appendix I-14) for Alternative B, which is the National Technical Team (NTT) conservation measures the Secretary of the Department of Interior has mandated be included as an alternative in the analysis. It states that the preferred policy of the DOI is, "On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in GRSG habitat areas."

This places the sage-grouse above people and is in direct conflict with our Districts policies, which places life and property above all other considerations. The preferred alternative D also leaves the door open for this conflict. It requires that the agency "Pre-position fire suppression resources based on all resource values-at-risk." (Appendix I-14) Alternative D makes protecting the sage-grouse the highest value, giving the species preference over the protection of life and property.

As a practical matter, this places undue burden on our District to protect the life and property of the people if the BLM pre-positions its fire resources in the remote areas that contain grouse habitat. Currently, we depend on and enjoy a mutually beneficial relationship with the BLM fire operations and our District. If a major fire event occurs, we currently call on the BLM's air drop services and sometimes ground services to help us protect the community. If these resources are pre-positioned in remote areas or simply unavailable to us because they have been pre-designated to protect the sage-grouse, our ability to protect human life from catastrophic fire is severely curtailed.

This consideration was never taken into account in the DEIS, nor was the conflict such policy creates with our District ever discussed or resolved. It was through our communication with Garfield County that we were made aware of the BLM's proposed policies. It is of greatest concern that the local governments most affected by this potential change in policy were not informed directly by the BLM nor coordinated with on this and other issues.

Failure to Consider Reasonable Alternative:

Earlier this year, Garfield County adopted the Garfield County Greater Sage-Grouse Conservation Plan. This plan was developed to ensure the conservation measures implemented were appropriate for the unique landscape and culture of the county, which is unlike any other habitat in the 11 state ranges of the grouse. The county also developed this plan so that there would be coordination among all of the agencies and governments with jurisdictional responsibilities for the habitat and the species. This includes coordination with our District.

NEPA regulations require your agency to "study, develop and describe alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." (40 CFR 1507.2) It is concerning to us that after reviewing the Garfield County plan, it was not carried forward as a reasonable alternative for the lands within the jurisdictional boundaries of Garfield County. The plan, properly compared with the other alternatives, provides the most protection to the greater sage-grouse, while also ensuring the productive use of the land will continue. Under the Garfield County plan, our District could continue to operate fully funded well into the future and continue to ensure the protection of our citizens, their property and the greater sage-grouse from fire events. This plan demonstrates that the grouse and the people can be fully protected without sacrificing human protection. It should have been fully considered and not summarily dismissed.

Rigorous analysis and comparison of the Garfield County plan would have helped to sharply define the issues, "providing a clear basis of choice among options by the decision makers and the public," (40 CFR 1502.14) as required under the NEPA rules. This currently does not exist in

the comparison of alternatives carried forward. The action alternatives (B-D) vary only slightly from each other. They are all a variation of the NTT approach mandated to be included by the Secretary of Interior as the policies preferred. Alternative B is the NTT alternative where these conservation measures are specifically carried forward. Alternative C is a more restrictive version of these same NTT polices. Alternative D is a slightly less restrictive alternative based on the same NTT principles. There are no sharply defining issues that show clear distinctions between the three action alternatives. They all carry forward the NTT approach in some fashion. Only the Garfield County Plan offers any distinction in how to develop and implement conservation measures for the protection of the grouse. However, you failed to analyze or consider this reasonable and preferable alternative.

Summary

For this reason, as well as, the others stated above, a supplemental statement should be prepared to properly consider the local impact of the proposed action on the human and natural environment. This supplemental statement should be prepared in coordination with our District for the purpose of resolving the conflicts with our policies and to ensure all reasonable alternatives are considered which would include a rigorous analysis of the Garfield County Greater Sage-Grouse Conservation plan.

If implemented, the proposed action would represent a violation of BLM's multiple use mandate and a violation of the public trust in that agency to protect human life and property as its first priority. In addition, the exclusion of coordinating with our District and not even considering the restrictions your actions will place on our ability to assist your agency is inconceivable and inexcusable.

Just as it is the BLM's mission to "sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations," it is our mission to protect the health, safety and welfare of our citizens during emergencies and disasters.

Your failure to coordinate your DEIS with our District has placed us in a very difficult and dangerous situation should you not consider our needs. We appreciate how the BLM and our District currently work together. However, the proposed action will harm our current working relationship and could be the demise of our District, as well as, be the direct cause of potential fire disasters in our District. We implore the BLM to delay approval of the proposed action and instead prepare a supplemental statement which takes these concerns into account.

These comments are only a summary of our concerns and not a complete analysis of the conflicts we find in the DEIS. Also, please include as a part of our comments those submitted by the Garfield County Board of Commissioners.

Sincerely,

Nick Marx

Nick Marx
De Beque Fire Protection District Chief

GRAND VALLEY FIRE PROTECTION DISTRICT
124 STONE QUARRY ROAD
PARACHUTE, CO 81635
PHONE: 285-9119, FAX (970) 285-9748

November 30, 2013

Mr. Jim Cagney
Northwest Colorado Director
Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

RE: Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement

Dear Mr. Cagney,

The Grand Valley Fire Protection District (District) located at 0124 Stone Quarry Road, Parachute, Colorado was formed in 1962, to provide emergency medical service and fire support for a 320 mile-square area in Garfield County, Colorado and a three-quarters of a square mile area located in Mesa County known as the Housetop Mesa Estates Subdivision.

Our District is a mix of populated lands along I-70 and the Colorado River corridor, as well as, mesa tops to the north and south. Over one-half of our District lies to the north of the Parachute Creek Drainage and Roan Plateau areas.

Since December, 2011, the Bureau of Land Management (BLM) has been preparing a Draft Environmental Impact Statement (DEIS) for the Greater Sage-Grouse to amend and update your Land Use Plan and Land Management Plan. As a Title 32, Special District for Fire and Rescue created by the Colorado Legislature, we are a local government and hereby notice the BLM of your failure to coordinate the DEIS with our District.

Our charge is to protect the health, safety and welfare of the people, specifically from fire hazards. In order to carry out this charge, we have policies that require human life be prioritized above all other concerns. None of the policies related to wildfire in any of the alternatives carried forward in the DEIS were coordinated with our District. As a result, there are unresolved conflicts with our policies that have not been addressed in the document and brought to the public light for further consideration by the public and decision makers. The impacts of these alternatives to human life are devastating, but they have not been considered and, therefore, could not be properly weighed in the analysis as to which of the alternatives would be preferable.

Because of this failing, the District formally requests that a supplemental statement be prepared to ensure that the environmental consequences of the four alternatives are properly analyzed by

including the direct, indirect and cumulative impacts on our District and the health and safety of the people we protect.

Failure to Coordinate:

The Federal Land Policy and Management Act specifically directs your agency to coordinate "planning" with local governments (43 USC 1712(c)(9)). The Grand Valley Fire Protection District is a political subdivision of the State of Colorado entitled to coordination with your agency in your planning efforts.

The National Environmental Policy Act (NEPA) (42 USC 4321) and corresponding regulations requires coordination with local governments to "improve and coordinate Federal plans, functions, programs and resources." The Grand Valley Fire Protection District is entitled to have its policies considered and resolved by you prior to the release of the now public DEIS.

Your agency's planning rules require that you coordinate this effort with the Grand Valley Fire Protection District as well, making it clear that you have a duty to ensure this coordination takes place with us above and beyond the public process.

> "In addition to the public involvement prescribed by Sec. 1610.2, the following coordination is to be accomplished with other Federal agencies, state and local governments, and federally recognized Indian tribes. The objectives of the coordination are for the State Directors and Field Managers to:
>
> (1) Keep apprised of non-Bureau of Land Management Plans;
> (2) Assure that BLM considers those plans that are germane in the development of resource management plans for public lands;
> (3) Assist in resolving, to the extent practicable, inconsistencies between Federal and non-governmental plans;
> (4) Provide for meaningful public involvement of other Federal agencies, State and local government officials, both elected and appointed, and federally recognized Indian tribes, in the development of resource management plans, including early public notice of final decisions that may have a significant impact on non-Federal lands;" (43 CFR 1610.3-1)

Further, in the Federal Register notice initiating the preparation of this environmental impact statement (Vol. 76, No. 237/ Friday, December 9, 2011), your agency is directed to make the proposed conservation measures consistent with our policies:

> "As described by law and policy, the BLM and FS will strive to ensure that conservation measures are as consistent as possible with other planning jurisdictions within the planning area boundaries."

No such effort has been made.

Even though the laws and policies that direct your agency to prepare this DEIS require you to do so in coordination with our District, for the purpose of resolving conflicts with our District, to ensure consistency with our policies, and ultimately to ensure that the health, safety and welfare of the public is fully considered in this process, your agency has failed to do so. Yet, we now

have a public document issued for review without these critical concerns being considered. For this reason a supplemental statement should be prepared taking into account the impact of these proposed conservation measures on the health, safety and welfare of the people and in coordination with our District.

Failure to Consider Financial Impact to District:

Our District is made up of a combination of federal BLM land and private property, with nearly 94 percent of our revenue being directly attributed to oil and gas exploration.

Specifically, should the BLM enact the current alternatives being considered and restrict or prevent oil and gas exploration and/or production in Garfield County, irreparable harm would come to our District and the citizens we serve. All of the action alternatives in the DEIS will severely curtail oil and gas production and harm our District. Even if only half of the production is stopped, our District would not be able to survive. If future development of these lands is stopped, our District will not survive as current operations have a finite life span. Additional resources must be developed today in order ensure we have sufficient revenue to continue to operate and provide the fire protection and emergency services entitled to our citizens.

Last year, revenue directly attributed from oil and gas production to our District was $4,220,698. As stated above, this was 94% of our total revenue. The income we have derived from oil and gas production has allowed us to hire 15 fulltime personnel, which includes a Fire Chief, a Deputy Fire Chief, one Training Chief on the Administrative staff, three Captains and nine Firefighters divided into three Operational Companies that rotate working 24/7/365.

The remaining 25-member staff is divided into 14 part-time and 11 volunteer personnel. This level of staffing is necessary to ensure we can protect the lives, homes, lands and wildlife within our District. Without this revenue, we could not properly respond to emergencies and this area would be vulnerable to unforeseen disasters.

In 2009, the Battlement Mesa Fire Station opened largely utilizing money derived from our oil and gas revenue. With these funds, we've also purchased: a Brush Truck in 2009; refurbished an engine in 2012; an ambulance and two utility trucks in 2011; the Parachute Training Center and Driver Operator Pad; an Aerial Platform ordered this year; a Remote Area Pumper Tender ordered this year; and the remodel of the Parachute Fire Station allowing us to move staff into it fulltime (24/7) as of the end of 2013.

All of these apparatus and facilities make it possible for us to have the resources necessary to protect our citizens and our land from fires and emergencies. Without these resources, we could not properly respond to emergencies and fulfill our charge. In particular, our District responds to a lot of high mesa responses that are a result of wildfires. These responses take personnel away from the populated areas of the District for long periods of time.

It is because of our ability to maintain four to six persons on a shift, 24/7/365, that we are able to maintain an adequate level of response to our citizens. Our support, however, goes beyond protecting citizens and their private property. It also protects the federal lands and ultimately the greater sage-grouse. Our District, many times, is the first responder for emergencies, including fires that are initiated on federal lands, as well as, private. When we arrive on the scene of a fire

emergency, we assess whether it is on private or federal lands. If it is on federal lands, we report this to the BLM where we still rely on our Mutual Aide Agreement for certain types of calls. Should a federal agency make a mutual aid request, we can extinguish the fire immediately. Our 320 and ¼ square mile area contains habitat for the greater sage-grouse. If a single stump fire or any other fire hazard was in this area, we could act immediately to protect the grouse if so authorized by the agency on federal land, rather than losing valuable time waiting for BLM to arrive with its resources.

Additionally, we immediately extinguish fires of private property when we arrive on the scene, which your agency is precluded from doing. As your DEIS points out, much of the greater sage grouse habitat is on private property. Without our continued services, great harm could come to this species. Yet, this was not considered or analyzed in the DEIS.

Should production be curtailed, as is being proposed through all the action alternatives, we will not be able to provide the normal emergency services we now provide to the federal government or the people, leaving all fire suppression on federal land to be provided solely by your Agency, and none available to those on private land.

If our budget is diminished as a result of the greater sage-grouse conservation measures, not only will the grouse be harmed, but the people as well. No consideration of this impact was discussed in the DEIS. No discussion was made with us as to how you will resolve this conflict. None of this harm has been brought to the attention of the public or decision makers making the DEIS incomplete and fatally flawed. A supplemental statement should be prepared to fully analyze the impact of the action alternatives on the financial resources of our District and other Special Districts and how this will jeopardize the health and safety of the people.

Unresolved Conflicts with District Policy:

The DEIS is required to discuss the environmental consequences of all the alternatives in comparative form so that the public and decision makers can properly weigh the impacts of conserving habitat for the greater sage-grouse. Included in this analysis is "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources …" (40 CFR 1502.16).

This includes analysis of the direct effects, indirect effects and cumulative effects. It also specifically directs that this analysis include conflicts with local government objectives.

> "Possible conflicts between the proposed action and the objective of Federal, regional, State, and local … land use plans, policies and controls for the area concerned." (40 CFR 1502.16(c))

Further, "Where an inconsistency exists, the statement should describe to the extent to which the agency would reconcile its proposed action with the plan or law." (40 CFR 1506.2(d))

Very concerning to the District is the policy being proposed in the DEIS to prioritize fire resources to be pre-positioned for the protection of greater sage-grouse during critical fire weather days. This is found under the "Required Design Features" (Appendix I-14) for

Alternative B, which is the National Technical Team (NTT) conservation measures the Secretary of the Department of Interior has mandated be included as an alternative in the analysis. It states that the preferred policy of the DOI is, "On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in GRSG habitat areas."

Under these circumstances, we would most like have to have a dedicated crew of two or more persons staged up on the Roan Plateau. And, depending on the areas identified, it may be as many as four to six persons with one crew on the mesa tops on each side of Parachute Creek leaving no one to cover the populated areas of our District where the majority of call for service are generated.

This places the sage-grouse above people and is in direct conflict with our District's policies, which places life and property above all other considerations. The preferred alternative D also leaves the door open for this conflict. It requires that the agency "Pre-position fire suppression resources based on all resource values-at-risk." (Appendix I-14) Alternative D makes protecting the sage-grouse the highest value, giving the species preference over the protection of life and property.

As a practical matter, this places undue burden on our District to protect the life and property of the people if the BLM pre-positions its fire resources in the remote areas that contain grouse habitat. Currently, we depend on and enjoy a mutually beneficial relationship with the BLM fire operations and our District. If a major fire event occurs, we currently call on the BLM's air drop services and sometimes ground services to help us protect the community. If these resources are pre-positioned in remote areas or simply unavailable to us because they have been pre-designated to protect the sage-grouse, our ability to protect human life from catastrophic fire is severely curtailed.

This consideration was never taken into account in the DEIS, nor was the conflict such policy creates with our District every discussed or resolved. It was through our communication with Garfield County that we were made aware of the BLM's proposed policies. It is of greatest concern that the local governments most affected by this potential change in policy were not informed directly by the BLM nor coordinated with on this and other issues.

Failure to Consider Reasonable Alternative:

Earlier this year, Garfield County adopted the Garfield County Greater Sage-Grouse Conservation Plan (Plan). This Plan was developed to ensure the conservation measures implemented were appropriate for the unique landscape and culture of the county, which is unlike any other habitat in the 11 state ranges of the grouse. The county also developed this Plan so that there would be coordination among all of the agencies and governments with jurisdictional responsibilities for the habitat and the species. This includes coordination with our District.

NEPA regulations require your agency to "study, develop and describe alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." (40 CFR 1507.2) It is concerning to us that after reviewing the Garfield County Plan, it was not carried forward as a reasonable alternative for the lands within the jurisdictional boundaries of Garfield County. The Plan, properly compared with

the other alternatives, provides the most protection to the greater sage-grouse, while also ensuring the productive use of the land will continue. Under the Garfield County Plan, our District could continue to operate fully funded well into the future and continue to ensure the protection of our citizens, their property and the greater sage-grouse from fire events. This Plan demonstrates that the grouse and the people can be fully protected without sacrificing human protection. It should have been fully considered and not summarily dismissed.

Rigorous analysis and comparison of the Garfield County Plan would have helped to sharply define the issues, "providing a clear basis of choice among options by the decision makers and the public," (40 CFR 1502.14) as required under the NEPA rules. This currently does not exist in the comparison of alternatives carried forward. The action alternatives (B-D) vary only slightly from each other. They are all a variation of the NTT approach mandated to be included by the Secretary of Interior as the policies preferred. Alternative B is the NTT alternative where these conservation measures are specifically carried forward. Alternative C is a more restrictive version of these same NTT policies. Alternative D is a slightly less restrictive alternative based on the same NTT principles. There are no sharply defining issues that show clear distinctions between the three action alternatives. They all carry forward the NTT approach in some fashion. Only the Garfield County Plan offers any distinction in how to develop and implement conservation measures for the protection of the grouse. However, you failed to analyze or consider this reasonable and preferable alternative.

Summary

For this reason, as well as, the others stated above, a supplemental statement should be prepared to properly consider the local impact of the proposed action on the human and natural environment. This supplemental statement should be prepared in coordination with our District for the purpose of resolving the conflicts with our policies and to ensure all reasonable alternatives are considered which would include a rigorous analysis of the Garfield County Greater Sage-Grouse Conservation Plan.

If implemented, the proposed action would represent a violation of BLM's multiple use mandate and a violation of the public trust in that agency to protect human life and property as its first priority. In addition, the exclusion of coordinating with our District and not even considering the restrictions your actions will place on our ability to assist your agency is inconceivable and inexcusable.

Just as it is the BLM's mission to "sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations," it is our mission to protect the health, safety and welfare of our citizens during emergencies and disasters.

Your failure to coordinate your DEIS with our District has placed us in a very difficult and dangerous situation should you not consider our needs. We appreciate how the BLM and our District currently work together. However, the proposed action will harm our current working relationship and could be the demise of our District, as well as, be the direct cause of potential fire disasters in our District. We implore the BLM to delay approval of the proposed action and instead prepare a supplemental statement which takes these concerns into account.

These comments are only a summary of our concerns and not a complete analysis of the conflicts we find in the DEIS. Also, please include as a part of our comments those submitted by the Garfield County Board of Commissioners.

On behalf of the Grand Valley Fire Protection District Board of Directors,

David A. Blair
Fire Chief

November 20, 2013

Mr. Jim Cagney
Northwest Colorado Director
Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

RE: Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement

Dear Mr. Cagney,

The City of Rifle is a political subdivision of the State of Colorado and a Home Rule Municipality located in Garfield County, Colorado. As a Home Rule Municipality, we can enact and provide for the enforcement of all town ordinances necessary to protect the life, health, safety and property of our citizens.

It has come to our attention that the Bureau of Land Management (BLM) has prepared a Draft Environmental Impact Statement (DEIS) for the Greater Sage-Grouse to amend and update your Land Use Plan and Land Management Plan. As a political subdivision of the State of Colorado, we hereby notice the BLM of its failure to coordinate the DEIS with our City and our seven-member City Council.

None of the proposed conservation measures for the Greater Sage-Grouse carried forward in the DEIS were coordinated with our city and as a result, these conservation measures may cause significant economic harm to our city. The impacts of the proposed alternatives would be devastating and have not been fairly considered and, therefore, could not be properly weighed in the analysis as to which of the alternatives would be preferable.

Because of this shortfall, the City of Rifle formally requests that a supplemental statement be prepared to ensure that the environmental consequences of the four alternatives are properly analyzed by including the direct, indirect and cumulative impacts on the City of Rifle and the health and safety of the people we serve.

CITY OF RIFLE
202 RAILROAD AVENUE – P. O. BOX 1908 – RIFLE, CO 81650
WWW.RIFLECO.ORG
(970)665-6405 – (970)665-6402

Failure to Coordinate:
Although the City of Rifle is not within the jurisdictional boundaries of your planning area, we are dependent upon and impacted by the use of federal lands managed by the BLM. Therefore every policy the BLM implements, has a direct impact on the services our city provides. Specifically, the BLM is directed through planning rules to take the impacts to our city into account in the analysis presented in the DEIS.

"The development, approval, maintenance, amendment and revision of resource management plans will provide for public involvement and shall be consistent with the principles described in section 202 of the Federal Land Policy and Management Act of 1976. Additionally, the impact on local economies and uses of adjacent or nearby non-Federal lands and on non-public land surface over the federally-owned mineral interests shall be considered." (43 CFR 1601.0-8)

Section 202 of the Federal Land Policy and Management Act includes the statutory direction for your agency to coordinate "planning" with local governments (43 USC 1712(c)(9)). As a political subdivision of the State of Colorado, the City of Rifle is entitled to coordination with your agency in your planning efforts.

The National Environmental Policy Act (NEPA) (42 USC 4321) and corresponding regulations requires coordination with local governments to "improve and coordinate Federal plans, functions, programs and resources." The City of Rifle is entitled to have its policies and economic effects considered and resolved by the BLM prior to the release of the now public DEIS.

Even though the laws and policies that direct the BLM to prepare this DEIS require you to do so in coordination with the City of Rifle, for the purpose of resolving conflicts and to ensure consistency with our policies, ultimately to ensure that the health, safety and welfare of the public is fully considered in this process, the BLM has failed to do so.

As a result, the direct, indirect and cumulative impacts the proposed action will have on our city have not been considered and analyzed so that these impacts can be weighed with the benefits and negative effects of this action. For this reason a supplemental statement should be prepared taking into account the impact of these proposed conservation measures on the health, safety and welfare of the people and in coordination with our city.

This analysis is not something that should be done at a later date when you prepare site specific environmental statements. The policies that will impact our City are being considered now, and will be put into place through this environmental statement. Therefore the harm that will come to the City of Rifle should be considered in this analysis.

Failure to Consider Economic Facts and Impacts to the City of Rifle:
In 2013 the City of Rifle received $615,417.79 from Federal Mineral Lease and $498,309.96 in Severance Tax Direct Distribution for a total of $1,113,727.75, nearly 10 percent of our City's total revenues. Over the last five years, the City of Rifle has received $7,848,911.77 from Federal Mineral Lease and Severance Tax dollars. This does not take into account the amount of money the City of Rifle has received from the Garfield County Federal Mineral Lease District or the Colorado Department of Local

Affairs Energy Impact grant program. Both of these funding mechanisms make it possible for the City of Rifle to complete high priority capital projects that protect the health and safety of our community.

Under the Federal Mineral Leasing Act, approximately 49 percent of those rentals and royalties from mineral production on federal lands are returned back to the state of origin for planning, construction and maintenance of public facilities in areas socially and economically impacted by the mineral leasing development that occurs on federal lands.

Two factors determine the allocation of federal mineral lease revenue to each county pool for further distribution, of which our City is a recipient. Those two factors include: 1) the proportion of residents in the county employed in mineral extraction, and 2) the proportion of the moneys credited to the mineral leasing fund generated in the county to the total generated statewide.
From those county "pools," further allocation is determined and our City receives a proportional share based on: 1) the proportion of residents in the unincorporated areas or municipalities employed in mineral extraction to the total employed in the county; 2) the proportion of population of unincorporated areas or municipalities to the total county population; and 3) the proportion of road miles in unincorporated areas or municipalities to the total road miles in the county.

Severance tax funds are distributed to counties and municipalities based on factors of mining and well permits, mineral production, population and road miles to determine how direct distribution funds are allocated to municipalities and counties.

Fifty percent of the State's receipts from the severance tax on minerals and mineral fuels are credited to the Local Government Severance Tax Fund. The State allocates 70 percent of these funds to local governments through discretionary grants and loans. The remaining 30 percent is placed in a county pool and distributed directly to municipalities and counties economically and socially impacted by mineral production based on similar factors under the Federal Mineral Leasing Act above.
The City of Rifle receives a significant amount of revenue from oil and gas properties, and also relies on sales tax revenues, much of which is derived from businesses and citizens directly employed with or doing business with the oil and gas industry.

We have hundreds of citizens employed in the energy industry that live and work in our City. This not only impacts our tax revenues, but the multiplier effect of their families and spouses who work and shop in our City bring much more in sales tax revenues that would be lost to our City should our concerns not be considered in your planning process.

A supplemental statement should be prepared to fully analyze the impact of the action alternatives on the financial resources of our City and how this will jeopardize the health and safety of our citizens.

Failure to Consider Reasonable Alternative:
Earlier this year, Garfield County adopted the Garfield County Greater Sage-Grouse Conservation Plan. This plan was developed to ensure the conservation measures implemented were appropriate for the unique landscape and culture of the county, which is unlike any other habitat in the 11 state ranges of the grouse. The BLM's policy approach is a "one size fits all" and does not acknowledge local conditions.

The county also developed this plan to ensure there would be coordination among all of the agencies and governments with jurisdictional responsibilities for the habitat and the species. This includes coordination with our City.

NEPA regulations require your agency to "study, develop and describe alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." (40 CFR 1507.2) It is concerning to us that after reviewing the Garfield County Plan, it was not carried forward as a reasonable alternative for the lands within the jurisdictional boundaries of Garfield County.

The plan, properly compared with the other alternatives, provides the most protection to the greater sage-grouse, while also ensuring the productive use of the land will continue. Under the Garfield County plan, our City could continue to operate with current funds derived from oil and gas exploration and production well into the future and continue to ensure the protection of our citizens, their property and the greater sage-grouse. This plan demonstrates that the grouse and the people can be fully protected without sacrificing human protection. It should have been fully considered and not summarily dismissed. The City of Rifle is also concerned that the BLM is using a seriously flawed habitat map that is not based on the "best available science".

Rigorous analysis and comparison of the Garfield County plan would have helped to sharply define the issues, "providing a clear basis of choice among options by the decision makers and the public," (40 CFR 1502.14) as required under the NEPA rules. This currently does not exist in the comparison of alternatives carried forward. The action alternatives (B-D) vary only slightly from each other and are all a variation of the NTT approach mandated to be included by the Secretary of Interior as the policies preferred. Alternative B is the NTT alternative where these conservation measures are specifically carried forward. Alternative C is a more restrictive version of these same NTT polices. Alternative D is a slightly less restrictive alternative based on the same NTT principles.

There are no sharply defining issues that show clear distinctions between the three action alternatives. They all carry forward the NTT approach in some fashion. Only the Garfield County Plan offers any distinction in how to develop and implement conservation measures for the protection of the grouse.

Summary

For this reason, as well as, the others stated above, a supplemental statement should be prepared to properly consider the local impact of the proposed action on the human and natural environment. This supplemental statement should be prepared in coordination with our City for the purpose of resolving the conflicts with our policies and to ensure all reasonable alternatives are considered which would include a rigorous analysis of the Garfield County Greater Sage-Grouse Conservation plan.

If implemented, the proposed action would represent a violation of BLM's multiple use mandate and a violation of the public trust in that agency to protect human life and property as its first priority. In addition, the exclusion of coordinating with the City of Rifle and not considering the restrictions the BLM's actions will place on our ability to protect our citizens is inconceivable.

Just as it is the BLM's mission to "sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations," it is our mission to protect the health,

safety and welfare of our citizens. The BLM's failure to coordinate the DEIS with our City has placed us in a very difficult and dangerous situation should our needs not be considered. We implore the BLM to delay approval of the proposed action and instead prepare a supplemental statement which takes these concerns into account.

These comments are only a summary of our concerns and not a complete analysis of the conflicts we find in the DEIS. Also, please include as a part of our comments those submitted by the Garfield County Board of Commissioners.

Sincerely,

Randy Winkler
Mayor

CITY OF RIFLE
202 RAILROAD AVENUE – P. O. BOX 1908 – RIFLE, CO 81650
WWW.RIFLECO.ORG
(970)665-6405 – (970)665-6402

How the National Technical Team Report Changes the way the BLM Operates

Fluid Minerals Program

The BLM would preclude fluid mineral development within designated priority sage-grouse habitat. Where the BLM cannot preclude development due to valid existing rights, the BLM would attach moderate to major restrictions to the development and require the use of certain Best Management Practices (BMP) in the form of Conditions of Approval (COA). The following are some of the key points for priority sage-grouse habitat areas:

Unleased Federal Mineral Estate:

- The BLM would halt leasing within priority sage-grouse habitat areas.
- The BLM would halt or heavily restrict geophysical exploration within priority sage-grouse habitat areas.

Leased Federal Mineral Estate:

The BLM would apply the following conservation measures through Resource Management Plan (RMP) implementation decisions. This process will evaluate, among other things, whether the conservation measure is "reasonable" (43 CFR 3101.1-2) with the valid existing rights.

- The BLM would place a 3.1 mile buffer [~30 square miles] around the perimeter of all sage-grouse leks within priority sage-grouse habitat areas, where no disturbance would be authorized [No Surface Occupancy]. *(Formerly this buffer was set to 0.25-0.6 miles, depending on the field office)*
- The BLM would restrict well pad spacing to a maximum of 2.5% disturbance per 640 acres or to no more than 16 acres per square mile within priority sage-grouse habitat areas, unless an equal amount of offsite mitigation is provided.
- The BLM would no longer utilize Categorical Exclusions (CX) including those under the Energy Policy Act of 2005, Section 390 for approval of Applications for Permit to Drill (APD) or Geophysical Exploration in priority sage-grouse habitat. Environmental Assessments (EA) or Environmental Impact Statements (EIS) would be required for these activities in priority sage-grouse habitat due to the potential resource conflicts. The BLM would still have the option of a DNA in the future if referencing the EA or EIS mentioned above.
- The BLM would apply seasonal restrictions to prohibit activity during breeding and brood-rearing seasons.
- The BLM would require unitization to better control the development and restrict development to one operator within priority sage-grouse habitat areas.
- The BLM would require full reclamation bonds for any disturbance within priority sage-grouse habitat areas.
- The BLM would prohibit disturbance within sage-grouse winter concentration areas.
- The BLM would require offsite mitigation.
- The BLM would require operators to submit Master Development Plans for their units as opposed to single APDs.
- The BLM would attach a set of applicable mandatory BMPs to all APDs in priority sage-grouse habitat areas as COAs including such practices as phased development, rolling reclamation, corridoring infrastructure, directional/horizontal drilling, closed-loop systems, advanced reclamation techniques, etc.

From:	Fielder, Dwight
To:	Morales, Raul
Subject:	Re: Planning IM and NTT Report
Date:	Tuesday, December 20, 2011 10:40:26 AM

Let's talk. Are you in Amy's office or are you calling from home?

E. Dwight Fielder, Chief
Division of Fish and Wildlife Conservation
Bureau of Land Management
(202) 912-7230 (Office)
(202) 285-6845 (Cell)

From: Morales, Raul
Sent: Tuesday, December 20, 2011 1:40 PM
To: Fielder, Dwight
Subject: Re: Planning IM and NTT Report

Can you right the forward that will address Jim's cocerns?

From: Fielder, Dwight
Sent: Tuesday, December 20, 2011 09:48 AM
To: Morales, Raul
Subject: FW: Planning IM and NTT Report

fyi

E. Dwight Fielder, Chief
Division of Fish and Wildlife Conservation
Bureau of Land Management
(202) 912-7230 (Office)
(202) 285-6845 (Cell)

From: Roberson, Edwin
Sent: Tuesday, December 20, 2011 11:00 AM
To: Nedd, Michael D
Cc: Perry, Jim; Jackson, Larry P; Kniola, Benjamin E; Martin, Benjamin F; Gewecke, William; Brady, Ray A; Lucero, Lucas J; Spisak, Timothy; Fielder, Dwight; Rubado, Jessica A; Ratcliffe, Robert; Rountree, Carl D; Murphy, Timothy M; Todd, Marci L; Stout, Joseph R; Russell, Gregory
Subject: Re: Planning IM and NTT Report

Michael,
We have been discussing the NTT report and the draft planning instruction memorandum on the national policy team for months. There were minerals and lands staff participating on the national technical team to ensure there was a full discussion of alternative conservation strategies related to all authorized uses. The report and cover letter from Raul Morales make it clear the primary focus of the measures in the final report are for conservation of the sage grouse. It is a discouraging to me that we have not been able to communicate that clearly to all of the folks who have been participating in the process during the last several months.

As the planning instruction memo clearly states these measures are to be considered in planning: "The conservation measures developed by the NTT and contained in Attachment 1 must be considered and analyzed through the land use planning process by all BLM State and Field Offices that contain occupied Greater Sage-grouse habitat. Specifically, those conservation measures must be considered and incorporated, as appropriate, into at least one alternative in the land use planning process."

There is no requirement to select the alternative(s) including the measures in tye NTT report. The impacts you and Ray discuss would be addressed in the impact analysis for the alternative including the conservation measures. There will of course be a full range of alternatives in the RMP/EISs developed under the strategy. There will be alternatives with different levels of conservation and development. The public will be able to be aware of the tradeoffs. As you know all this is part of the public decisionmaking process. If we've done a good job our RODs will provide for continued energy development and transmission while precluding the need for listing of the sage grouse. The planning teams are demanding this guidance ASAP so they can conduct plan evaluations and proceed with scoping. So it is urgent that we get it out. We can discuss on the NPT call. Ed

From: Nedd, Michael D
Sent: Tuesday, December 20, 2011 07:05 AM
To: Roberson, Edwin
Cc: Perry, Jim; Jackson, Larry P; Kniola, Benjamin E; Martin, Benjamin F; Gewecke, William; Brady, Ray A; Lucero, Lucas J; Spisak, Timothy
Subject: FW: Planning IM and NTT Report

Ed,

Thank you for the opportunity to review and comment on the proposed NTT Report. Here are our comments and due to time constraint, I'm sending you two NTT report comments document. The "WO320" document with comments is in addition to "Perry" document.

Overall, the NTT Report conservation measures (planning prescriptions) are complete game-changers for any actions within the Priority Habitats where there are valid existing rights and showstoppers for those actions where there are no valid existing rights. We strongly believe the changes we are proposing will ensure the BLM can continue to play a role in helping to meet the nation's energy (both conventional and renewable) demands. It is my understanding that our staff (primarily Jim Perry) are having discussions with your staff on some of the changes and there are some agreements.

The Conservation Measures are focused on identifying all lands within Priority Habitat Areas as "exclusion areas" for rights-of-way and all lands within General Habitat Areas as "avoidance areas" for rights-of-way. The biggest problem with this strategy is if the BLM is going to move designated corridors and right-of-way applications out of the Priority Habitat Areas (exclusion lands), then we must have the ability to designate corridors and site rights-of-way within the General Habitat Areas. Therefore, identifying the General Habitat Areas as avoidance areas (tens of millions of acres) is totally unworkable and may be viewed by some as one more BLM attempt to hinder energy development. We need to allow rights-of-way on these lands with mitigation opportunities

that provide for off-site mitigation to improve habitat in the Priority Habitat Areas.

The NTT Report includes sections on Habitat Restoration and Monitoring of Habitats, however and as an example, the prescriptions for rights-of-way are instead focused on identifying exclusion areas and avoidance areas through planning decisions. The Conservation Measures for rights-of-way should focus instead on opportunities for habitat restoration and monitoring, adaptive management and off-site mitigation. There are outstanding opportunities for significantly improving sage grouse habitats in Priority Habitat Areas by allowing rights-of-way in General Habitat Areas and allowing for off-site mitigation and restoration of lands disturbed to better sage grouse habitats. Many rights-of-way can be restored to better sage brush vegetation than previously existed.

In several places (i.e. page 11) we noticed that there are references to only a few literature citations that attempt to portray the impacts to a program (lands, minerals, etc.) and as far as we know, there really are no studies that have been completed that show this direct correlation. We are not aware of any Before/After/Control/Treatment (BACT) studies that have been completed specifically on linear rights-of-way or even more specifically on wind energy or renewable energy projects. Our proposal will be for the BLM to support efforts for some adaptive management, off-site mitigation and BACT monitoring in General Habitat Areas instead of identifying these lands as avoidance lands.

We look forward to further discussing this policy.

Take care and have a wonderful day! :)

MDN – 202-208-4201

A thought to consider *"Do all the good you can, in all the ways you can, for all the people you can, while you can!"*

From: Nedd, Michael D
Sent: Monday, December 19, 2011 7:18 AM
To: Leverette, Mitchell; Berns Kim M; Brady, Ray A; Shoop, Robyn; Martin, Benjamin F; Lucero, Lucas J; Wells, Steven; Perry, Jim; Kniola, Benjamin E
Subject: Fw: Planning IM and NTT Report

Please review (or have your staff review) and provide your comments to Jim (or Ben K), unless they are both out on leave then I'll ask Steve/Robyn or Mitch/Frank, to id someone to collect the comments and get it to me.

Take care and have a wonderful day! :-)))

MDN - 202-208-4201

A thought to consider "Do all the good you can, in all the ways you can, for all the people you can, while you can!"

Jim Perry
Senior Natural Resource Specialist
Bureau of Land Management
Washington, D.C.
202-912-7145 desk
202-251-5017 cell

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From: Fielder, Dwight
Sent: Wednesday, December 21, 2011 10:13 AM 2
To: Perry, Jim
Subject: RE: Follow up to Today's NPT call on the NTT report

What did you predict?

F. Dwight Fielder, Chief
Division of Fish and Wildlife Conservation
Bureau of Land Management
(202) 912-7230 (Office)
(202) 285-6845 (Cell)

From: Perry, Jim
Sent: Wednesday, December 21, 2011 11:54 AM 1
To: Fielder, Dwight
Subject: Re: Follow up to Today's NPT call on the NTT report

Dwight

I thought we had agreed last night to modify the parts that were contrary to law or regulation... except for NSO?

We didn't just step backwards did we? Making progress?

(What I predicted last night about NSO is coming true.)

Jim

Jim Perry
Senior Natural Resource Specialist
Bureau of Land Management
Washington, D.C.
202-912-7145 desk
202-251-5017 cell

From: Fielder, Dwight

5

From: Fielder, Dwight
To: Morales, Raul
Subject: FW: Follow up to Today"s NPT call on the NTT report
Date: Wednesday, December 21, 2011 9:57:18 AM

Fyi. I think we might need Amy's help on this one.

E. Dwight Fielder, Chief
Division of Fish and Wildlife Conservation
Bureau of Land Management
(202) 912-7230 (Office)
(202) 285 6845 (Cell)

From: Fielder, Dwight
Sent: Wednesday, December 21, 2011 12:56 PM 4
To: Perry, Jim
Subject: RE: Follow up to Today's NPT call on the NTT report

Who is doing the research? I was assuming we probably had a duty to preclude drainage and that this requirement came from the mineral leasing act? I do not think this can be included in the NTT report, because it is a consensus document that included outside scientists. I think we can contextualize the document with the language I offered earlier and Raul can call out the drainage issue specifically in the transmittal memo. I have said all along that we will not have policy folks messing around with the NTT report and I'm afraid we are pushing the limit with the issues we agreed to yesterday.

E. Dwight Fielder, Chief
Division of Fish and Wildlife Conservation
Bureau of Land Management
(202) 912-7230 (Office)
(202) 285-6845 (Cell)

From: Perry, Jim
Sent: Wednesday, December 21, 2011 12:52 PM 3
To: Fielder, Dwight
Subject: Re: Follow up to Today's NPT call on the NTT report

That drainage is a very important issue to people above me, and its prevention is supported by law or regulation, (they are researching it now), and that forces above me will ensure it is adequately addressed. That I would step back from the issue, but others will not. You know.... that stuff.

Here's me stepping back:
If a technical document can prescribe putting utilities in corridors, it can certainly prescribe a form of leasing with virtually zero impact. You can even put "zero" impact in the lease terms.

Almost done with the shoe molding.

From: Fielder, Dwight
To: Morales, Raul
Subject: FW: Follow up to Today"s NPT call on the NTT report
Date: Wednesday, December 21, 2011 11:01:35 AM

I don't know how to respond to this and am thinking that I shouldn't.

E. Dwight Fielder, Chief
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(202) 912-7230 (Office)
(202) 285-6845 (Cell)

From: pat_deibert@fws.gov [mailto:pat_deibert@fws.gov]
Sent: Wednesday, December 21, 2011 1:56 PM
To: Fielder, Dwight; Morales, Raul; 'dave.naugle@cfc.umt.edu'; Perry, Jim; Goodman, Jonathan D; Stout, Joseph R
Subject: Re: Follow up to Today's NPT call on the NTT report

The NTT is providing the science. That does not change with the laws that BLM works under.

From: "Fielder, Dwight" [dfielder@blm.gov]
Sent: 12/21/2011 10:15 AM MST
To: Pat Deibert; Raul Morales; "'dave.naugle@cfc.umt.edu'" <dave.naugle@cfc.umt.edu>; Jim Perry; Jonathan Goodman; Joe Stout
Subject: RE: Follow up to Today's NPT call on the NTT report

But, does the NTT really want to recommend something that is blatantly illegal? It seems to me that the caveat provided makes it clear that the NTT document IS a technical document that has not undergone a policy or legal review.

E. Dwight Fielder, Chief
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(202) 912-7230 (Office)
(202) 285-6845 (Cell)

From: pat_deibert@fws.gov [mailto:pat_deibert@fws.gov]
Sent: Wednesday, December 21, 2011 11:59 AM
To: Fielder, Dwight; Morales, Raul; 'dave.naugle@cfc.umt.edu'; Perry, Jim; Goodman, Jonathan D; Stout, Joseph R
Subject: Re: Follow up to Today's NPT call on the NTT report

I would only consider adding this to a cover memo. The report is a science document period.

From: "Fielder, Dwight" [dfielder@blm.gov]
Sent: 12/21/2011 08:55 AM MST
To: Raul Morales; "'dave.naugle@cfc.umt.edu'" <dave.naugle@cfc.umt.edu>; Jim Perry; Jonathan Goodman; Joe Stout; Pat Deibert
Subject: RE: Follow up to Today's NPT call on the NTT report

To address concerns raised by Jim that some of the NTT recommendations may not be possible under existing law, we are proposing to add the following verbiage (or variation thereof) to the NTT Report introduction, the memo from Raul to the NPT and, possibly, the IM:

"The recommendations in this report have not undergone a full legal review to ensure that they are consistent with the variety of statutes and regulations with which the BLM must comply. Where inconsistencies arise, it is the hope of the NTT that the recommendation(s) may be considered to the fullest extent consistent with the law."

Do you think the NTT would be comfortable with this addition?

E. Dwight Fielder, Chief
Division of Fish and Wildlife Conservation
Bureau of Land Management
(202) 912-7230 (Office)
(202) 285-6845 (Cell)

From: Morales, Raul
Sent: Tuesday, December 20, 2011 3:31 PM
To: 'dave.naugle@cfc.umt.edu'; Perry, Jim; Fielder, Dwight; Goodman, Jonathan D; Stout, Joseph R; Deibert, Pat
Subject: Re: Follow up to Today's NPT call on the NTT report

Ok, we are on for 2:00 Pacific time this afternoon. Thanks everyone.

From: Dave Naugle [mailto:dave.naugle@cfc.umt.edu]
Sent: Tuesday, December 20, 2011 12:59 PM
To: Morales, Raul; Perry, Jim; Fielder, Dwight; Goodman, Jonathan D; Stout, Joseph R; Deibert, Pat
Subject: RE: Follow up to Today's NPT call on the NTT report

Raul,

I'm in and can do it today; was on a conference when you rang. Dave.

From: Morales, Raul [mailto:rmorales@blm.gov]
Sent: Tuesday, December 20, 2011 12:47 PM
To: Perry, Jim; Fielder, Dwight; Goodman, Jonathan D; Stout, Joseph R; Deibert, Pat; Dave Naugle
Subject: Follow up to Today's NPT call on the NTT report

I am trying to pull a call together for 2:00 Pacific time to discuss Jim's comments. I am waiting to hear back from Dr. Naugle and Dr. Tom Remington to see if they can join us. Tom is actually

From:	Goodman, Jonathan D
To:	Fielder, Dwight; Morales, Raul; Stout, Joseph R
Subject:	RE: Follow up to Today"s NPT call on the NTT report
Date:	Wednesday, December 21, 2011 8:04:41 AM
Attachments:	Greater Sage-Grouse National Planning Strategy Draft 12 21 11(clean).docx

Clean final copy of the IM attached, pending SOL input.

--
Dave Goodman
Planning & Environmental Analyst
BLM Division of Decision Support, Planning, and NEPA (WO-210)
dave_goodman@blm.gov
(202) 912-7352

From: Fielder, Dwight
Sent: Wednesday, December 21, 2011 10:59 AM
To: Goodman, Jonathan D
Subject: RE: Follow up to Today's NPT call on the NTT report

Fine by me.

E. Dwight Fielder, Chief
Division of Fish and Wildlife Conservation
Bureau of Land Management
(202) 912-7230 (Office)
(202) 285-6845 (Cell)

From: Goodman, Jonathan D
Sent: Wednesday, December 21, 2011 10:58 AM
To: Fielder, Dwight
Subject: RE: Follow up to Today's NPT call on the NTT report

How about this language to include in the IM?

The conservation measures in Attachment 1 have not undergone a full legal review to ensure that they are consistent with the variety of statutes and regulations with which the BLM must comply. Where inconsistencies arise, the BLM should consider the conservation measure(s) to the fullest extent consistent with the law.

Overall, I'd get rid of recommendations and put in conservation measures to be consistent with our language.

--
Dave Goodman
Planning & Environmental Analyst

> 775-861-6464 (p)
>
> From: Morales, Raul
> Sent: Wednesday, December 21, 2011 3:20 PM
> To: Roberson, Edwin; Nedd, Michael D; Walsh, Noreen
> Cc: Fielder, Dwight; Stout, Joseph R; Stout, Joseph R; Goodman, Jonathan D; Rubado, Jessica A
> Subject: NTT Report and Transmittal Letter
>
> The NTT Report and Transmittal letter have been updated to reflect the comments discussed on yesterday's NPT call. Most comments in The NTT report centered in the fluids minerals section and Appendix D and a few in the Travel and Transportation section.
>
> Merry Christmas to all and a Happy New Year.
>
> Raul Morales
> Deputy State Director Resources, Lands and Planning
> Bureau of Land Management
> 775-861-6464 (p)

From:	Perry, Jim
To:	Morales, Raul; Fielder, Dwight
Cc:	Kriola, Benjamin E; Bergsten, Travis D; Wells, Steven; Perry, Jim
Subject:	RE: NTT Report and Transmittal Letter
Date:	Thursday, December 22, 2011 11:37:36 AM

Raul,

Here are two main points from Dave…, and both statements make sense and are fine with me. **But my question is not answered and my concerns remain. Is the NTT report in error? Please see my recommendation at the bottom.**

Dave said…..
"You have it right…the 50-70% is a minimum acreage of sagebrush habitat necessary over broad scales to maintain a population. "

"Thus the limit of 1 pad per square mile and a 3% cap **on additional footprint.**"

The key words from Dave are "additional footprint"

But here is what the NTT Report actually says in the quotes below. (Rather than 50% - 70% in sagebrush habitat (the minimum needed on a broad scale to maintain a population based on Science), the priority habitat must already, today, have over 97% in sagebrush habitat or else no development is permitted.) 100% - 3% = 97%

- Manage priority sage-grouse habitats so that discrete **anthropogenic disturbances cover less than 3% of the total sage-grouse habitat regardless of ownership**…..
  - "In priority habitats where the **3% disturbance threshold is already exceeded from any source, no further anthropogenic disturbances will be permitted by BLM** until enough habitat has been restored to maintain the area under this threshold (subject to valid existing rights)."
  - In this instance, an additional objective will be designated for the priority area to prioritize and reclaim/restore anthropogenic disturbances so that 3% or less of the total priority habitat area is disturbed within 10 years.

I do not understand the logic in this….at least not the way it is worded in the NTT report.

RECOMMENDATION:
The report should say something like, …"the amount of sagebrush habitat in the priority habitat areas, as of the date of this plan amendment, is a baseline, and additional anthropogenic surface disturbances must not increase the anthropogenic surface footprint by more than 3% "

The NTT bullet points above need to be removed from the report as it conflicts with science.

Jim

From: Morales, Raul
Sent: Thursday, December 22, 2011 1:03 PM
To: Perry, Jim; Fielder, Dwight
Subject: Fw: NTT Report and Transmittal Letter

Jim, your answer to your question this morning.

From: Dave Naugle [mailto:dave.naugle@cfc.umt.edu]
Sent: Thursday, December 22, 2011 10:52 AM
To: Morales, Raul
Subject: RE: NTT Report and Transmittal Letter

Raul,

You have it right...the 50-70% is a minimum acreage of sagebrush habitat necessary over broad scales to maintain a population. I'm not a big fan of setting "minimums" because that is then the number everybody tries to achieve. In reality, many cores surpass this 50-70% minimum because they were delineated around the best remaining habitats.

The non-sagebrush sites within cores may be naturally fragmented or the result of past anthropogenic impacts. Regardless, we cannot further litter the cores with additional anthropogenic impacts without expecting impacts to populations.

We got off track on the NSO and drainage issue because some view non-sagebrush habitat inside cores as a throw away developable area. But additional impacts anywhere inside cores increases cumulative impacts beyond the site of the new well pad. Thus the limit of 1 pad per square mile and a 3% cap on additional footprint.

We've progressed in our thinking past individual lek buffers to now delineate whole cores at appropriately large scales that encompass all seasonal habitats necessary to support a population. We will still see impacts from 1 pad per square mile and a 3% cap on new anthropogenic disturbances.

I hope these end up being acceptable losses that still respect valid existing rights. I suspect the NTT Team would be very leery of endorsing any additional impacts inside cores.

The NPT can determine if existing laws or other issues preclude NTT recommendations; but that is a policy issue not a technical one.

Happy holidays Raul,

Dave

From:	Perry, Jim
To:	Morales, Raul; Fielder, Dwight
Cc:	Kniola, Benjamin E; Barnsten, Travis D; Perry, Jim; Wells, Steven
Subject:	RE: NTT Report and Transmittal Letter
Date:	Thursday, December 22, 2011 6:28:14 AM
Attachments:	2011_1221_Final_NTT_Report_edits made by NTT1.docx

Raul and Dwight,

Thanks for making those edits and for mentioning NSO in the Transmittal memo to the NPT!

I'm confused why the "**Locatable** Minerals" BMPs did not get changed to "**Solid** Minerals" in the Appendix?!?

Last night's edits opens a new, very serious question.... It may be too late to address this in the report, but it is one we will need to address in our outreach to the field....

It appears to me the BLM is being unnecessarily set up for immediate failure across the priority habitats. Nearly all contain roads, pipelines, power lines, homes, farms, well pads, etc.... Science says 30 – 50% in non-sagebrush cover is okay (see quote below), but the NTT Report says 3% in anthropogenic features is the NTT recommended maximum (see quote below).

Am I missing something, is it worded poorly, or is this a misapplication of professional judgment and science?

The report now makes this scientifically-based assertion:
Within priority **habitat, a** minimum range of **50-70% of the acreage in sagebrush cover is** required for long-term sage-grouse persistence (Aldridge et al. 2008, Doherty et al. 2010, Wisdom et al. 2011).

That leaves an allowance of **30 - 50%** in **non**-sage-brush cover. So how was the 3% maximum cap on surface anthropogenic features derived based on "professional judgment"? (see footnote) **3% is a long way from 30 – 50%**

Manage priority sage-grouse habitats so that discrete **anthropogenic disturbances cover less than 3%** of the total sage-grouse habitat **regardless of ownership**. Anthropogenic features include but are not limited to paved highways, graded gravel roads, transmission lines, substations, wind turbines, oil and gas wells, geothermal wells and associated facilities, pipelines, landfills, homes, and mines. [III]

[III] Professional judgment as derived from Holloran 2005, Walker et al. 2007, Doherty et al. 2008, Doherty et al. 2011, Naugle et al. 2011a,b.

- In priority habitats **where the 3% disturbance threshold is already exceeded from any source, no further anthropogenic disturbances will be permitted by BLM** until enough habitat has been restored to maintain the area under this threshold (subject to valid existing rights).

From:	pat_deibert@fws.gov
To:	Morales, Raul
Subject:	Re: NTT report
Date:	Monday, November 07, 2011 2:49:34 PM
Attachments:	2011_1006_NTT_ConservationMeasures_PlanningStrategy (2) pd.doc

Here you go. All is good except the 12 inch fire stuff. We are stuck as I can't support using that from an ESA standpoint. No amount of bananas will help unless you (or the range folks) can convince me there are absolutely no other treatments available, no matter how hard they are.

stubborn in WY.
Pat

(See attached file: 2011_1006_NTT_ConservationMeasures_PlanningStrategy (2) pd.doc)

Pat Deibert , PhD.
National Sage-grouse Coordinator
U.S. Fish and Wildlife Service
Wyoming Field Office
5353 Yellowstone Road, Suite 308A
Cheyenne, WY 82009
307-772-2374, ext. 226
"Morales, Raul" <rmorales@blm.gov>

"Morales, Raul" <rmorales@blm.gov>	To"Deibert, Pat" <pat_deibert@fws.gov>
	cc
	SubjectNTT report
11/07/2011 03:04 PM	

Pat, please take a quick look at what I have highlighted in yellow and let me know if you can live with these additions. I would like to send the report to WO today.

Thx.

Raul Morales
Deputy State Director Resources, Lands and Planning
Bureau of Land Management
775-861-6464 (p)
[attachment "2011_1006_NTT_ConservationMeasures_PlanningStrategy (2).doc" deleted by Pat Deibert/R6/FWS/DOI]

From:	Sell, Robin A
To:	Morales, Raul; Mormolo, Lauren L; ,
Subject:	quick review of NTT document
Date:	Monday, September 19, 2011 11:51:47 AM
Attachments:	2011_0916_NTT_ConservationMeasures_PlanningStrategy_NTT_ReviewDraft_RAS.doc

Raul et al-

I know you guys have done a lot of good work on the document, and I did a reaaaaallly quick review- (attached).

A couple of quick points from memory- Not sure we can say we did a review of existing literature and I don't think Tony's group embarked on that, they were trying to fill in holes for citations etc. The 'new way' to discuss or calculate surface disturbance has merit, but leaves me with lots of questions as well – not sure you can make changes, 'cause I don't know who worked on it or based on what model.
Did the 1/640 acres density recommendation get dropped? Or did I just go over it too fast?
A few other points – poor sentences or clarity for example, may seem minor at this point- but may aid in thorough review if you can fix.

Thanks, Robin

From: Wood, David
To: Morales, Raul
Subject: RE: NTT Report
Date: Monday, November 14, 2011 11:31:26 AM

Hi Raul,

Thanks for the update and glad to see this report heading out to the NPT and others. I am trying to schedule some other sage-grouse planning meetings over the next few weeks so can you give me an idea of if I will be asked to be on the smaller team for the next steps of this and what dates I would need to reserve for that? Thanks!

David Wood
Conservation Biologist
MT/Dakotas BLM State Office
(406) 896-5246

From: Morales, Raul
Sent: Saturday, November 12, 2011 10:32 AM
To: Mermejo, Lauren L; Sell, Robin A; Rinkes, Earl T; Wood, David; Rose, Jeffrey A; Pellant, Michael L; Quamen, Frank R; Bargsten, Travis D; Havlina, Douglas W; Figarelle, Mary; Beecham, Charlie F; Knick, Steven T.; Deibert, Pat; 'dave.naugle@cfc.umt.edu'; 'sesplnosa@ndow.org'; 'jasonrobinson@utah.gov'; 'tony.apa@state.co.us'; 'don.kemner@idfg.idaho.gov'; Perrin, Robert S; 'christian.a.hagen@state.or.us'; (b) (6) 'happylabs@millect.com'
Cc: 'Adair Mutti'; Smurthwaite, Donald S; Fielder, Dwight; Tague, Melvin J; Rubado, Jessica A
Subject: RE: NTT Report

Woops, hit the wrong button!

The rest of the story.

During our several month wait I and others were able to address additional comments I had received from many of you to improve the report. Also, while we were waiting NDOW Director Ken Mayer commissioned an outside review of just the conservation measures by 6 scientist. A small team of NTT members addressed many of these scientist comments and rolled them into our latest daft NTT report (See attachment from Director Ken Mayer and the scientist comments).

The SOL wanted to keep the report as draft and that is why you will see the draft watermark on the plan. Their concern is that they are in negotiations with litigants on a separate lawsuit involving 16 BLM Land Use Plans and they wanted to make sure that our Policy recommendations section did not contradict or mess up these negotiations. As of last Wednesday when the National Policy Team (NPT) received the draft NTT report for the first time the solicitor on the call was feeling positive that our NTT report was not going to impede their negotiations, however, the SOL was waiting from staff comments on the report.

Also, at last Wednesday's NPT call I got another assignment on the NTT report that will involve a small number of NTT members. In the scientist review of our report you will notice one scientist's concern that our report could be challenged (blowback)by outside groups without a stronger

connection between our conservation measures to the available science. I have been tasked to bring the science folks from our NTT team together with an outside scientist to begin strengthening our connections. This will need to be accomplished prior to the publishing of the National Sage Grouse Planning Notice of Intent which is scheduled to be published mid-December. I will be contacting this small group of NTT individuals shortly.

The NPT will be releasing the NTT report to all of the BLM State Director's soon, if it hasn't happened already. The WO will be issuing an instruction memorandum early this coming week that will direct the rest of the Bureau on how the NTT report will be used in the upcoming planning effort. At this point the NTT report will officially become public knowledge. The NPT has asked that I share with you the latest NTT report and to still keep as a close hold to the NTT team until the WO issues their IM.

I have also been working with Public Affairs to draft some talking points for the NTT report which I hope to finalize very soon.

While a report of this nature will not make everyone completely happy I would say that overall, the report seems to have been favorably received both internally and externally. The next step of strengthening the science in our report will no doubt make this report more robust and will lead to an excellent starting point for BLM's planning effort. Again, I am very proud of all our efforts that week we spent in Denver and afterwards putting the report together.

Please call or send me a note if you have any questions.

Thanks and have a great week.

Raul Morales
Deputy State Director Resources, Lands and Planning
Bureau of Land Management
775-861-6464 (p)

From: Morales, Raul
Sent: Saturday, November 12, 2011 8:59 AM
To: Morales, Raul; Mermejo, Lauren L; Sell, Robin A; Rinkes, Earl T; Wood, David; Rose, Jeffrey A; Pellant, Michael L; Quamen, Frank R; Bargsten, Travis D; Havlina, Douglas W; Figarelle, Mary; Beecham, Charlie F; Knick, Steven T.; Delbert, Pat; dave.naugle@cfc.umt.edu; scspinosa@ndow.org; jasonrobinson@utah.gov; tony.apa@state.co.us; don.kemner@idfg.idaho.gov; Perrin, Robert S; christian.a.hagen@state.or.us; (b) (6) | happylabs@millcat.com
Cc: Adair Muth
Subject: NTT Report

Hello fellow NTT members!

I want to give you the latest on our NTT report. Washington BLM finally received the Governor's letters that the solicitor's said we needed in order for me to forward our report to DC. The SOL wanted to make sure that there were no FACA issues related to the state agency involvement in our NTT report.

From:	Apa, Tony
To:	Christian Hagen; Knick, Steven T; David Naugle; Deibert, Pat
Cc:	Kenner,Don; Showe P. Espinosa; JasonRobinson@utah.gov; Morales, Raul
Subject:	Citations for N11 product
Date:	Monday, September 12, 2011 3:22:16 PM
Attachments:	N11_ConservationMeasures_PlanningStrategy_0902_2011_draftScience Citations.docx

Hey Everyone,

I've been putting out other brush fires with regards to my day job and haven't had much time with this. I've tried to identify those biological recommendations that may need a scientific citation. I've taken my hand at highlighting as well and those things I flagged are in grey. I'm working on an introductory part on certainty of conclusions and inference space with regards to science without relating it to any study in particular and run it by everyone. If we don't have the science I'm assuming it will be our best professional judgement.

So, if you could get each of you to take a shot and identify a research citation that supports the biological recommendation along with the full citation I would greatly appreciate the help. Many of you were authors/editors of the SAB and/or an editor of a recent book, so you will have a much better handle on the recent literature than I. I will put together the literature cited and then can incorporate those citations into a more "final document" along with the literature cited.

I would like to get this to Raul before COB Thursday. Thanks in advance.

Tony Apa

Sage-Grouse Research Biologist
Colorado Parks & Wildlife
Northwest Region Service Center
711 Independent Avenue
Grand Junction, CO 81505
970.255.6196 (office)
970.640.1671 (cell)
tony.apa@state.co.us

Do you have some thoughts for me to pass along to Ray?

E. Dwight Fielder, Chief
Division of Fish and Wildlife Conservation
Bureau of Land Management
(202) 912-7230 (Office)
(202) 285-6845 (Cell)

From: Stout, Joseph R
Sent: Tuesday, December 20, 2011 8:35 AM
To: Roberson, Edwin; Fielder, Dwight; Rubado, Jessica A; Todd, Marci L.
Cc: Goodman, Jonathan D
Subject: FW: Planning IM and NTT Report

FYI

Joe Stout
Planning and NEPA Branch Chief
Bureau of Land Management
Washington DC
202-912-7275 (w)
202-658-8191 (bb)

From: Brady, Ray A
Sent: Tuesday, December 20, 2011 8:31 AM
To: Perry, Jim; Nedd, Michael D; Leverette, Mitchell; Berns Kim M; Shoop, Robyn; Martin, Benjamin F; Lucero, Lucas J; Wells, Steven; Kniola, Benjamin E
Cc: Goodman, Jonathan D; Stout, Joseph R
Subject: Re: Planning IM and NTT Report

I have reviewed the Planning IM and Conservation Measures for the rights-of-way activities on page 11-12 of the NTT Report. These planning prescriptions will be significant game changers and unworkable in my mind for the linear ROW program, including renewable energy rights-of-way (especially wind energy program).

The Conservation Measures are focused on identifying all lands within Priority Habitat Areas as "exclusion areas" for rights-of-way and all lands within General Habitat Areas as "avoidance areas" for rights-of-way. The biggest problem with this strategy is that if BLM is going to have any ability to move designated corridors and right-of-way applications out of Priority Habitat Areas (exclusion lands), we are going to have to have the ability to designate corridors and site rights-of-way within the General Habitat Areas. Identifying General Habitat Areas as avoidance areas (tens of millions of acres) is totally unworkable. We need to allow rights-of-way on these lands with mitigation opportunities that provide for off-site mitigation to improve habitat in the Priority Habitat Areas.

The NTT Report includes sections on Habitat Restoration and Monitoring of Habitats, however the prescriptions for rights-of-way are instead focused on identifying exclusion areas and avoidance areas thru Planning decisions. The Conservation Measures for rights-of-way should focus instead on opportunities for habitat restoration and monitoring, adaptive management and off-site mitigation. There are outstanding opportunities for significantly improving sage grouse habitats in Priority Habitat Areas by allowing rights-of-way in General Habitat Areas and allowing for off-site mitigation and restoration of lands disturbed to better sage grouse habitats. Many rights-of-way can be restored to better sage brush vegetation than previously existed.

Page 11 makes references to only a few literature citations that attempt to portray the impacts of rights-of-way on sage grouse. There really are no studies that have been completed that show this direct correlation and I am not aware of any Before/After/Control/Treatment (BACT) studies that have been completed specifically on linear rights-of-way or even more specifically on wind energy or renewable energy projects. Let's support efforts for some adaptive management, off-site mitigation and BACT monitoring in General Habitat Areas instead of identifying these lands as avoidance lands.

From: Perry, Jim
Sent: Tuesday, December 20, 2011 05:07 AM
To: Nedd, Michael D; Leverette, Mitchell; Berns Kim M; Brady, Ray A; Shoop, Robyn; Martin, Benjamin F; Lucero, Lucas J; Wells, Steven; Kniola, Benjamin E; Perry, Jim
Cc: Goodman, Jonathan D; Stout, Joseph R
Subject: RE: Planning IM and NTT Report

Mike,

Ben and I completed our review of the Planning IM and NTT Report. We did not receive any additional 300 program input, so we also looked at the ROW and Solids programs. Those programs might want to look through and verify our edits today, but otherwise, this quick review is good to go to Ed Roberson.

There is one really critical change that needs to be made in the Planning IM. I've discussed it with Dave Goodman – a planner and the primary author, and he agrees. Dave now needs to sell it to his team at their meeting today, so I've cc'd Dave.

Overall, the NTT Report conservation measures are complete game-changers for any actions within the Priority Habitats where there are valid existing rights and showstoppers for those actions where there are no valid existing rights.

Jim

From:	Lueders, Amy L
To:	Morales, Raul
Subject:	RE: FW: Planning IM and NTT Report
Date:	Tuesday, December 20, 2011 8:11:28 AM
Attachments:	image002.png image003.png

You were right—I should have gotten the crying out of my system @ FEI. Ray's note makes me want to cry.

From: Morales, Raul
Sent: Tuesday, December 20, 2011 8:02 AM
To: Lueders, Amy L
Subject: Fw: FW: Planning IM and NTT Report

It continues this morning.

From: pat_delbert@fws.gov [mailto:pat_delbert@fws.gov]
Sent: Tuesday, December 20, 2011 08:49 AM
To: Fielder, Dwight
Cc: Morales, Raul
Subject: Re: FW: Planning IM and NTT Report

Dwight -

Avoidance areas are not exclusion areas. It was not the intent to shut-down ROW in general sage-grouse habitats, but rather be extremely judicious in their placement. Pushing them outside of PPH without provisions for general habitats would likely have resulted in lots of ROWs in the general areas, some of which may have been duplicative or unnecessary. That may have diminished the value of the adjacent PPHs, and potentially preclude opportunities for restoration and maintenance of connectivity in general habitats. I don't think there are any expectations that there will be no ROWs in general habitats, and the NTT acknowledges valid existing rights in both PPH and general habitats, and provides provisions. I've copied Raul on this response to make sure I am not mis-interpreting the intent of the NTT.

As for no knowledge on ROWs - we know a lot about roads and the effects on sage-grouse vital rates - particularly breeding activities. We don't know about most renewables, but given the similarities in infrastructure with non-renewables and their known negative impacts on sage-grouse we can use professional judgement to be conservative in planning developments. Research is on-going, and those data - when available - should be used for adaptive management. I would love to restore unneeded ROWs to "better sagebrush vegetation" but am unaware of the ability to do so. Funding and seed sources also seem to be reoccurring concerns with revegetation to sagebrush and the associated native understory.

This is a change in business as usual - no doubt - and it will result in some difficult choices. I don't believe either the IM or the NTT stop valid existing rights, nor was that their intent. I do think they will make us think more creatively about how to honor those rights and conserve sage-grouse. This is also true for new activities. In the end it may come to a choice between conserving grouse or not on these local projects.

From: trinkes@blm.gov
To: pmable@enviroissues.com; Morales, Raul
Subject: Introduction for NTT Report
Date: Wednesday, September 14, 2011 3:42:03 PM

Penny and Raul,

I have had a discussion about the intro that I proposed with Steve Ellis and our Chief SOL in Boise. I have some suggested wording changes concerning a recommendation that I made last week for the introduction. This involves the second paragraph following the bullet points as to the charge of the NTT team in the introduction. The following is my revised wording for the paragraph:

> These policy recommendations and conservation measures were identified and discussed among team members. The recommendations and measures provide the tools to BLM that provides for the greatest potential for success to conserve sage-grouse. The team understands that management will implement these recommendations and conservation measures to the greatest extent practicable and may prioritize actions/amendments over other actions/amendments to achieve the best use of resources and protection of sage-grouse within a region.

Tom

****

Tom Rinkes, Wildlife Biologist
BLM Idaho State Office
Division of Resources and Science (931)
208.373.4045
208.559.8477(c)

From:	Tague, Melvin J
To:	Morales, Raul
Cc:	Rubado, Jessica A
Subject:	FW: sage grouse NTT report
Date:	Thursday, November 10, 2011 7:09:03 AM

Raul,

I think you will have to answer this one.

Joe

From: Roberson, Edwin
Sent: Wednesday, November 09, 2011 11:49 AM
To: Brown, George
Cc: Morales, Raul; Tague, Melvin J; Rubado, Jessica A; Perry, Jim; Spisak, Timothy
Subject: Re: sage grouse NTT report

I am not a biologist, George. I have copied folks who can provide you an answer. Thank you. Ed

From: Brown, George
Sent: Wednesday, November 09, 2011 12:34 PM
To: Roberson, Edwin
Subject: sage grouse NTT report

Edwin,

Questions about an item on page 9 of the NTT report.

> (1) Each one-mile^2 analysis section will be managed so that total anthropogenic disturbance does not exceed 2.5 %. However, total anthropogenic disturbance is likely to exceed this threshold within an analysis unit with some developments. For example, a sand and gravel mine can result in intensive development of 40 acres, effectively rendering the area unsuitable to sage-grouse. The actual 40-acre disturbance may not push total anthropogenic disturbance to more than 2.5% for the entire priority area, but obviously has a significant local impact. In these situations, 40 acres of off-site mitigation will be necessary to offset this loss of habitat. The priority is to implement off-site mitigation within the priority sage-grouse habitat, followed by general sage-grouse habitat.

-What is the scientific basis/rationale for selecting 2.5% (instead of some other percentage)?
It appears to refer to 2.5% of every section, regardless of the actual size of the priority habitat area, so the limitation would be greater.

For instance, if the priority habitat area is 20 square miles (12,800 acres), 2.5% of that would be 320 acres (20 times 640 acres times 2.5%). But if it pertains to every section, then the limit is 16 acres of disturbance per section (2.5% times 640 acres), or 0.125% of the priority habitat area.

-Given the example and assuming that is what is intended as the limitation, what is the basis for requiring 100% mitigation?

If 2.5% or less disturbance is acceptable (less than 16 acres) if 40 acres is disturbed, why wouldn't the requirement be to provide offsite mitigation for at least 25 acres instead of a flat 40 acres? Is the rationale that "sage-grouse population must be maintained or increased", so zero disturbance is acceptable?

Requiring 100% offsite mitigation implies total destruction of a disturbed area instead of reclamation. Disturbance may persist until reclamation has been accomplished, so there will be a time lag as discussed today.

-Question about what is acceptable "offsite mitigation" specifically for sage grouse? Offsite mitigation is a nice buzzphrase that sounds good, but as the saying goes, the devil is in the details. What exactly would be involved? (since the other area would presumably already be land that was undisturbed suitable habitat). What extra measures would be required specifically for sage grouse (e.g., purchase/acquisition of private fee lands)?

George Brown, CME 0134
Geologist WO320
Washington Office BLM
570-593-8659 (telework phone)
570-593-8659 (telework fax - call first –need to reset settings before sending a fax and be off the phone)
202-912-7118 (voicemail messages only)
202-245-0012 (M St. fax #1)
202-912-7199 (M St. fax #2)

From: Thomas Remington
To: Morales, Raul
Subject: Re: NTT Report (2nd Draft)
Date: Monday, December 19, 2011 8:32:36 AM

Raul, thanks, but I didn't see any attachments?

> ----- Original Message -----
> **From:** Morales, Raul
> **To:** Mermejo, Lauren L ; Sell, Robin A ; Rinkes, Earl T ; Wood, David ; Rose, Jeffrey A ; Pellant, Michael L ; Quamen, Frank R ; Bargsten, Travis D ; Havlina, Douglas W ; Figarelle, Mary ; Beecham, Charlie E ; Knick, Steven T ; Deibert, Pat ; 'dave.naugle@cfc.umt.edu' ; 'sespinosa@ndow.org' ; 'jasonrobinson@utah.gov' ; 'tony.ape@state.co.us' ; 'don.kemner@idfg.idaho.gov' ; Perrin, Robert S ; 'christian.a.hagen@state.or.us' ; Kniola, Benjamin E
> **Cc:** (b) (6)
> **Sent:** Saturday, December 17, 2011 11:22 AM
> **Subject:** NTT Report (2nd Draft)
>
> Here is the 2nd draft of our NTT report. It is draft because the solicitors (as far as I can tell) like it that way.
>
> There are big changes with the layout of this report as compared to the previous document. Based on comments from the solicitors and the independent science review team this draft reflects those comments. The solicitors were struggling with having a Policy recommendations piece in the NTT report due to ongoing negotiations with current litigants over a lawsuit affecting 16 BLM LUP's. So we removed the Policy recommendation piece from this draft report and instead we addressed those concerns through a letter from me to the NPT (see attachment). Overall the original intent of most of our conservation measures we developed in Denver are still the same. The wording describing some conservation measures is different, again to address solicitors concerns, but the intent is the same.
>
> As a result of our science team review last week in Phoenix, there are a few major changes to the conservation measures from the 1st draft to this draft:
>
> Recreation - removed measure about SRMAs.
>
> Land Tenure - removed from Exception:
>
> * Seek to acquire state and private lands with intact subsurface mineral estate by donation, purchase or exchange in order to best conserve, enhance or restore sage-grouse habitat.
>
> Range Management - changed, re-ordered and revised several measures to clarify and reduce repetitiveness.
>
> Minerals -
>
> * Significant introductory discussion and rework of leased fluid mineral estate measures.
> * Coal
> * deleted - Do not require offsite mitigation when the short-term effects are mitigated by the long-term benefits, for example, phased reclamation, (assuming sage-grouse can be restored [Musil et al. 1993, Reese and Connelly 1997, Baxter et al. 2008] to the area or if offsite mitigation demonstrates sage-grouse will be maintained in the population area).

Habitat Restoration

* deleted - Surface disturbance resulting from wildfires may render a designated priority habitat as unsuitable for continued sage-grouse occupancy. Additional priority habitats may be designated to compensate for lost habitats until such time as the original priority habitats either recover or are restored and sage-grouse populations successfully re-established to pre-disturbance levels.

Monitoring section has been significantly updated.

Yesterday, Washington sent out the draft IM introducing the NTT conservation measures to the National Policy team for their review. The conservation measures were not sent out (solicitors need to review again). Goal is to have the final IM and conservation out to the Bureau during the holiday season.
I really believe this new draft is a significant improvement to our first draft and the science underpinnings for our conservation measures are much stronger. I again want to thank everyone involved in both drafts for their efforts and dedication to this effort. Now the fun is about to really begin as the public scoping meetings begin in early January and we will begin to see what the comments from the public will be!

Merry Christmas and Happy New year to all.

Raul Morales
Deputy State Director Resources, Lands and Planning
Bureau of Land Management
775-861-6464 (p)

From:	Sell, Robin A
To:	Morales, Raul
Subject:	NTT Science review
Date:	Friday, September 16, 2011 6:33:49 AM

Hi Raul-

I know you are working to pull together a revised NTT document. Tom R mentioned it might be sent out for a quick NTT review before going to the National Policy Team- that would be great! My question, and maybe a suggestion... I don't feel like we really got into (or had time to discuss) the current science out there on SG... so I would like to propose that the researchers and biologists on the NTT – maybe a few other bios if appropriate - meet again in the next few months (maybe Nov/Dec) for about 3 days to have a frank discussion on various studies/papers out there... the good, bad & ugly so to speak. It would not have to hold up the current document we have worked on- the Policy and Regional ID teams can continue to work on their tasks- but a more concentrated and defensible overview of the science (all of it, to our ability) would be great justification for the RMP effort and an invaluable tool for more localized NEPA and project/management implementation. It would also help CO/UT with the upcoming GUSG listing – we will be referencing the same data sources anyway. My thought is, we can pull together the straight science side of things by end of January- do it right- and it will still inform and support 1) ongoing planning in all stages, and 2) cumulative effects report efforts. People can continue to move forward on the other teams, if we find with a more robust review of the science we need to tweak a few recommendations- there should still be time to do so, and I think it will better support and defend criticism down the line.

I will be in the office until at least 1pm today if you want to discuss quickly. The reality, the science folks were not going to have this kind of discussion with program leads in the group, and our timeline did not allow this review and scrutiny. But I think this kind of full disclosure will really benefit the Bureau, FWS, and SG down the road. Let me know what you think.

Robin
303.239.3723

From:	Roberson, Edwin
To:	Luedors, Amy L; Morales, Raul
Subject:	Fw: Draft NTT report
Date:	Wednesday, November 09, 2011 7:13:02 AM

FYI. SOL feedback.

From: Russell, Gregory
Sent: Wednesday, November 09, 2011 08:09 AM
To: Roberson, Edwin
Subject: RE: Draft NTT report

(b) (5)

From: Russell, Gregory
Sent: Wednesday, November 09, 2011 10:07 AM
To: Roberson, Edwin
Subject: FW: Draft NTT report

From: Morales, Raul
Sent: Monday, November 07, 2011 8:22 PM
To: Roberson, Edwin
Cc: Tague, Melvin J; Fielder, Dwight; Hallett, Hal; Russell, Gregory
Subject: Draft NTT report

Alas, the long awaited NTT report. A small team of us completed changes to the report that reflected some of the review comments made by outside scientist commissioned by NDOW Director, Ken Mayer(see 2nd and 3rd attachments). The outside scientists only reviewed the Conservation Measures section of the report and not the Policy recommendations. Our team also only addressed the quick comments made by the science team. Some of the 'longer" term comments made by the science team (i.e. space and time) were not addressed and can be discussed by the National Policy Team at some point to determine the need for our Conservation Measures to address some of the science "short falls" brought up by the science team.

Raul Morales
Deputy State Director Resources, Lands and Planning
Bureau of Land Management
775-861-6464 (p)

From:	Sell, Robin A
To:	Wood, David; Morales, Raul
Cc:	Quamen, Frank R; Mermejo, Lauren L
Subject:	RE: BLM Talking Points for the NTT Report
Date:	Friday, September 30, 2011 2:08:34 PM

I agree with David's comments, wish I had time to spin off those and add a few more. Bottomline- the range ones in particular seemed way off base, and reflect very narrow interpretations of proposed conservation measures. In fact, in the range section, *most* of the measures proposed should reflect current management -- not a new way of doing business. It worries me someone out there is sharing a much different message. If you are still taking comments in a few weeks, I'd be happy to provide my two cents worth.

From: Wood, David
Sent: Friday, September 30, 2011 2:55 PM
To: Morales, Raul
Cc: Sell, Robin A; Quamen, Frank R; Mermejo, Lauren L
Subject: RE: BLM Talking Points for the NTT Report

Hi Raul,

Based on our discussion I tried to provide some ideas and ways to improve these talking points. I think an approach that talks much more about restoring the balance and leads off with a discussion about how ongoing unchecked development has got us into the situation would be useful. Language still needs a lot of cleaning up and not spun to just talk about the negative. Until we can talk about the impacts to our program in a practical and realistic nature, we will not be able to avoid becoming victims of the standard fear mongering approaches taking these days. These are intial thoughts, did not have time to get into it too much more.

David Wood
Conservation Biologist
MT/Dakotas BLM State Office
(406) 896-5246

From: Morales, Raul
Sent: Tuesday, September 27, 2011 6:21 PM
To: Beecham, Charlie F; Bargsten, Travis D; Figarello, Mary; Havlina, Douglas W; Kniola, Benjamin E; Mermejo, Lauren L; Pellant, Michael L; Perrin, Robert S; Quamen, Frank R; Rinkes, Earl T; Rose, Jeffrey A; Sell, Robin A; Wood, David
Subject: BLM Talking Points for the NTT Report

All, attached is what I have received to date. I have not modified anything, I just cut and pasted into the attached word document. Charlie, do you have any talking point for minerals that you would like to provide? Now that you can see what I have received if anyone would like to add/comment on the talking points please get them to me by the end of the week.

Garfield County

November 26, 2013

John Mehlhoff
Acting State Director, Colorado
Bureau of Land Management
2850 Youngfield Street
Lakewood, Colorado 80215

Dan Jirón
Regional Forester, Rocky Mountain Region
U.S. Forest Service
740 Simms Street
Golden, Colorado 80401

RE: Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement

Dear Mr. Mehlhoff and Mr. Jirón:

The undersigned organizations write to express our concerns with the Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement (DLUPA/EIS). This comment letter does not replace but is in addition to detailed technical comments that may be submitted by the individual undersigned organizations to the Bureau of Land Management and U.S. Forest Service (the agencies) on this matter. Our constituents represent a diverse group of stakeholders that drive and rely on economic development in northwest Colorado, utilize public lands for myriad multiple-use activities, and play a significant role in the protection and conservation of plant and wildlife species, including the Greater Sage-Grouse (GSG), and its habitat. We therefore have a direct and vested interest in the proposed management decisions in the DLUPA/EIS.

We believe there have been significant efforts undertaken in northwest Colorado to conserve GSG and we support the agencies' efforts to craft additional management procedures to conserve and protect the species and its habitat in order to demonstrate to the U.S. Fish & Wildlife Service (FWS) that a listing under the Endangered Species Act (ESA) is unnecessary. Nonetheless, after reviewing the DLUPA/EIS we have identified several issues with the document that, if implemented, will have a number of inequitable socioeconomic consequences in northwest Colorado. Furthermore, we have concluded that the proposed management procedures in the DLUPA/EIS far exceed what is needed to demonstrate to FWS that the regulatory mechanisms needed to conserve GSG and its habitat will exist in the planning area.

The signatories of this letter are seriously concerned about many facets of the DLUPA/EIS that will adversely affect our respective constituencies. We collectively believe that the document has been rendered fundamentally flawed due to the following reasons:

1. The document does not contain an adequate range of alternatives as required under the National Environmental Policy Act (NEPA)
2. The analysis and recommendations in the document rely heavily on the BLM National Technical Team's Report (NTT) Report, which failed to include recent scientific and commercial data and would severely limit the ability of the agencies to meet their multiple-use mandates
3. The agencies have proposed overly broad and rigid management restrictions in mapped habitat areas
4. The analysis underestimates the negative socioeconomic impact of the proposed management of GSG in the planning area
5. The disturbance cap methodology proposed in the DLUPA/EIS is not clearly defined and lacks scientific justification
6. The document does not adequately explain the proposed mitigation strategy or the context for its use.

Because the management policies resulting from this planning effort will significantly affect northwest Colorado and the future economic vitality of local communities within the planning area, the agencies must rectify these issues before preparing the final LUPA/EIS and issuing a Record of Decision.

Inadequate Range of Alternatives

NEPA and Council on Environmental Quality (CEQ) regulations require agencies to consider a well-defined range of management alternatives and have a clear basis for choosing among the options. While the agencies claim they "will consider a range of reasonable alternatives, including appropriate management prescriptions,"[1] the DLUPA/EIS does not include an alternative that would protect GSG and its habitat while also meeting the traditional multiple-use concepts required under the Multiple-Use Sustained Yield Act of 1960, the Federal Lands Policy and Management Act of 1976 (FLPMA), and the Forest and Rangeland Renewable Resources Planning Act of 1974 as amended by the National Forest Management Act of 1976. Alternatives carried forward for analysis must be reasonable and meet existing land use objectives and mandates.

Instead, the preferred alternative (Alternative D) largely represents a mixture of the elements of Alternatives B and C, one of which relies on non-site specific recommendations from the NTT report, and another that employs impractical restrictions developed by special-interest environmental groups. As currently proposed, it is unclear how the BLM would implement any of the proposed alternatives and still be able to meet their multiple-use mandate.

[1] DLUPA/EIS at 25

During scoping, the agencies received input from local and state governments that have been recognized as cooperating agencies in this process. During these meetings, the cooperating agencies offered substantive input that would provide a fourth alternative usually reserved for cooperating agency guidance. Unfortunately, those suggestions were not factored into the formulation of alternatives.

To ameliorate this dilemma, we urge the agencies to draw upon the materials submitted by the cooperating agencies that foster GSG conservation as well as a range of public land uses and incorporate those elements into the preferred alternative in the final LUPA/EIS. Taking this step will help ensure that the final LUPA/EIS actually balances economic development with GSG protection in the planning area and that the agencies have considered a broader range of management alternatives as required under NEPA and CEQ regulations.

Overreliance on the NTT Report

We question the reliance on many cited sources in the DLUPA/EIS, particularly the NTT Report. Some recommendations from the NTT report are directly included in the preferred alternative, and it appears the report serves as the basis of many of the proposed management restrictions.

The use of the NTT report is problematic as it contains overly burdensome recommendations that are not based on local conditions in northwest Colorado. An independent review of the report shows that it contains many methodological and technical errors, selectively presents scientific information to justify recommended conservation measures, and was disproportionally influenced by a small group of specialist advocates.[2] As such, the NTT report does not adequately represent a comprehensive and complete review of the best scientific and commercial data available and is inappropriate for use as the primary basis of many of the proposed management restrictions.

Overly Broad Application of Restrictions in Habitat Areas

We question the proposal to impose rigid, uniform management restrictions without consideration of local conditions in habitat areas that were mapped by Colorado Parks & Wildlife. The agencies have proposed to prohibit surface occupancy or disturbance within four miles of a lek in Preliminary Priority Habitat (PPH) during nesting, lekking, and early brood-rearing periods. The four-mile buffer around leks does not address the variations in habitat quality or use and given the topography of the planning area there is substantial acreage within four miles of leks that may not actually be GSG habitat.

The map of "Ecological Sites Supporting Sagebrush" fails to differentiate between sagebrush habitat quality or use by GSG. As a result, the agencies may be arbitrarily expanding areas subject to the management restrictions outlined in the DLUPA/EIS to areas that do not actually contain active leks or GSG habitat. In addition, there is no scientific evidence that enforcing rigid, uniform restrictions across thousands of acres will actually benefit the species and its habitat, which is counter to the

[2] Rob Roy Ramey, *Review of Data Quality Issues in a Report on National Sage-Grouse Conservation Measures Produced by the BLM National Technical Team (NTT)*, (September 19, 2013).

agencies' objectives for this planning process. These factors undercut the agencies' ability to work with users of public lands to identify site-specific plans that allow for development while protecting the GSG and high-quality habitat.

Furthermore, the agencies have not provided a mechanism to ground-truth the habitat areas on a project-specific basis before imposing restrictions, or to monitor its quality or use in the future. Without ground-truthing and future monitoring, the agencies will likely preclude multiple-use activities in areas that do not actually support GSG habitat or active leks, unnecessarily preventing economic activities without commensurate benefit to GSG populations and habitat.

Inadequate Socioeconomic Analysis

Users of public lands in northwest Colorado pump millions of dollars of into the national, state and local economies and provide thousands of high-paying jobs within the planning area. The management restrictions and closures in the DLUPA/EIS will undeniably have a direct impact on these users and will have a negative impact on the future viability of coal and hard rock mining, oil and natural gas development, agricultural production, grazing and ranching activities, and power generation in the planning area and beyond. As a result, crucial tax revenue and other economic benefits from these activities will decline.

Unfortunately, the agencies underestimate and consequently underreport this negative impact. The socioeconomic analysis is biased in favor of non-market valuation methods which by the agencies' own admission "are not directly comparable to regional economic indicators commonly used to describe how natural resources on public lands contribute to the regional economic indicators such as output/sales, labor income, and employment."[3] Due to this bias, the agencies have overestimated non-market valuations and underestimated the negative economic impact on local communities and the State of Colorado.

The agencies portray the socioeconomic impacts on the entire planning area but do not delineate the effects that would result from the proposed management restrictions on specific areas, including counties. A more specific portrayal of the projected impacts which was proposed by many cooperating agencies during the scoping process would help those impacted to fully understand the varying levels of socioeconomic impacts that will result from the DLUPA/EIS.

Disturbance Cap Methodology

Limiting surface disturbance in the 21 management zones using a cap is a central component of the management of GSG as proposed in the DLUPA/EIS. The methodology proposed for implementing a cap in the DLUPA/EIS is not clearly defined, lacks scientific justification, and no evidence exists that it will result in sustaining or increasing sage grouse populations.

The agencies have not adequately elucidated several critical details about the functionality and application of the cap concept. For example, the DLUPA/EIS does not clearly explain the scientific

[3] DLUPA/EIS at M-13

data or the sources for that data that is being used to establish the cap; how the disturbance database would be managed and updated and by whom; if or how disturbance percentages will capture reclamation or habitat enhancements; whether and how temporary anthropogenic disturbances will be treated differently than permanent disturbances; and whether and how GSG populations will be actively monitored in each zone and by whom. Because a cap tool, like the one proposed in the DLUPA/EIS, presents myriad challenges that may inhibit consistent and clear implementation, the basis and functionality of the tool must be clearly thought out and presented to entities that will be impacted by its use.

The agencies have not presented information adequately demonstrating that limiting total disturbance to less than 30% in a particular management zone is actually achievable, scientifically defensible, and would result in stable populations in the management zones. Habitat disturbance should be managed according to more localized considerations including habitat quality and habitat distribution, as well the nature and variability of multiple use activities and their associated mitigation.

We are similarly concerned that the cap approach affords the agencies the unprecedented discretion to halt projects on public lands in order to compensate for disturbances on private land. While the agencies state they will not inventory private lands or monitor the activities of private landowners, they will track and account for large projects on private lands and apply them against disturbance caps.[4] This approach represents a broad overreach of the agencies' authority and is inappropriate.

Mitigation Strategy and Context for Use

Throughout the DLUPA/EIS, the agencies reference the notion of utilizing mitigation strategies but have not adequately defined the basis or context when mitigation might be used. While BLM has adopted an interim offsite mitigation policy, the DLUPA/EIS lacks the specificity necessary to implement approaches that would meet the parameters of this policy, much less give adequate direction to BLM Field Offices that mitigation is a viable option.

Colorado, through a diverse stakeholder process, has under development a mitigation approach called the *Colorado Habitat Exchange* that would meet, if not exceed, BLM's mitigation policy. We request that the agencies develop a more meaningful strategy for mitigation and further define the means by which mitigation might be used in the context of the alternatives in the DLUP/EIS with special attention paid toward the efforts underway in the State around the *Colorado Habitat Exchange*.

[4] DLUPA/EIS at F-3

Conclusion

We respectfully request that the agencies rectify the issues identified above before preparing the final LUPA/EIS and issuing a Record of Decision. As written, the DLUPA/EIS does not represent a balanced approach to the future conservation of GSG and economic development in the planning area and its implementation may ultimately preclude the agencies from carrying out their respective multiple-use mandates. It also far exceeds what is needed to demonstrate to FWS that a federal listing of the GSG is unnecessary. The undersigned organizations appreciate the agencies' consideration of these concerns and are fully willing to further discuss these comments and recommendations with you in more detail.

Sincerely,

John Martin, Chairman

Board of County Commissioners

Mike Samson, Commissioner

Tom Jankovsky, Commissioner

Other Signatures include:

Associated Governments of Northwest Colorado
Moffat County Commissioners
American Petroleum Institute
Bord Gulch Ranch
Colorado Cattlemen's Association
Colorado Farm Bureau
Colorado First Conservation District
Colorado Mining Association
Colorado Public Lands Council
Colorado Woolgrowers Association

Douglas County Conservation District
Independent Petroleum Association of America
Public Lands Advocacy
Rio Blanco County Commission
West Slope Colorado Oil and Gas Association
Western Energy Alliance
White River Conservation District

cc: The Honorable John Hickenlooper, Governor, State of Colorado
The Honorable Mark Udall, U.S. Senate
The Honorable Michael Bennet, U.S. Senate
The Honorable Scott Tipton, U.S. House of Representatives
Tom Tidwell, Chief, U.S. Forest Service
Neil Kornze, Acting Director, Bureau of Land Management
Jim Cagney, Northwest Colorado District Manager, Bureau of Land Management
Mike King, Executive Director, Colorado Department of Natural Resources
Robert Broscheid, Director, Colorado Parks & Wildlife

DEFICIENCIES IN THE

NORTHWEST COLORADO GREATER SAGE-GROUSE

DRAFT ENVIRONMENTAL IMPACT STATEMENT AND LAND USE PLAN AMENDMENT

November 26, 2013

I. Overview

Garfield County finds the Northwest Colorado Greater Sage-Grouse Draft Environmental Impact Statement and Land Use Plan Amendment (DEIS) is deficient is numerous areas and does not comply with the National Environmental Policy Act (NEPA), Council on Environmental Quality Regulations (CEQ Reg.), Federal Land Policy and Management Act (FLPMA), Bureau of Land Management (BLM) NEPA Planning Regulations, BLM Departmental Procedures as well as U.S. Forest Service NEPA planning rules and departmental procedures.

Attached to this memo is an analysis using the NEPA checklist from the BLM Environmental Statement Memorandum that accesses whether the DEIS is compliant with the statutes, rules and procedures that govern the preparation of an environmental impact statement. In making this assessment, major failings of the DEIS have been identified and are being included through these comments for the purpose of providing the BLM and USFS and opportunity to correct the flaws prior to releasing a final statement. We find that the document needs to be redrafted to include the missing information and correct critical errors, and a supplemental statement should be prepared to carry forward the local plan alternative.

II. Analysis

A. Failure to Rigorously Analyze and Consider All Reasonable Alternatives

Selection and discussion of the alternatives in an Environmental Impact Statement are the foundation from which all other analysis and comparisons are made to complete a proper statement. In fact, CEQ regulations describe the alternative analysis as "the heart of the environmental impact statement." (40 CFR 1502.14)

> *"This section is the heart of the environmental impact statement. Based on the information and analysis presented in the sections on the Affected Environment and the Environmental Consequences, it should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public."*

To fulfill this duty, the lead agency is required to "Rigorously explore and objectively evaluate all reasonable alternatives. " (40 CFR 1502.14(a)) The Northwest Colorado Greater Sage-Grouse Draft Environmental Impact Statement (DEIS), fails to provide this analysis. It does this in three primary ways:

(1) By not preparing and carrying forward the local plan alternative that was discussed during scoping, thereby providing the local perspective on how best to conserve the sage-grouse;

(2) By not fully describing, discussing and analyzing the no action alternative with the same context and intensity as the action alternatives; and,

(3) By only carrying forward three similar action alternatives with vary degrees of application of the same conservation measures.

1. Failure to Prepare and Carry Forward the Local Plan Alternative

During the scoping process, the counties within the planning area participated as cooperating agencies, including Garfield County. Appropriately, during this forum, the counties advocated preparing one alternative that represented the local perspective, which would be a combination of five local sage grouse conservation plans that together covered the planning area. Each of the plans took into account the unique local topography and habitat of the different areas, as well as, the unique industries in each area and created policies and conservation measures that matched the local impacts on the greater sage-grouse. The local plans balanced sage-grouse conservation with the productive use of the land and advocated policies which provided for continued use of the land by the people who lived in the communities.

This was a distinctly different approach to sage-grouse conservation than the NTT, top down, eleven-state blanket set of policies mandated to be considered as an alternative by the Department of Interior Secretary. The counties felt that a local alternative should be included in order to ensure that all of the perspectives of the competing interests were appropriately represented in the environmental statement. In this way, the alternatives would be distinct with "sharply defining issues," "providing a clear basis for choice among options." Their request was summarily dismissed by the lead agency with little explanation as to why, other than Washington D.C. would not accept the local plan approach.

However, when national pressure was placed on the agency by environmental organizations that advocated complete removal of the productive resource industries, such as livestock and the oil and gas industries, an alternative representing their views was included. This is currently Alternative "C" in the DEIS.

Garfield County initiated coordination with the lead agency and the Bureau of Land Management (BLM) for the purpose of ensuring consistency with the local policies and to gain further explanation as to why the local perspective was not being included in the analysis. The County was told by the Northwest Colorado BLM Director that the reason the plan the County participated in (The Piceance-Parachute-Roan Plan, or PPR) would not work was because it was "voluntary," and the agency could not implement such a program.

Given that feedback, Garfield County refined the PPR plan for the area within its jurisdiction and developed a series of mandatory policies that were based on the best available science that could be implemented by the BLM. The plan was submitted to the BLM during the scoping process prior to the completion of scoping comments giving the agency sufficient time to consider and include the Garfield Plan as a reasonable alternative for the area within the counties jurisdiction.

The lead agency did not sufficiently analyze or carry forward the Garfield County plan. Instead, it included the Plan and the County's analysis in the DEIS as an appendix for the public to comment. The BLM refused to carry forward the Plan stating that the conservation measures in the County's plan were incorporated into the other alternatives. Nothing could be further from the truth.

None of the alternatives remotely resemble the science-base approach of the Garfield plan, nor the habitat delineation, nor the policies based on local topography. The very appendix the BLM included in the DEIS that provides the County's plan also includes the County's analysis of the numerous inconsistencies between the three action alternatives and the County's plans, none of which have been addressed or resolved. Their statement that the County's policies are included in other alternatives is disputed by the evidence in their own DEIS pointing out the inconsistencies. The BLM's decision not to carry forward the Garfield plan was strictly a policy decision and one that does not comply with the requirements of NEPA.

NEPA requires that when there are unresolved conflicts between local plans and the proposed action that these conflicts be discussed in the Environmental Consequences section of the document. 40 CFR 1502.16 (Environmental Consequences) "It shall include discussions of:

> *(c) Possible conflicts between the proposed action and the objectives of Federal, regional, State, and local land use plans, policies and controls for the area concerned."*

There is no such discussion in the DEIS in the environmental consequences section or any other section of the document.

Further, the agency is required to include an alternative in the analysis that resolves the conflict between the proposed action and the local plans and policies (40 CFR 1501.2).

> *"Agencies shall integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts. Each agency shall:*
>
> *(c) Study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources as provided by section 102(2)(E) of the Act."*

There are considerable and numerous unresolved conflicts between the counties' plans and the proposed action and these were brought to the attention of the BLM repeatedly and at every opportunity throughout the development of the DEIS. But, the counties concerns were ignored. The evidence of this is the DEIS itself, which does not carry forward an alternative that resolves the conflicts with the counties in the planning area, and makes no mention of the action it will take to resolve these conflicts.

Had the BLM been forthcoming with the counties early in the process as to the reasons it would not consider the local plans, and then been willing to work with the counties to develop a local plan alternative that it could implement, then such an alternative could have been carried forward and

available for review by the public and decision makers. That Garfield County was able to refine its plan into an approach that could be adopted and implemented by the agency in just a few short months, demonstrates how easily this could have been done for the entire planning area during the two-year scoping process. However, the BLM was unwilling to carry forward an alternative that truly represented the local perspective. Instead, it slightly modified the NTT Alternative (B) and labeled this the local option (Alternative D) to give the appearance that all viewpoints are represented through the range of alternatives.

Washington D.C.'s perspective to create a single use landscape is clearly represented in Alternative B. The Environmental Organization's agenda to eliminate all use of the land is fully described and analyzed in Alternative C. Alternative D, the so-called local option, varies little from its parent, Alternative B, and differs considerably for the actual local plans already in existence across the planning area.

The DEIS is fatally flawed, as it fails to offer an alternative that represents all the reasonable alternatives by excluding any consideration of a local plan option. A supplemental statement should be prepared that carries forward the local plan alternative.

2. Failure to Fully Describe, Discuss and Analyze the No Action Alternative

Section 40 CFR 1502.14(b) requires that the document "devote substantial treatment to each alternative considered in detail including the proposed action so that reviews may evaluate their comparative merits." This includes the no action alternative. However, in this case, the no action alternative (A) is sparsely described. The side-by-side table analysis shows detailed policies in the three action alternatives, but rarely details the current existing policies. In some cases, the policies detailed in the "action" alternatives are already authorized under current law, but the document fails to note this in the "no action" alternative. This appears to be a deliberate attempt to lead reviewers to believe existing laws do not contain conservation measures sufficient to protect the Greater Sage-Grouse. Nothing could be further from the truth. The DEIS fails to acknowledge that there are existing laws, regulations and policies that mandate the BLM and USFS manage habitat for candidate, sensitive, threatened, endangered and other special species designations.

3. Failure to Sufficiently Distinguish Between Alternatives

The three action alternatives are variations of the NTT policies mandated from Washington D.C. For instance, two key fundamental components that dictate the direction of the conservation policies and restrict the policy options come directly from the NTT report. These are the delineations of habitat and the required design features.

The habitat is delineated into priority, general and linkage habitat in the NTT report and also in all three action alternatives. This type of habitat description may be appropriate in some areas, but not in all as is the case in Garfield County. However, by limiting each alternative through these habitat parameters, it follows that the conservation measures will have few variances.

In contrast, the Garfield County conservation plan defines the habitat areas as “suitable” and “unsuitable” with clear and reproducible parameters that can be verified and modified through ground-truthing. The suitable habitat area is much smaller (by 75%) than the BLM’s “priority” habitat. As a result, Garfield County was able to develop a no surface occupancy policy for these areas knowing that it was not guessing as to whether the habitat truly had the potential to contain sage-grouse, but instead knew the probability of sage-grouse presence was high. In so doing, the County’s policies then did not preclude use of unsuitable habitat.

Compare this to the other three alternatives which take in 75% more land as priority habitat, much of which is unsuitable for the sage-grouse. The path then to develop conservation measures is narrow and must allow flexibility knowing that most of the land within the area will be unsuitable for the sage-grouse. This has led to a suite of conservation measures and design features which are confusing and impractical to implement, regardless of which of the three action alternatives are viewed. Garfield County’s approach offers more regulatory assurances than the BLM’s approach, which takes a flow chart and years of analysis to determine how to implement the policies.

The three action alternatives lead to the same confusion, which caused the U.S. Fish and Wildlife Service to determine that the sage-grouse habitat was threatened because they could not ascertain an adequate assessment of the habitat nor could they acquire adequate information from the BLM on its existing policies.

It seems clear that the BLM is intent on repeating this failure since all three action alternatives are designed using the NTT habitat delineation, which then narrow the options to those dictated through the NTT report.

The required design features for each of the three action alternatives are also from the NTT report. These features are the “means, measures, and practices,” that are to be implemented on the ground. They are what must be implemented, so they are the ultimate on the ground result of the policy. The DEIS states that these design features “were derived from the NTT report.” (DEIS page xxxii) Although it states that these design features vary by alternative, the variances are slight. For instance, the “Required Design Features” (Appendix I-14) for Alternative B on wildfire management is, “On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in GRSG habitat areas.” Alternative D requires that the agency “Pre-position fire suppression resources based on all resource values-at-risk.” (Appendix I-14) However, because Alternative D makes protecting the sage-grouse the highest value-at-risk, the two policies are essentially identical as they require the same response; prioritize sage-grouse over people on critical fire warning days.

While the DEIS claims the action alternatives are discrete, the analysis does not match the statement. They all are premised from the perspective that productive use of the land harms the sage-grouse. They all use the same methods and language defined in the NTT report. They all severely lock up the land from productive use compared to what is occurring today.

Not one of the alternatives offers a balanced approach that includes man and his environment working in productive harmony, which is the very essence of the purpose for the NEPA analysis. In fact, Congress declared the following to be our National Environmental Policy when it passed NEPA into law:

> *"The Congress, … recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance,* ***in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans****." (42 USC 4331)(emphasis added)*

Had the local plan alternative been considered and not summarily dismissed, then such an alternative would be available for a meaningful comparison that fulfilled the NEPA mandate to maintain conditions where man and nature exist in productive harmony. Instead, the DEIS fails to consider ***all*** reasonable alternatives and specifically excludes the one alternative that promises to fulfill our national environmental policy. A supplemental statement should be prepared which corrects this error.

B. Failure to Coordinate the Planning Criteria with Garfield County

BLM rules require that the planning criteria, which are the "standards, rules and factors used as the sideboards to resolve issues and develop alternatives" (DEIS xxix), be developed in coordination with local governments.

> *"Planning criteria will generally be based upon applicable law, Director and State Director guidance, the results of public participation, and coordination with any cooperating agencies and other Federal agencies, State and local governments, and federally recognized Indian Tribes." (43 CFR 1610.4-2 (b))*

The DEIS states that this was accomplished.

> *"Criteria also were based on public participation and coordination with cooperating agencies, other federal agencies, state and local governments, and Indian tribes." (DEIS xxix)*

Garfield County attended all but one of the cooperating agency meetings, and reviewed the minutes of the meeting they were absent. Also, the county initiated and held three coordination meetings in which the BLM was directly involved. At no time during any of these meetings was there a discussion of the "planning criteria," and was Garfield County's input sought. The DEIS is in error by stating otherwise. The BLM failed to coordinate the planning criteria with Garfield County.

C. Failure to Resolve Inconsistencies with the Garfield County Greater Sage-Grouse Conservation Plan

As has been stated above, NEPA requires that conflicts with local government plans be resolved and when this cannot be achieved, the lead agency shall include an alternative that brings forward this perspective to be compared with the proposed action. This was not fulfilled.

At the very least, the BLM is obligated to explain why it was not able to resolve the conflicts.

> *"To better integrate environmental impact statements into State or local planning processes, statements shall discuss any inconsistency of a proposed action with any approved State or local plan and law (whether or not federally sanctioned).* ***Where an inconsistency exists, the statement should describe the extent to which the agency would reconcile its proposed action with the plan or law****." (40 CFR 1506.2(d)) (Emphasis Added)*

The DEIS is completely silent on this element. In Chapter 6, titled "Consultation and Coordination," section 6.4 "Coordination and Consistency" should address this very issue. Instead it fails to even address how conflicts will be resolved with local plans. The complete section reads as follows:

> *"The BLM's planning regulations (43 CFR 1610) require that its RMPs be consistent with officially approved or adopted resource-related plans of other federal, state, local, and tribal governments, to the extent that those plans are consistent with federal laws and regulations applicable to public lands. Plans formulated by federal, state, local, and tribal governments that relate to management of lands and resources have been reviewed and considered as the LUPA/EIS has been developed. These plans can be found in* ***Chapter 1****,* ***Section 1.7****, Relationship to Other Policies, Plans, and Programs." (DEIS pg. 988)*

There is no explanation as to what the conflicts are, why they cannot be resolved and how they will be resolved. NEPA requires this resolution be identified and explained in the DEIS so that the public and decision makers can make an informed decision as to the true impact of the proposed action. NEPA does not allow an agency to ignore and hide the conflicts by failing to disclose these in the DEIS. The statement above seems to indicate the BLM is aware of conflicts but will not acknowledge these in the DEIS. This cheats the public of vital information. In fact, we believe that if such conflicts were disclosed, it could change the outcome of the selected alternative because the true environmental impact of the proposed action will have been revealed.

The DEIS does not attempt to resolve any of the inconsistencies between the Garfield County plans and policies and the proposed action, even though the lead agency was aware of the conflicts. The initial analysis of inconsistencies made by the County during the scoping process (found in Appendix D) is still relevant and unresolved. Therefore, the County carries forward these concerns for consideration during this generation of comments and will expect these to be addressed by the agency. A consistency review should be initiated by the agency in coordination with the County to address these and other inconsistencies not specifically identified here.

These conflicts are not insignificant. For example, the County's Sage-Grouse plan requires that all policies rely on the best available science consistent with the standards of the Information Quality Act.

> *Principle #3: Sage-grouse management decisions shall be made based on the best available scientific information that is applicable to sage-grouse habitat in Garfield County. The scientific information used will be consistent with standards of the Information Quality Act (see definitions of Quality, Objectivity, Utility and Integrity), as determined by the County.*

As is repeatedly pointed out in these comments and previous comments, much of the science relied upon to prepare the NTT report, and therefore this DEIS, will not meet the standards of the Information Quality Act (IQA). This includes the 3% disturbance cap, the four (4) mile buffer and the noise disturbance measures, to name a few. Further, the BLM knew the science behind the NTT report was flawed and, in some cases, knew that some of the conservation measures they had written violated the law, which is documented in the NTT email FOIA package.

The planning criteria also require that the science comply with the IQA. This puts the entire DEIS in question because the same agency that required the NTT report be relied upon when developing the alternatives, also knew that the science did not support these measures and did not comply with the IQA. Never the less, they moved forward with the flawed science, crafted a sweeping set of new policies that will fundamentally change the landscape, and placed statements in the DEIS asserting that everything conforms to the standards of the IQA. **This is a deliberate attempt to mislead the public.**

More egregious is that the habitat maps, which delineate the lands to be restricted, are not reproducible and the BLM is aware of this deficiency. The only habitat map that is reproducible is the map they refused to carry forward in the analysis, the Garfield County habitat map. The questionable process used to prepare the BLM's habitat maps, compiled by Colorado Parks and Wildlife (CPW), were revealed in a public coordination meeting attended by CPW and BLM. In this meeting, the CPW acknowledged that the habitat maps they provided to BLM were not reproducible, but rather were compiled making "judgment" calls. With no means to duplicate and verify the information, the BLM has knowingly asked the public to rely on maps that do not comply with the IQA.

It is for this very purpose that Principle 3 of the Garfield County plan exists; to ensure that regardless of which agency is implementing the measures for the conservation of the sage-grouse, it will be based on sound science and verifiable methods. Ultimately, it is the people and the sage-grouse that will be harmed if the BLM fails to disclose these and other conflicts, and correct the fatal flaws.

D. DEIS Prepared to Justify NTT Policy

The CEQ regulations for implementing NEPA set forth the manner in which environmental impact statements are to be prepared. One of these critical requirements is to ensure that statements are prepared to assess the impacts and are not to be prepared to justify a particular policy. The reason for the NEPA process would be irrelevant if Congress had intended the Act to simply become a procedural rubber stamp that would allow the agency to pursue its programs in the manner it preferred, regardless

of the impacts. Rather, the purpose of the Act is to ensure that all the impacts of the proposed action are fairly and thoroughly examined and that all reasonable approaches to implement the action are considered. The Environmental Impact Statement is not intended to be used as a device to justify a certain outcome.

> *"Environmental Impact statements shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made." (40 CFR 1502.2(g))*

The preparation of this DEIS was clearly put forward for the purpose of implementing the NTT policies mandated by Washington D.C.

The BLM contends that the NTT report was created to provide the agency with a science-based suit of conservation measures for the protection of the Greater Sage-Grouse. The report was generated in response to the U.S. Fish and Wildlife Service's (USFWS) determination that listing of the grouse was warranted, but precluded. BLM has stated that a new set of conservation measures were needed across the 11 western states in an effort to preclude a listing.

However, the USFWS did not call for new conservation measures to be put in place. Rather, they found that the data available through the BLM and U.S. Forest Service (USFS) was lacking and incomplete preventing them from making an assessment on the quality of habitat or on the adequacy of existing regulatory measures. It was the agency's reporting and monitoring activities that were identified as the problem.

> "*the BLM … reported information at a different scale than was used for their landscape mapping. Therefore, we lack the information necessary to assess how this regulatory mechanism effects sage-grouse conservation*… ." (USFWS Candidate Determination at 75 FR 13976)

> "*The land use planning process and other regulations available to the USFS give it the authority to adequately address the needs of sage-grouse, although the extent to which they do so varies widely across the range of the species. We do not have information regarding the current land health status of USFS lands in relation to the conservation needs of greater sage-grouse; thus, we cannot assess whether existing conditions adequately meet the species' habitat needs*." (USFWS Candidate Determination at 75 FR 13980)

The BLM and USFS, therefore, are misleading the public into believing that the USFWS has directed the agency to put in place new conservation measures, when in fact, they have not. These new measures are at the direction of the Secretary of Interior, who is using this opportunity to make significant policy changes that will forever impact the western landscape. Hence, the preparation of the NTT report.

Although the NTT report was to be prepared to provide a scientific basis for new conservation measures, it instead became a vehicle to implement the policy objectives of the current administration. A review of the FOIA NTT emails shows that significant debates were had between the scientists and policy makers, with the policy makers ultimately prevailing. The conclusion then drawn is that the NTT report is ultimately a policy document where scientific citations are added to justify the policy, rather than policies being written based on the science. The following email is from a FOIA response by Department of the Interior, Bureau of Land Management, and Office of the Solicitor to a request by Idaho Governor Otter. (See ***Exhibit M*** for this and additional internal BLM correspondence on this issue.)

> ***"If we don't have the science I'm assuming it will be our best professional judgment. So, if you could get each of you to take a shot and identify a research citation that supports the biological recommendation along with the full citation I would greatly appreciate the help. Many of you were authors/editors of the SAB and/or an editor of a recent book, so you will have a much better handle on the recent literature than I. I will put together the literature cited and then can incorporate those citations into a more "final document" along with the literature cited. I would like to get this to Raul before COB Thursday. Thanks in advance.***
>
> ***Tony Apa***
> ***Sage-Grouse Research Biologist***
> ***Colorado Parks & Wildlife***
> ***Northwest Region Service Center"***

Secretary of Interior Salazar then issued an Interim Memorandum (IM 2012-044) directing the BLM to prepare an Environmental Impact Statement for the purpose of amending Resource Management Plans with new Greater Sage Grouse conservation measures. Included in this memorandum was the requirement that at least one of the alternatives considered had to be based on the conservation measures set forth in the NTT Report.

The purpose and need statement of this DEIS directs the agencies to include the NTT conservation measures and policies when preparing the alternatives.

> *"The purpose of this LUPA is to identify and incorporate appropriate GRSG conservation measures into LUP's. In compliance with BLM Instruction Memorandum 2012-044, BLM National Greater Sage-Grouse Land Use Planning Strategy (BLM 2012a)(Appendix A), the measures to be considered include appropriate conservation measures developed by the National Technical Team (NTT). (DEIS page xxvi)*

So, even if during the scoping process, the BLM determined that the conservation measures developed through the NTT report were not appropriate for Northwest Colorado, they were still required to pursue a pure NTT alternative. More importantly, however, what has resulted is three NTT based action alternatives, as discussed above. There are no alternatives carried forward that are distinctly unique

from the NTT approach. Further, the no action alternative, also not based on the NTT report, was minimally described so as to give the appearance that sufficient conservation measures are not currently in place.

As a result, we now have a DEIS out for public comment that restricts selection of an alternative to one of the three NTT based actions. We believe this was by design. First, the public has been misled into believing that a new suit of conservation measures are necessary to preclude a listing, when existing regulations are sufficient. Second, the NTT report was purported to have been created to provide the scientific basis for new measures, when instead it was created to justify the administration's new policies. Third, the Secretary has insisted that one of the alternatives in all the EIS's for Greater Sage-Grouse conservation be based on the NTT report. And fourth, the resulting document fails to fully disclose and analyze potential alternatives not based on the NTT report. As a result, unless major changes are made in the preparation of this document, the BLM has deliberately narrowed all options left on the table to one that is based on the NTT report.

It is our belief that this DEIS is being prepared to justify a new sweeping policy that will significantly change the western landscape. It is not being prepared for the purpose of providing a reasonable range of options to be equally compared and assessed. This DEIS has been prepared to justify putting into place the policies developed through the NTT report. It violates the very purpose of preparing an environmental impact statement.

III. Summary

Major flaws exist in the DEIS as released to the public exposing the administration to a legal challenge. These deficiencies must be corrected for the public and decision makers to understand the full breadth of impacts that will come as a result of the proposed action, and an alternative needs to be carried forward that represent the perspective of those who will be most directly impacted; local communities. It is the very essence of NEPA to do so. This document either needs to be redrafted in its entirety, or at the very least a supplemental statement prepared that corrects the deficiencies and provides full analysis of the no action alternative while also carrying forward the local plan alternative.

Analysis of Compliance of the BLM's Northwest Colorado Greater Sage-Grouse Draft LUPA/EIS (DEIS) with National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ), and the BLM's own Policies and Procedures

November 26, 2013

[Analysis by Mary Darling (Darling Geomatics) in relation to the Draft LUPA/EIS and BLM 2013 Checklist for Use in Preparing National Environmental Policy Act (NEPA) Documents and for Complying with NEPA, Council on Environmental Quality (CEQ), and Departmental Procedures.]

As background, the BLM prepared a January 2013 memorandum to transmit guidance to be used by bureaus and offices to ensure uniform compliance with the policies and procedural requirements of NEPA, the CEQ regulations implementing NEPA, departmental regulations at 43 CFR Part 46, and the Departmental Manual at Part 516 DM, Chapters 1-15. This analysis uses the NEPA checklist from the BLM Environmental Statement Memorandum to assess compliance.

1. NEPA Application Considerations

Does the decision involve a "major Federal action" that may have a "significant" impact on the quality of the human environment? (40 CFR § 1502.3)

Analysis – Undisputedly – Yes.

Does the action fall into one of these categories?

A major Federal action does **not** include funding assistance solely in the form of general revenue sharing funds (e.g., funds distributed under the State and Local Fiscal Assistance Act of 1972, 31 USC 1221 et. seq.) with no Federal agency control over the use of the funds. Another example is Payments in Lieu of Taxes (or PILT) which are Federal payments to local governments that help offset losses in property taxes due to nontaxable Federal lands within their boundaries (31 USC 6901, et. seq.) (40 CFR § 1508.18(a)) Is the action one of these types?

2. Circumstances When There is a Major Federal Action, but NEPA Does Not Apply

Does the decision or action qualify as a major Federal action that has been specifically exempted by Congress from the usual compliance with NEPA requirements? (Consult with the Office of the Solicitor)

Analysis - No

3. Initial Development/Internal Scoping

Is there a proposal for a Federal action?

Analysis – Yes

Has the bureau formulated a concise "proposal" and conducted internal scoping to define potential effects and alternatives?

Analysis – Yes

Can the potential effects (impacts) of the proposal, and all feasible alternatives to it, be meaningfully evaluated?

Analysis – Yes

If not, review the proposal to determine the appropriate level of NEPA documentation or develop a better definition of the proposed action.
(43 CFR § 46.100)

Has the bureau or office developed a "purpose and need" statement?

Analysis – Yes

Is the proposal a major Federal action having the potential to significantly affect the quality of the human or natural environment?

Analysis – Not necessarily. The No Action Alternative (Current Management) can continue to be implemented without proposing a new major federal action. The GRSG and its habitat can and should be protected under the No Action Alternative. The EIS was unnecessary.

If so, is an environmental impact statement (EIS) planned?

Analysis – The Draft LUPA/EIS did not need to be planned. The agencies used a top down approach and Washington DC personnel dictated the preparation of new plans, regardless of the adequacy of existing regulatory mechanisms under the No Action Alternative.

When the USFWS attempted to analyze existing regulatory mechanisms to determine whether or not they were adequate to protect GRSG, USFWS did not direct BLM and USFS to create new plans with new regulatory measures. Instead, USFWS merely pointed out that they did not have the ability to assess regulatory mechanisms because of how the information was being reported.

As stated by USFWS at 75 FR 13976 – "*the BLM … reported information at a different scale than was used for their landscape mapping. Therefore, we lack the information necessary to assess how this*

regulatory mechanism effects sage-grouse conservation… ."

As stated by USFWS at 75 FR 13980 "*The land use planning process and other regulations available to the USFS give it the authority to adequately address the needs of sage-grouse, although the extent to which they do so varies widely across the range of the species. We do not have information regarding the current land health status of USFS lands in relation to the conservation needs of greater sage-grouse; thus, we cannot assess whether existing conditions adequately meet the species' habitat needs*."

It seems clear from the Warranted but Precluded determination quoted above that USFWS was seeking evidence that the current regulatory mechanisms within BLM and USFS would be implemented and that the effectiveness of those mechanisms would be documented.

If not, why not?

Analysis – See above.

Has NEPA compliance already been completed for this action in a previous document?

Analysis – Yes. Both agencies completed previous NEPA documents with decisions that can continue to be implemented under the No Action Alternative.

4. Categorical Exclusions

Analysis – N/A

5. Deciding Between an environmental assessment (EA) or EIS

Analysis – N/A

6. Developing the EA (43 CFR Subpart D)

7. Cooperating Agencies (40 CFR §§ 1501.5 and 1501.6. See also 43 CFR § 46.230)

Have you invited eligible Federal, state, tribal and local governmental entities to become cooperating agencies (required for an EIS, or you must explain in the EIS why an eligible entity was denied cooperating agency status).

Analysis - Yes

As the lead agency, did you establish a formal cooperating agency/lead agency relationship with a Memorandum of Understanding, Memorandum of Agreement, or other document that formally delineates the commitments and expectations of the lead and cooperating agencies?

Analysis - Yes

8. Public Participation

Has a Notice of Intent to Prepare an Environmental Impact Statement been published in the *Federal Register*?

Analysis - Yes

Is there an alternative that is supported by the affected community and stakeholders? If so, is this the preferred alternative? (43 CFR § 46.110)

Analysis – The affected community and stakeholders represented by Garfield County support the No Action Alternative. In the alternative to this action, the Garfield County Sage-Grouse Conservation Plan should have been analyzed and carried forward as the preferred alternative for the area within the jurisdiction of Garfield County. An alternative that represented the local perspective could have been developed by combining the locally developed sage-grouse plans into one alternative. However, this idea was rejected during the cooperative agency meetings and later in coordination meetings with Garfield County.

Is staff trained in public participation practices? If not, training should occur before any public meeting is held.

Analysis – No comment.

Has public scoping been planned? Initiated? Completed? If not, what kind of public involvement is anticipated or did occur? (43 CFR § 46.435)

Analysis - Yes

9. Tiered Analysis (40 CFR §§ 1502.20, 1508.28)

Did you consider using tiering from an analysis broader in scope, or from an existing programmatic EIS?

Analysis – No comment.

10. Incorporation by Reference

Did you consider incorporating a comparable analysis from a previous document?

Analysis – No comment.

Is the analysis over 10 years old? If so, is it still relevant? Document the relevance. If not, have you attempted to obtain relevant information that is available at reasonable cost?

Analysis – No comment.

Does the EIS make use of incorporation by reference whenever and wherever it will cut down on bulk without impeding agency and public review of the action?

(40 CFR § 1502.21)

Analysis - Yes

Has the incorporated material been accurately cited in the EIS and its content briefly described? (40 CFR § 1502.21 and 43 CFR § 46.135)

Analysis - Yes

Is the material incorporated by reference reasonably available for inspection by potentially interested persons within the time allowed for comment? (40 CFR § 1502.21)

Analysis – No. Many literature citations are only available online through research library subscriptions that the general public does not have access to. Others are not available unless purchased for considerable sums of money such as $95 or higher.

Example - http://sagemap.wr.usgs.gov/monograph.aspx
"Pre-release of the 25 chapters formerly available on this web site occurred under special arrangements with the authors, the Cooper Ornithological Society, and the University of California Press. Per this agreement, pre-release chapters were removed when the book was published. The book is now available from the University of California Press and many major booksellers."

So, after being paid once by a federal agency, some federal biologists allowed their publications to be locked in profit centers where the authors, the Cooper Ornithological Society (COS) and University of California Press (UCP) sell the publications for a considerable fee. The public cannot copy any text from the government authors/COS/UCP e-book version nor print any of its contents. This effectively limits distribution and restricts independent review while securing and increasing government authors/COS/UCP profits. Taxpayers paid for the production of almost all the referenced sage-grouse publications. This raises the question of whether the documents are a private product or a U.S. Government product since the taxpayers undoubtedly supported the production and publication that are now being sold online in a read-only format.

11. Incomplete or Unavailable Information (40 CFR § 1502.22 and 43 CFR § 46.125) If a bureau or office has evaluated reasonably foreseeable significant adverse effects on the human environment in an EIS and there is incomplete or unavailable information, has the bureau or office made it clear that the information is lacking?

Analysis – No – The there is a plethora of incomplete data, much of which is available, yet the document does not make it clear that the information is lacking. For example, the agencies used 1996 to 1998 federal wage data. Since there would be significant adverse effects to the socio-economic environment with any of the action alternatives, old economic data is unacceptable. The Draft LUPA/EIS did not discuss this weakness in the analysis.

The Draft LUPA/EIS contains incomplete data on private land and the socio-economic effects of each action alternative as the effects relate to private land and private industries, as well as how the action alternatives affect the local, regional, national and global economies.

The Draft LUPA/EIS contains incomplete information on the full extent of the significant adverse impacts to the local, regional, national and global economy from the loss of oil and gas, food production, jobs, etc.

12. Adopting another Agency's NEPA Document

Can another agency's NEPA document, whether an EA (43 CFR § 46.320) or an EIS (40 CFR § 1506.3), be adopted for the proposal under consideration? Does the analysis meet the standards of the CEQ regulations?

Analysis – The BLM and USFS had existing NEPA documents that they could have continued to utilize. The Draft LUPA/EIS was unnecessary. The Draft LUPA/EIS was put together too quickly and fails to analyze the adequacy of the No Action Alternative. Instead, the Draft LUPA/EIS uses a small number of recently written federal publications to makes a strong federal case for a series of overly restrictive new federal policies that forsake anything except sage-grouse. The new federal policies ignore existing federal laws, regulations, and policies as well as state and local laws and private property rights. The Draft LUPA/EIS does not meet the standards of the CEQ regulations.

Have you independently reviewed and evaluated the analysis and assumed the responsibility for scope and content of the document?

Analysis – The agencies did NOT review and evaluate the analysis. Instead, BLM and USFS condoned a cut and paste process that allowed for incorporation of only a limited number of publications from certain government agencies. The governmental agency publications including the NTT report started with the end in mind (satisfy the litigious environmental groups by stopping oil, gas, mining, livestock grazing, etc. in eleven western states), then cherry picked any data that fit their "sky is falling" paradigm. This process created a flawed NEPA analysis.

As a case in point, information obtained from a FOIA response by Department of the Interior, Bureau of Land Management, and Office of the Solicitor to a request by Idaho Governor Otter's office (herein referred to as NTT FOIA Package) included an email stating the following:

> *"If we don't have the science I'm assuming it will be our best professional judgement.*
> *So, if you could get each of you to take a shot and identify a research citation that supports the biological recommendation along with the full citation I would greatly appreciate the help. Many of you were authors/editors of the SAB and/or an editor of a recent book, so you will have a much better handle on the recent literature than I. I will put together the literature cited and then can incorporate those citations into a more "final document" along with the literature cited. I would like to get this to Raul before COB Thursday. Thanks in advance.*
> ***Tony Apa***
> *Sage-Grouse Research Biologist*
> *Colorado Parks & Wildlife*
> *Northwest Region Service Center"*

BLM and USFS presented impacts (i.e. environmental consequences) by resource and alternative in the Draft LUPA/EIS, however the Draft LUPA/EIS fails to include any detailed or meaningful analysis of the

impacts to resources under any of the action alternatives, especially the socioeconomic impacts of withdrawing lands from locatable and saleable mineral development, livestock grazing, ROWs, etc. (*See* Draft LUPA/EIS Chapter 4).

The Draft LUPA/EIS authors can only speculate impacts because good science does not exist to back up the claims of benefits to GRSG from prohibitions of land uses. The agencies need to slow down and gather data before prohibiting the number of land use activities listed in the action alternatives.

As pointed out in the NTT FOIA Package:

> "In several places (i.e. page 11) we noticed that there are references to only a few literature citations that attempt to portray the impacts to a program (lands, minerals, etc.) and as far as we know, there really are no studies that have been completed that show this direct correlation."

The Draft LUPA/EIS fails to meet NEPA in that the authors do not discuss or analyze impacts the proposed withdrawals, segregations, and restrictions will have on GRSG except to say they will be beneficial. The Draft LUPA/EIS provides no quantitative analysis, data, convincing rationale or evidence of this assertion.

There is no attempt to quantify the impacts whether beneficial or adverse. Instead broad generalizations are used. Garfield County opposes any impact analysis that does not quantify the cumulative impacts the proposed management decisions will have on all uses of public lands, including locatable and saleable minerals exploration and development, livestock grazing, and ROWs. Detailed discussion of the impacts to locatable and saleable mineral operations and development, as well as to other land uses, must be thoroughly analyzed and developed, otherwise the Final LUPA/EIS documents will be vulnerable to legal challenges.

In Chapter 4, the Draft LUPA/EIS states there are numerous short-term negative impacts to GRSG, yet long-benefits. However, the Draft LUPA/EIS authors fail to explain the rationale for concluding that sage-grouse will benefit in the long- term – but certainly not in the short term. As an example, fire suppression and livestock grazing restrictions are likely to increase the potential for catastrophic fires; which would increase the potential for the spread of invasive species, which would then take decades to restore sagebrush ecosystems after wildfires. The impact analysis is fatally flawed and must be revised before the final EIS documents are published.

Alternatives B and D are based on recommendations in the NTT Report. These alternatives lead to an absurd outcome that makes hands-off, complete and full preservation of sagebrush habitat the agencies primary objective – rather than documenting and implementing existing regulatory mechanisms to protect sage- grouse populations and their habitat now and into the future while maintain habitat for other species and allowing multiple use. Garfield County opposes this misguided objective and urges BLM and USFS to recognize that they already have the regulatory measures to conserve GRSG habitat and the opportunity to minimize the likelihood of the USFWS determining it is necessary to list the GRSG as a threatened or endangered species.

The likelihood that USFWS will determine it is necessary to list the GRSG increases significantly if BLM and USFS fail to develop appropriate conservation measures to address the fire and invasive species cycle – one of the main threats to sage-grouse habitat range wide. Unfortunately, the conservation

measures in the NTT Report do not mainly address habitat threats due the wildfire – invasive species cycle and focus inappropriately on restrictions and prohibitions on land uses and the regulated community. Alternative C is especially egregious in that it recommends complete removal for livestock from the land without adequately addressing the increased fuel loads, increased fire risks, and increased noxious weed risks as well as decreased grass and forb vigor, decreased insect production, and ultimate destruction of GRSG habitat.

The assumptions used in the Special Status Species analysis are flawed, partly due to the way in which the NTT Report mischaracterizes other studies in order to support arbitrary habitat and disturbance thresholds. The analysis also contains broad generalizations that the level of disturbance directly correlates to the level of adverse impacts to species (Draft LUPA/EIS Ch. 4), but does not provide data to support that assertion. Based on the above mentioned flaws, the Draft LUPA/EIS is "inadequate as to preclude meaningful analysis" (40 CFR §1502.9(a)); and therefore the BLM and USFS must prepare and re-issue a revised draft which provides the analysis necessary.

Additionally, the CEQ regulation at 40 CFR § 1502.16(c) requires BLM and USFS to include discussion of "[p]ossible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies, and controls for the area concerned." Garfield County contends that the surface use restrictions and land withdrawals proposed within sage-grouse habitat under Alternatives B, C and D described in the Draft LUPA/EIS conflict with BLM's own policy in Manual 6840, USFS's policies in Manual 2670, the Colorado Public Land Health Standards, the General Mining Law, and BLM's multiple use mandates under FLPMA. The Draft LUPA/EIS contains fatal flaws which render the document both inadequate and inconsistent with existing laws and policies.

The artificial construct of a monumental conflict between sage-grouse conservation and mineral, oil and gas, livestock grazing and other commodity development in the planning area is merely a ruse. The real issue is land control. Certain environmental groups have lobbied, become politically influential, and are attempting to have their preservationist philosophies implemented via abuses of the Endangered Species Act. Unfortunately, the Draft LUPA/EIS fails to recognize and disclose this conflict.

The Draft LUPA/DEIS fails to adequately address mitigation and new technologies. The oil and gas industry has developed significantly since the original drilling program studies by Holloran (2005) at the Pinedale Anticline in Wyoming. However, the Draft LUPA/DEIS quotes Holloran (2005) over and over as if there is no new data.

Instead they should reference http://www.pinedaleonline.com/news/2012/10/GreaterSageGrousestu.htm:

> *"Unlike the preliminary data presented in the 2008 and 2009 annual reports which suggested that sage-grouse were avoiding habitats near natural gas development with relatively high levels of activity, the 2009-2010 data suggests that well pad density may be a bigger factor than human activity in avoidance of winter habitats by sage-grouse. However, the final report also suggested that collecting liquids related to natural gas development off-site via an LGS may reduce the impact of development to sage-grouse habitat selection. An LGS, which Ultra, Shell and QEP Energy Company proposed and are implementing on the Anticline, is a system of*

pipelines used to move condensate and produced water from the well pads to centralized gathering facilities and trunk pipelines. The LGS system largely replaces the trucks that were formerly used to haul fluids.

Matt Holloran, Senior Ecologist for WWC said, "Sage-grouse certainly appear to be avoiding areas with high well pad densities during the winter. However, the results additionally suggest that sage-grouse may be avoiding well pads with decreased human activity to a lesser degree than those with more activity. Given the potential biological importance of decreased functional habitat loss as a result of management actions and the fact that many wells on the study area were converted to LGS during the study—potentially influencing our ability to detect an effect given the strong fidelity to seasonal ranges exhibited by the species—a follow-up investigation of population-level reaction to LGS may be warranted in 5 to 10 years."

"The data from the previous years' studies must be taken into account when looking at the 2009-2010 data in the final report regarding potential benefits to sage-grouse distribution from the use of liquids gathering systems," said Aimee Davison, Senior Regulatory Specialist for Shell. "We are convinced that the previous years' data showing the benefits of the LGS to winter habitat selection by sage-grouse remains important, particularly since the LGS was only recently installed in many of the areas studied. The LGS is in its infancy and the benefits to all wildlife including sage-grouse as a result of the cumulative decrease in human activity must be viewed in the long term."

It is estimated that once the LGS is operational field-wide it will reduce truck traffic by 165,000 trips per year when the field is at maximum production.

Using radio-transmitting collars and data-loggers, sage-grouse presence was recorded at defined habitat patches on the Pinedale Anticline. The study compared habitat containing pads with active winter drilling, pads both with and without LGS, plowed main haul roads, and control areas. Researchers studied the length of time and number of visits sage-grouse made to the distinct habitat patches relative to the level of and type of development activity occurring near these patches."

Detailed discussion of the impacts to each of the resources with respect to the proposed mitigation measures for sage-grouse found throughout the Draft LUPA/EIS must be thoroughly developed and analyzed before the Final LUP/EIS is published.

BLM and USFS have failed to clearly indicate a Preferred Alternative for Garfield County to analyze. Instead, the agencies state that Alternative D is the agencies' preliminary preferred alternative. The Draft LUPA/EIS states that "*Alternative D is not a final agency decision but instead an indication of the agencies' preliminary preference that reflects the best combination of decisions to achieve BLM and USFS goals and policies, meet the purpose and need, address the key planning issues, and consider the recommendations of cooperating agencies and BLM and USFS specialists. The alternatives present a range of management actions to achieve goal of Greater Sage-Grouse conservation for the BLM Colorado Northwest District and the Routt National Forest. Major planning issues addressed include realty actions, oil and gas, minerals, travel management, grazing, and fuels management*." (Draft LUPA/EIS page xv), emphasis added).

Garfield County recognizes that agencies are only required to identify a Preferred Alternative at the

time the final LUPA/EIS is published (40 CFR § 1502.14(e)); however Garfield County contends that if there are any changes to the "Preliminary Preferred Alternative" or if a new alternative is developed, chosen and published at the time of the final NEPA document, public involvement will be precluded and the detailed analysis/disclosure required under NEPA, will not be met. The agencies will not have complied with their procedural obligations under NEPA.

BLM and USFS must provide detailed analysis that supports why the No Action or Preferred Alternative is in the best interest of the agencies as well as the public. BLM's Land Use Planning Manual and Land Use Planning Handbook, II.A.7, pg. 22 (Rel. 1-1693 03/11/05) provides that BLM must identify how the Preferred Alternative best meets the multiple use and sustained yield requirements of FLPMA. BLM has failed to demonstrate how any of the alternatives best satisfy statutory requirements; balance BLM goals, objectives, and polices; and which alternative represents the best way to satisfy the Purpose and Need, address key issues, and consider cooperating agencies' recommendations.

The USFS Land Use Planning Manual and Land Use Planning handbook procedures (FSM 1950 and FSH 1909.15) provide that USFS "*must provide an evaluation of alternatives and identification of a preferred alternative to the extent required by NEPA, CEQ regulations, and Forest Service environmental policies*." As discussed below, the USFS failed to provide adequate evaluation of alternatives and adequately identify the preferred alternative as required by NEPA, CEQ and USFS policies.

Alternatives B, C and D do not satisfy statutory requirements, do not balance BLM and USFS goals, objectives and policies, and are not the best fit for the Purpose and Need. The lack of meaningful analysis contained in the Draft LUPA/EIS constitutes a serious shortcoming that must be addressed. Consequently, the Draft LUPA/EIS is "inadequate as to preclude meaningful analysis" (40 CFR §1502.9(a)); and therefore the BLM and USFS must prepare and re-issue a revised draft which provides the analysis necessary to support each of the alternatives, including identifying the Preferred Alternative.

13. <u>EIS Format and Content</u>

The following format in the prescribed order is recommended. Have you included all of the following components? Does the EIS contain the elements from the list below in the prescribed order? (40 CFR § 1502.10) Explain any deviation from this format and these elements.

- Cover sheet (not to exceed one page)
- Summary
- Table of contents
- Purpose of and need for action
- Alternatives including proposed action
- Affected environment
- Environmental consequences
- List of preparers
- List of Agencies, Organizations, and persons to whom copies of the statement are sent
- Index
- Appendices (if any)

Does the "purpose and need" statement clearly specify the underlying need for why the agency is

initiating the proposed action and the reasons for the choice of alternatives including the proposed action? (40 CFR § 1502.13; 43 CFR § 46.420(a)) Does the range of alternatives, to a large extent, meet the objectives of the purpose of and need for the plan? (40 CFR § 1502.14; 43 CFR § 46.420(c))

Analysis – Draft LUPA/EIS pages xxvi - xxvii states:

> *"The purpose of this LUPA is to identify and incorporate appropriate GRSG conservation measures into LUPs. In compliance with BLM Instruction Memorandum 2012-044, BLM National Greater Sage-Grouse Land Use Planning Strategy (BLM 2012a) (**Appendix A**), the measures to be considered include appropriate conservation measures developed by the National Technical Team (NTT). The BLM and USFS will consider such measures in the context of their multiple-use missions and propose to incorporate measures that will help conserve, enhance, and/or restore GRSG habitat by reducing, eliminating, or minimizing threats to that habitat. For purposes of this planning effort, conservation measures include both restrictions on land uses and programs that affect GRSG and measures to reduce the impacts of BLM/USFS programs or authorized uses. This would be done in concert with the BLM and USFS's allocation of resources, in accordance with the mandates of FLPMA and NFMA.*
>
> *The need for this LUPA is to establish regulatory mechanisms in BLM and USFS LUPs to respond to the recent "warranted, but precluded" ESA listing petition decision from USFWS (75 Federal Register 13910, March 23, 2010). In its finding on the petition to list the GRSG, USFWS identified adequacy of regulatory mechanisms as a major threat. The USFWS also identified the principal regulatory mechanism for the BLM and USFS is conservation measures embedded in LUPs.*
>
> *In addition, the purpose of this LUPA is as follows:*
>
> *To reevaluate existing conditions, resources and uses*
>
> - *To reconsider the mix of resource allocations and management decisions designed to conserve and enhance GRSG habitat and to eliminate, reduce, or minimize threats to GRSG PPH and PGH on BLM-administered and National Forest System lands within the Northwest Colorado District, in accordance with FLPMA, Multiple-Use Sustained-Yield Act of 1960, and applicable laws*
> - *To resolve multiple-use conflicts or issues between other resource values and resource uses in GRSG habitat; the resulting Northwest Colorado GRSG LUPA will establish consolidated guidance and updated goals, objectives, and management actions for the BLM-administered and National Forest System lands in the GRSG habitat; it also will address issues that have been identified through agency, interagency, and public scoping efforts*
> - *To disclose and assess the direct, indirect and cumulative impacts of the past, present, and reasonably foreseeable future actions that would result from GRSG management actions, identified in the alternatives, in accordance with the requirements of the National Environmental Policy Act (NEPA), its implementing regulations, and other applicable laws."*

Garfield County contends that the Draft LUPA/EIS does not clearly specify the underlying need for why the agencies are initiating the proposed action. Both BLM and USFS discarded their own policy manuals including BLM Manual 6840 (effective December 12, 2008) and USFWS Manual 2670 (effective May 3, 2006), which already mandated protection of GRSG and other candidate species. Instead, the agencies arbitrarily and capriciously, without reasonable explanation, impose a

completely new regulatory framework without providing a reasonable explanation for doing so.

BLM did not need to write IM 2012-044 or the NTT Report since BLM Manual 6840 already mandated protections of GRSG:

> BLM Manual 6840 states that the "*purpose of this manual is to provide policy and guidance for the conservation of BLM special status species and the ecosystems upon which they depend on BLM-administered lands. BLM special status species are: (1) species listed or proposed for listing under the Endangered Species Act (ESA), and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA, which are designated as Bureau sensitive by the State Director(s). All Federal candidate species, proposed species, and delisted species in the 5 years following delisting will be conserved as Bureau sensitive species."*
>
> *The objectives of BLM Manual 6840 special status species policy are:*
> *"A. To conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA protections are no longer needed for these species.*
> *B. To initiate proactive conservation measures that reduce or eliminate threats to Bureau sensitive species to minimize the likelihood of and need for listing of these species under the ESA. "*

FSM 2670 already requires an analysis for federally listed or proposed species to determine whether the action may affect the species or critical habitat.

> "*The purpose of this analysis for sensitive species is to determine whether the action will contribute toward federal listing or loss of viability in the Planning Area. As part of the interdisciplinary process of designing alternatives under NEPA, develop design criteria to meet objectives for threatened, endangered, proposed, and sensitive species, and identify any necessary mitigation measures. The analysis must consider direct, indirect, and cumulative effects of the proposed action and any alternatives on the species and its habitat.*
>
> *Factors that may be considered in the analysis of effects include: the proportion of the species' total population and range that is in the analysis area or is affected by the action; whether the habitat affected by the action is necessary for critical life functions (for example, feeding, breeding, nesting); timing, frequency and duration of human activity, especially as it relates to significant behavioral modification; any anticipated reductions in numbers or distribution of the species; and the potential of the species to recover from short-term impacts.*
>
> *Based on the analysis, make a determination of the effects of each of the alternatives on federally listed or proposed species and critical habitat, and on Region 2 sensitive species. Use the appropriate language for each federally listed species, critical habitat, proposed species, proposed critical habitat (FSM 2671.43 through 2671.45), and sensitive species, and summarize the rationale for each."*

The BLM and USFS manuals clearly provide adequate regulatory mechanisms to protect GRSG as well as other sensitive species (defined by both agencies to include candidate species including GRSG).

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Have proposals which are related closely enough to be, in effect, a single course of action been analyzed in a single EIS? If not, why not?

Analysis – No comment.

Was scoping initiated early and was it an open process for determining the scope of issues to be addressed and for identifying the significant issues related to the proposed action? (40 CFR § 1501.7)

Analysis – Scoping was initiated early and was open. However, the agencies ignored public input including input provided by Garfield County in written documents and five coordination meetings. Instead, the BLM forced a top-down NTT plan that was put together by a team that prescribed measures that they knew violated the law. As clearly stated in NTT FOIS Package emails between NTT members:

> *"But, does the NTT really want to recommend something that is blatantly illegal "*

Are the alternatives and the proposed action clearly presented and capable of being compared as to their differing impacts? (40 CFR § 1502.14)

Analysis – No - The alternatives and the proposed action are not clearly presented. Readers and the agency decision makers are not provided adequate information to make an informed decision. The alternatives are not presented in adequate depth to compare impacts. The impact analysis is superficial and meaningless.

Do all alternatives sharply define the issues and show a clear basis for choice among them?

Analysis – No – The three action alternatives fail to define virtually any issue other than agenda driven single species protection at the expense of all else. All three action alternatives are bad choices. The only good choice is the No Action Alternative.

Do the decision maker and the public understand the options based on the comparison made among the alternatives?

Analysis – No – The comparison of alternatives is woefully inadequate. Very few impacts were identified, whether positive or negative. Impacts that were identified were too general in nature. Most impacts were a cut and paste from a variety of irrelevant documents that do not apply to the unique nature of Garfield County and other parts of northwest Colorado.

The analysis failed to use the best available data. For example, the Draft LUPA/EIS used 1996 - 1998 federal wage data in the socio-economic impact section instead of 2012 data. Use of 15-16 year old federal data does not provide the public the ability to understand the options based on a comparison of alternatives.

Have all reasonable alternatives, including, where applicable, alternatives employing adaptive management strategies, been rigorously explored and objectively evaluated? (See 40 CFR § 1502.14 and 43 CFR § 46.145)

Analysis – No. The Draft LUPA/EIS failed to analyze the No Action alternative adequately. Instead of explaining the large number of existing regulatory mechanism including laws, regulations, and policies available to the agencies under the No Action alternative, the agencies summarily dismissed the alternative. Said dismissal was arbitrary and capricious, in violation of NEPA.

Were any alternatives, identified during the scoping process, eliminated from detailed study? If so, have the reasons been thoroughly explained? (40 CFR § 1502.14)

Analysis – Yes and no. The local plan alternative was rejected during the scoping process, but there is no discussion as to why this was done in the DEIS. Garfield County requested that its sage-grouse plan be included as an alternative for the area within the counties jurisdiction. This plan could have been combined with other similar local plans that together would have covered the entire planning area, creating an alternative with conservation measures designed for each unique habitat, instead of the one-size fits all 11 state plan represented through the other three action alternatives. Although this idea was advocated by the local governments in the cooperative agency meetings and in coordination with Garfield County, it was summarily rejected. Had a local plan alternative that combined the local plans been carried forward, fully discussed and rigorously analyzed, the public and decision makers would have had the opportunity to compare conservation measures significantly different than the other alternatives and therefore compare the restrictions, impacts and benefits. A supplemental statement should be prepared that carries forward this alternative. It is a reasonable alternative that meets all the requirements of the purpose and needs statement and complies with all federal, state and local laws.

Were the alternatives chosen for detailed study awarded sufficient analysis to allow proper evaluation of their comparative merits, including a comparison of potential impacts and environmental consequences?

Analysis – No. Alternatives were inadequately analyzed. Proper evaluation of their comparative merits including potential impacts and environmental consequences was impossible. The Draft LUPA/EIS was quickly put together through a cut and paste process that is occurring across eleven western states. The superficial, general analysis presented throughout the Draft LUPA/EIS fails to comply with NEPA.

Did you include any reasonable alternatives that are not within the jurisdiction of the lead agency? If not, why not? These alternatives, too, should be included.

Analysis – The Draft LUPA/EIS failed to include the Garfield County Greater Sage Grouse Conservation Plan in an alternative. Instead, the agencies merely include the County Plan as an appendix for the public to read. The plan is scientifically based and needs to be included in the next version of the Draft LUPA/EIS.

Did you include a “no action” alternative? (See 40 CFR § 1502.14(d)) and 43 CFR § 46.30).

Analysis – Though the LUPA/DEIS included a “no action” alternative, as described above, the no action alternative was not seriously considered.

Does the EIS succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration? (40 CFR § 1502.15)

Analysis – No – the socioeconomic environment is not adequately described or analyzed.

Does the environmental consequences section include the environmental impacts of the alternatives and the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, the relationship between short-term uses of man's environment and the maintenance of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented? (40 CFR § 1502.16) This section should not duplicate discussions in the comparison of alternatives section. (See 40 CFR § 1502.14)

Analysis – The sections on unavoidable adverse environmental effects and irreversible and irretrievable commitments of resources is limited to two pages (Draft LUPA/EIS Pages 917-918). The section on unavoidable adverse environmental effects does not discuss the significant unavoidable adverse socioeconomic effects that would occur under any of the action alternatives. The unavoidable adverse environmental effects analysis does not meet NEPA.

The section on irreversible and irretrievable impacts is woefully inadequate in its discussion of socio-economic impacts and needs to be rewritten to detail the numerous significant socioeconomic impacts that would occur with any of the action alternatives. The irreversible and irretrievable impact analysis does not meet NEPA.

Have you considered and included any needed mitigation? (40 CFR §§ 1502.14(f) and 1508.20) See CEQ's January 14, 2011, memo on *Appropriate Use of Mitigation and Monitoring and Clarifying Appropriate Use of Mitigated Findings of No Significant Impact*.

Analysis - The Draft LUPA/EIS includes Appendix I - Required Design Features, Preferred Design Features, and Suggested Design Features Regional Mitigation Strategy. The appendix fails to discuss mitigation measures available under the No Action Alternative and lists a litany of overly restrictive prohibitions that would serve to unnecessarily destroy the economy of Garfield Colorado and all NW Colorado.

Is the draft more than 150 pages? (40 CFR § 1502.7) Why is this length necessary? Is it possible to use tiered analyses? Is it possible to incorporate by reference?

Analysis - The draft includes 1,099 pages in the Draft LUPA/EIS plus 541 pages of appendices. This lengthy 1,640 page document is unnecessary in light of the fact that current management within the No Action Alternative provides adequate regulatory mechanisms to protect GRSG.

Did you make the draft EIS available for public review and invite comments? (40 CFR §§ 1503.1–1503.3)

Analysis – The 1,660 page Draft LUPA/EIS was made available for public review but due to complexities and inadequacies within the document insufficient time was granted to fully assess deficiencies.

Did you allow at least 45 days for public comment? (40 CFR §§ 1506.10(c) and (d)) If not why not (must be a compelling reason)?

Analysis – Though more than 45 days was allowed, it was insufficient due to the large size of the Draft LUPA/EIS.

Did you respond to all substantive comments in your final document? How? Did you revise relevant analyses, introduce new data and findings, or provide the basis for refuting a comment? (40 CFR § 1503.4)

Analysis – Not yet applicable.

Based on the responses to comments, are the changes to the final LUPA/EIS confined to minor corrections? Do the changes warrant preparing an abbreviated final EIS?

Analysis – Not yet applicable.

Does the cover sheet include a list of the responsible agencies including the lead agency and any cooperating agencies? (40 CFR § 1502.11(a))

Analysis – Not yet available.

Does the cover sheet include the title of the proposed action that is the subject of the EIS? If appropriate, the titles of related cooperating agency actions should be included,
together with the State(s) and county(ies) (or other jurisdiction, if applicable) where the action is located? (40 CFR § 1502.11(b))

Analysis – Not yet available.

Does the cover sheet contain the name and complete contact information of the person who can supply additional information about the EIS? (40 CFR § 1502.11(c))

Analysis – Not yet available.

Does the cover sheet indicate the designation of the EIS as a draft, final, or draft or final supplement?

Analysis – Not yet available.

Does the cover sheet include a one paragraph abstract of the EIS?
(40 CFR §§ 1502.11(d), (e))

Analysis – Not yet available.

Does the draft EIS identify the agency's preferred alternative or alternatives, if one or more exists?

Analysis – The Draft LUPA/EIS is vague on whether the "Preliminary Preferred Alternative" will be chosen as the preferred alternative in the Final LUPA/EIS.

Does the final EIS identify such alternative unless another law prohibits the expression of such a preference? (40 CFR § 1502.14(e)) Is there a reason why such an alternative may not have been

identified in either the draft or final EIS?

Analysis – The FEIS is not yet available.

Is the treatment of the environmental consequences scientific and analytical?

Analysis – The treatment of environmental consequences is not scientific and analytical. Instead the agencies choose one overly restrictive alternative from environmental groups and two NTT alternatives. All three action alternative were solely focused on GRSG. The environmental consequences of the no actions alternative were vague, general and biased. The environmental consequences for the action alternatives were a series of cut and paste statements with little true science or analysis.
OLD
****
NEW
(40 CFR § 1502.16) Does the analysis focus on significant issues and support the comparisons among the alternatives? Can readers make an informed comparison among the alternatives based on the scientific analysis of the environmental consequences associated with each alternative?

Analysis – The only issue addressed in any detail in the Draft LUPA/EIS was the GRSG. The issue is one that was manufactured by environmental groups to stop oil and gas development, livestock grazing, and other land uses. The issue is one of public policy, not biology.

The GRSG is a surrogate for protectionism. The problem is that almost any species in the USA can be used to stop economic development if the Sagebrush Sea / Save the Sage-Grouse Campaign is successful. Every species has cycles – every species has good and bad years. In any given year some subpopulations of the GRSG and every other wild animal in the USA will be stable or increasing, while other subpopulations are declining. For the GRSG, populations are related to predator cycles – as coyotes, ravens, foxes, badgers, and other predators' peak in their cycle, GRSG decline. As prey species decline, predators decline, then the cycle repeats itself. Droughts, fires, sagebrush decadence, and many other factors influence sage-grouse cycles.

The LUPA/DEIS needs to be rewritten to address adverse consequences to other species if any of the action alternatives are chosen. As written, the DEIS fails to address the environmental and socioeconomic consequences of single species management. What happens to pinyon-juniper dependent species if their habitat is reduced to create more sagebrush habitat, as the Draft LUPA/DEIS proposes? Will the ferruginous hawk be listed as an endangered species because the pinyon-juniper forests that this hawk depends on are bulldozed to provide more sagebrush habitat? The same exact environmental groups that want to stop oil, gas, mining, agriculture, livestock, and other resource management through the GRSG have already petitioned USFWS to list ferruginous hawks.

What happens next year when the environmental groups choose their next campaign? Will the BLM and USFS be absorbed by the National Park system and the United States become a tourist nation with no industry?

The LUPA/DEIS fails to address the consequences of loss of heating fuel for the USA. Where will Colorado and the rest of the USA obtain heating fuels as oil and gas development projects are shut down in eleven western states? The environmental community and EPA have attacked coal. Now there is an attack on natural gas via the GRSG. The LUPA/DEIS must discuss where the USA will get

fuel to heat houses and commercial buildings. What products will need to be imported? What will the effect on global resources be if countries without environmental regulations export heating fuels to the USA?

The EIS will also need to discuss the nationwide consequence of this type of abuse of the Endangered Species Act. The prohibitions proposed in all action alternatives in reaction to the threat of listing the GRSG, a wide spread prey species that fluctuates as broadly in population numbers as rainfall fluctuates, is absurd.

The precedent setting consequences of all action alternatives needs to be addressed. What species will environmental groups choose next if it is this easy to create an artificial crisis based on quoting Holloran (2005) in regard to outdated Wyoming Pinedale Anticline well pad and road data and other site specific examples of old well drilling methods to predict a hypothetical crisis that cannot and will not occur in the future.

Have you properly acknowledged and/or referenced all sources of data and scientific findings used in the analysis?

Analysis: No. See discussion above.

Does the environmental consequences section clearly show the impacts likely to be associated with each of the impact producing factors that would occur from the adoption of any of the studied alternatives? Is there a clear demonstration of cause and effect?

Analysis: No. See discussion above

Is there a clear discussion of any adverse environmental effects which could not be avoided if the proposal or any of the alternatives were implemented? (40 CFR § 1502.16)

Analysis: No. See discussion above

Is there a clear discussion of the relationship between short-term uses of the human and natural environment and the maintenance of long-term productivity? (40 CFR § 1502.16)

Analysis: No. This discussion is absent from the DEIS. The analysis focuses on impacts to the "natural environment," but fails to consider the impacts to the "human environment." For instance, no analysis is made of the increased threat to human life and property that will take place if fire fighting resources are placed near priority sage-grouse habitats instead of being prioritized for the protection of human life. This is a major policy sift which will have devastating consequences to the communities that surround and support the sage-grouse habitat. This should have been disclosed and analyzed. This is but one example of the failure of the DEIS to consider and analyze the impact on the human environment, whether this be the direct, indirect or cumulative impacts, or whether this be the short-term use and long term productivity of the human environment. The DEIS completely fails to analyze and disclose the impact on the human environment as defined at 40 CFR 1508.14.

Did you include a necessary discussion of any irreversible or irretrievable commitment of resources which would result if the proposal were implemented? (40 CFR § 1502.16)

Analysis: No. See discussion above.

Do all analyses of the environmental consequences include an even-handed treatment of all alternatives including the proposed action and the "no action" alternative although one or more of the alternatives may be unlikely (or less likely) to be selected?

Analysis. Absolutely not. The no action alternative and conservation measures already authorized to protect the sage-grouse are not described in the same detail as the three action alternatives, and therefore is not analyzed in the same detail. We believe this was a deliberate decision of the lead agency so as to influence the public and decision makers to support the three more restrictive alternatives.

Did you discuss the direct effects, the indirect effects, and the cumulative effects and their significance? (40 CFR §§ 1502.16, 1508.8)

Analysis. No. The direct, indirect and cumulative effects on the "human" and environment specific to the productive use industries and the communities which support these industries were not adequately discussed. Again, we believe this was a deliberate effort to mislead the public and decision makers into believing the impacts of the three action alternatives would be minimal. Had a full and rigorous analysis been done, it is likely the public would not support any of the three action alternatives, and a more balanced alternative, such as the Garfield County SG Plan would be supported, or the no action alternative would have been preferred.

Is there an analysis of the possible conflicts between the proposed action and any objectives of the Federal, regional, State, local or Indian tribal land-use plans, policies, and controls for the area concerned? (40 CFR § 1502.16(c))

Analysis: No. There is no analysis of the possible conflicts between the proposed action and the Garfield County Sage Grouse Plan, nor special districts plans such as the Hospitals, Cities, and Fire Districts. There are numerous conflicts between the proposed action and the local plans, but no effort has been made to resolve or analyze these conflicts. Garfield County pointed out several of these conflicts in their scoping comments which were submitted according to the lead agency deadlines prior to the release of the DEIS. Although the lead agency had specific inconsistencies identified in these comments, they failed to address any of the conflicts in the DEIS. This is a significant flaw in the DEIS. NEPA requires these conflicts to be discussed and analyzed so that the public and decisionmakers can make an object and informed decision about the appropriateness of the action and the differences between alternatives. We believe that this was not an oversight of the lead agency, but a deliberative decision to mislead the public and decision makers about the true impacts of their proposed action.

Is there a discussion of the energy requirements and conservation potential of the various alternatives and mitigation measures? (40 CFR § 1502.16(e))

Analysis: The DEIS fails to properly consider the impact of preventing access to the energy stores, namely oil and gas production, within the sage-grouse habitat. As discussed above, neither the short-term or long-term impact of preventing extraction of these resources has been considered.

Is there a discussion of natural or depletable resource requirements and conservation potential of various alternatives and mitigation measures? (40 CFR § 1502.16(f))

Analysis: No. See discussions above.

Does the EIS discuss urban quality, historic and cultural resources, and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures? (40 CFR § 1502.16(g))

Analysis: The DEIS fails to discuss and consider the impact on the built environment. See discussion above.

In the analysis, were any mitigation measures not already included in the proposed action or alternatives discussed? Did you include a means to mitigate adverse environmental impacts if not otherwise fully covered elsewhere? (40 CFR § 1502.16(h))

Analysis: No. There is no clear discussion on what mitigation will be utilized to reduce impacts.

Have the mitigation measures beyond those required by applicable Federal, state, and local regulation been described in sufficient detail to allow assessment of their potential effectiveness to reducing any impacts?

Analysis: No. There is limited information available on what mitigation will be used and how this will be employed, who will be making the analysis, i.e. the producer or the regulating agency, how data will be collected to monitor the impacts, among other key questions. Although NEPA requires that the mitigation to be utilized be clearly explained in the DEIS, this analysis fails to provide this information.

Is the EIS a "full disclosure" document? Are all major points of view on the environmental impacts and the alternatives, including the proposed action discussed appropriately?

Analysis: No. Although NEPA requires that the conflicts with local government be identified and resolved, that the analysis of the impacts include those at the local level, not just a regional level, these requirements were not fulfilled. Garfield County attended every cooperating agency meeting except one held to prepare the DEIS and also initiated five coordination meetings with the lead agency and other agencies in an effort to get the local impact of the proposed action considered and analyzed in the DEIS. However, these efforts were rejected and the Northwest Colorado BLM Director stated to Garfield County that he would not be including an alternative that represented the local position. The only representation of the local position has been relegated to an appendix with no analysis. We find this to be a deliberate decision to give the appearance of considering the local position while not providing any true analysis or representation of that position in the alternatives carried forward.

Is it written in plain language? (40 CFR § 1502.8) Were graphics used to ensure brevity and to enhance analytical adequacy? Were the graphics readily understandable to the general public?

Analysis: No. Data is incomplete, misleading, outdated, and scientifically unsound. While graphs were utilized they provided little relevant information. Even the various maps used in the DEIS to depict habitat are not reproducible.

Did preparation of the EIS use an interdisciplinary approach to insure the integrated use of natural and social sciences and the environmental design arts? (40 CFR § 1502.6)

Analysis – It appears a combination of agency personnel and consultants were utilized. The problem was a top down, Washington DC directive that forced the environmental alternative (Alternative C) and two NTT alternatives to be assessed from a single species management perspective only. Local issues, especially socioeconomic issues, were ignored. The fact that portions of Colorado, including Garfield County, already have Sage-Grouse Plans and healthy GRSG populations was ignored.

The top down approach did not allow the NEPA team time to properly evaluate alternatives. Instead, the time table was so compressed that the multidisciplinary team did very little as a whole. Consultants used a library of EIS language to cut and paste meaningless, irrelevant sentences and paragraphs into the DEIS, to meet a time table instead of meeting NEPA.

Were the disciplines of the preparers appropriate to the scope and issues of the analysis? Was a multidisciplinary team used?

Analysis – The preparers lacked socioeconomic information and expertise. This is common in federal agency documents; however, in the case at hand, due to the compressed time schedule, the last of data and incomplete analysis is especially egregious. It appears the preparers have no understanding of the socioeconomic impacts; they copied numbers and did not care in the least what the numbers would mean to Colorado and the nation. The socioeconomic analysis showed a combination of lack of understanding and actual contempt for oil, gas, livestock grazing, and other historical uses.

Does the final EIS respond fully, objectively, and completely to the substantive comments submitted on the draft EIS? How? Did you revise relevant analyses, introduce new data and findings, or provide the basis for refuting a comment? (40 CFR § 1503.4)

Analysis – Not yet available.

Are responsible alternatives to scientific inquiry, such as traditional knowledge, which are not discussed in the draft EIS, acknowledged and properly, respectfully, and professionally addressed in the final EIS?

Analysis – Not yet available. The DEIS needs to be redrafted to include a hard look at the No Action (Current Management) Alternative so that an an honest, fair and open analysis of all feasible options for GRGS management under the No Action Alternative Is rigorously analyzed. There is a strong argument for utilizing existing regulatory mechanisms to protect GRGS and their habitat instead of defaulting to NTT protectionism with utter disregard for existing laws and socioeconomic consequences.

Is your agency's response to the issues raised appropriate and clearly articulated? Did you make a substantial change to the proposed action that is relevant to the environmental concerns that would warrant preparing a supplement to the draft or final EIS? (40 CFR § 1502.9(c))

Analysis – Critical information was not considered in the DEIS as has been discussed above. The document either needs to be redrafted or a supplemental prepared that takes into account the missing impacts on the human environment as well as a complete and rigorous description of the no action alternative. Currently, the following laws have been violated through the preparation of this DEIS.

- NEPA – The overly broad NEPA analysis was merely a cut and paste exercise based on canned sentences from EIS templates.
- The action alternatives and analysis were based on a fatally flawed NTT report.
- FLPMA we violated due to the cessation of multiple use on the majority of public lands
- The DEIS does not comply with the National Forest Management Act (NFMA) of 1976 (P.L. 94-588) that requires alternative land management options to be presented, each of which have potential resource outputs (timber, range, mining, recreation) as well as socio-economic effects on local communities. Instead the DEIS superficially, with very little thought or analysis, threw in outdated irrelevant information including 1996-1998 federal wage data, and pretended to satisfy the NFMA.
- Existing BLM and USFWS sensitive species management direction in existing agency manuals was ignored in lieu of aggressive new protectionism policies.

Are there significant new circumstances or information relevant to the environmental concerns and that bear on the proposed action or its impacts that would warrant such an action, i.e., a supplement to an EIS? Would the purposes of NEPA be served by preparing a supplement? (40 CFR § 1502.9(c))

Analysis – Unless the DEIS is sufficiently revised to provide a detailed and accurate analysis of the socio-economic information relevant to all alternatives, there is a legal and rational basis for triggering a supplement to the EIS. At this time the DEIS glosses over economics as if BLM and USFS are putting a small neighborhood park into a subdivision. In reality, the agencies are proposing virtual national park status for over 1.7 million acres of public lands, most of which are currently under FLPMA with strong multiple use laws and regulations that are completely being discarded in favor of single-species management.

Does your agency have procedures in place for introducing a supplement to an EIS into the formal administrative record? Are these procedures known by bureau and office NEPA practitioners?

Analysis – No comment

If you have the need to supplement an EIS, are you aware that the supplement must be prepared, circulated, and filed with the Environmental Protection Agency in the same fashion (exclusive of scoping) as a draft and final EIS unless alternative procedures are approved by CEQ? (40 CFR § 1502.9 (c) (4))

Analysis – Not comment

14. Documenting the Decision When the EA or EIS Has Been Completed

The bureau or office decision is separate from the analysis and should not be included as part of the supporting EA or EIS document. Has it been kept separate?

Analysis – Not yet an issue

If the bureau or office has prepared an EA and a FONSI, the FONSI should briefly explain why a proposed action will not have a significant effect on the human environment. (40 CFR § 1508.13) The responsible official's decision may be documented along with the FONSI or in a separate decision

record. (Note that if an EA has been prepared and the decision is to prepare an EIS or that no further action will be taken on the proposal, a FONSI is not required.) Has such documentation been prepared?

Analysis – Not applicable

If a bureau or office has prepared an EIS, a concise public Record of Decision (ROD) is needed which briefly explains the decision that the bureau or office is making and the NEPA analysis upon which it is based. Does the ROD do this? (40 CFR § 1505.2)

Analysis – Not yet an issue

15. Effective Date of the Decision Based on an EA or an EIS

In the case of an EIS, has a minimum of 90 days passed from the time that EPA has published the Notice of Availability of a draft EIS in the *Federal Register* before a decision based on the EIS has been made? (40 CFR § 1506.10(b)(1))

Analysis – Not yet an issue

In the case of an EIS, has a minimum of 30 days passed from the time that EPA has published the Notice of Availability of the Final EIS in the *Federal Register* before a decision based on the EIS has been made? (40 CFR § 1506.10(b) (2))

Analysis – Not yet an issue

In the case of an EA prepared for a proposed action that is without precedent, or is similar to one which normally requires the preparation of an environmental impact statement, the finding of no significant impact must be made available for public review for 30 days before the bureau makes its final determination (40 CFR § 1501.4(e)(2)). Has sufficient time elapsed?

Analysis – Not applicatble

16. Emergencies

The CEQ regulations provide that when an emergency makes it necessary to take an action likely to have significant environmental effects without following the procedures in the regulations, the bureau or office should consult with CEQ about "alternative arrangements." (40 CFR § 1506.11) Alternative arrangements do not mean that the bureau or office can forgo any NEPA analysis. Department of the Interior regulations at 43 CFR § 46.150 set forth a procedure for taking emergency actions and for consulting with the Office of Environmental Policy and Compliance. Are you proposing to take an emergency action? Have the provisions of the regulations been followed?

17. References for Preparation of NEPA Documents

The National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321-4347)

Council on Environmental Quality regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR Parts 1500-1508)

Council on Environmental Quality Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act regulations (46 Fed. Reg. 18026 (March 23, 1981))

Department of the Interior regulations for Implementation of the National Environmental Policy Act (NEPA) of 1969, at 43 CFR Part 46

Department of the Interior, Departmental Manual (Part 516 DM, Chapters 1-15)

Individual bureau and office NEPA handbooks

MEMORANDUM

TO: Garfield County Board of County Commissioners

FROM: Dr. Rob Roy Ramey, Wildlife Science International, Inc.

RE: Issues of fundamental importance to the scientific integrity and data quality of the BLM's Northwest Colorado Greater Sage Grouse Draft Resource Management Plan and Draft Environmental Impact Statement (DEIS)

Date: November 26, 2013

Section I. The following issues above cut across all alternatives in the DEIS.

1) Reliance on disturbance caps that have no demonstrable conservation benefit to sage grouse, do not mitigate the cause and effect mechanisms of purported threats, and are based upon opinion rather than data, whether these disturbance caps are 1, 3, or 5%, or one well per section.

2) Prohibition on surface disturbance within 4 miles of a lek in PPH, including during the lekking and early brood-rearing period when there is no specific cause and effect mechanism cited and the prohibition is solely based upon the subjective opinion of the NTT and opinions expressed in selected reports and publications. The DEIS effectively proposes "protecting" large areas (~50 square miles) of non-habitat and marginal habitat surrounding each lek without any demonstrable benefit to sage grouse populations, ignoring more appropriate conservation actions suited to local ecological conditions, and basing the presumed benefits of this recommendation upon speculation.

3) Ignores predation as the primary demonstrable source of mortality to sage grouse, in favor of an approach that relies on a series of land use setbacks, disturbance caps, and restrictions based around speculative benefits to sage grouse that have not been shown to be effective by any data.

4) Reliance on archaic and statistically invalid lek-count data collection to estimate sage grouse population trends as a basis for management. The lack of resolution in these data, their non-random sampling, and fact that sage grouse populations are known to fluctuate, means that it would be impossible to discern any pattern in the data that could be used to guide management actions in a timely manner, or that would be scientifically defensible. This would result in a virtual state of paralysis imposed on almost all land use activities.

   The BLM's approach is to rely on an undefined assessment of whether sage grouse populations are healthy, stable, or increasing. As an example, none of the population trend diagrams in the DEIS contain any confidence intervals around population estimates. This renders the interpretation of any trends derived from those data as meaningless.

5) Reliance on outdated data and opinion in reports and papers, rather than more current data and information.

6) Reliance on recommendations in the NTT that were influenced by special interest groups involved in litigation rather than a transparent and inclusive public process.

7) The DEIS elevates speculative benefits of management prescriptions for sage grouse above other land use activities, in clear violation of the BLM's multiple use mandate.

8) Ignores the substance of local conservation plans, especially the Garfield County sage grouse plan, in favor of one-size fits all restrictions in its alternatives, in clear contrast to the stated position of the BLM. The DEIS lacks a comprehensive and objectively informative analysis of locally-appropriate conservation alternatives that could be used to guide management of BLM lands, while addressing specific threats to sage grouse.

9) The DEIS is deficient in that it does not include conservation strategy for analyzing treats or their specific cause and effect mechanisms, and then mitigating the mechanisms that underlie each threat within the BLM's adaptive management framework. That approach for sage grouse was clearly articulated in the publication by Ramey, Brown, and Blackgoat (2011).

Section II. The following section comprises comments regarding more specific components of the DEIS

1) The BLM's rationale for 4-mile buffers is based on erroneous information.

The scientific justification for requiring 4-mile buffers and surface disturbance caps (whether they are 1, 3, or 5%) is entirely based on the opinions of selected authors (some of whom were NTT members) and the erroneous assumption that a local and temporary displacement of sage grouse from an area of development means that a population decline has occurred. However, none of the cited studies actually ever documented a population decline. One of the most frequently cited studies, the unpublished dissertation by Holloran (2005), was wrong in all of its predicted population declines. To the contrary, recent data from the state of Wyoming has documented that the sage grouse population in Pinedale actually experienced an overall increase from 1990 to 2012. Throughout that time period, it has consistently been above statewide averages and has the highest density of sage grouse in the state.

In the field of science when the observations do not match the predictions of a hypothesis or theory, the hypothesis is falsified (i.e., it is wrong). The BLM cannot rely on research that has been found to be wrong. Holloran (2005) is one of the most widely cited studies in the DEIS, yet his predictions have been unfounded.

Furthermore, the BLM cannot rely on research whose authors relied on belief to reach their conclusions when the results lacked any statistical significance. One of the key studies cited in the NTT Report did exactly that: Lyon and Anderson (2003) erroneously characterized oil and gas development as having a negative effect on sage grouse nest initiation rates. That unsupported opinion, clearly contrary to the available data and analysis, has subsequently been cited by the BLM as a scientifically valid conclusion in the NTT Report, which portrays all oil and gas development in a negative light. The DEIS (page 516) then cites the NTT Report in support of its

statements that negative effects have been reported 4-miles from oil and gas development: "Recent studies have consistently demonstrated that oil and gas development and its infrastructure influence GRSG behavior and demographics at distances of up to 4 miles (NTT 2011). This prompts declines in lek persistence and male attendance, yearling and adult hen survival, and nest initiation rates. It also elicits strong avoidance response in yearling age classes, nesting/brooding hens, and wintering birds." However, as the following quotation indicates, the study by Lyon and Anderson (2003) relied on belief (rather than statistically significant results) to reach their conclusions: *"Finally, even though nest initiation between disturbed and undisturbed hens was not statistically significant, we believe lower initiation rates for disturbed hens were biologically significant and could result in lower overall sage grouse productivity."* Additionally, Holloran (2005) reported that nest success that was virtually identical and not significantly different between disturbed and undisturbed areas, using a much larger sample size compared to Lyon and Anderson (i.e., n=213 used by Holloran vs. n=77 used by Lyon and Anderson). Clearly, the BLM cannot base its management decisions on the basis of belief and opinion, while disregarding contrary results.

The DEIS needs to acknowledge the alternative hypothesis that sage grouse, like other animals, may be disturbed by human activity and will sometimes move away from it but that does not mean that they suffer a populations decline. The birds may have simply responded by relocating, or coexisting with human activity (i.e. habituation). Neither the DEIS or the NTT Report acknowledge that that there has been no population-level decline reported in any of the cited studies, only decreased lek attendance in affected areas. The DEIS needs to be revised to explicitly acknowledge these facts and alternative hypotheses that are consistent with the data.

The DEIS and the NTT Report does not acknowledge that Holloran (2005) reported results that the probability of sage grouse survival was *higher* (61.5 $\pm$6.4%) in disturbed areas compared to less impacted areas (29.6 $\pm$18.1%), or control areas (48.5 $\pm$14.4%). These results refute Holloran's (2005) own statements regarding population impacts. Furthermore, neither the DEIS or the NTT Report acknowledge that Holloran's (2005) predicted sage grouse population declines in the Pinedale area, of -8.7 to -24-4% annually, have not occurred. Instead, publicly available lek count data from the State of Wyoming show the population has been steadily increasing. The BLM rely on a study whose predictions have been so clearly falsified.

The Information Quality Act (IQA) requires that information used by agencies, including the BLM, be based upon verifiable data and reproducible results, and not based upon opinion. Moreover, the NTT Report cannot selectively use results from Lyon and Anderson (2003), or Holloran (2005) to support its recommendations, while failing to state that they were statistically insignificant and/or contrary to more recent and comprehensive data. And finally, Holloran (2005) did not use any hypothesis testing in his research. Instead, Holloran (2005) relied upon interpretation of data and results (rather than hypothesis testing), speculated on potential mechanisms that could cause a population decline, and did not provide any data that a population decline had actually occurred in the population in the Pinedale area.

The following two excerpts from Holloran (2005) best illustrate these issues (the underlining added for emphasis is ours):

> *"The results from this study <u>suggest</u> that dispersal from developed areas could be contributing to population declines. Although the proportion of <u>potentially</u> displaced*

adult and yearling males and yearling females breeding and nesting in areas removed from gas field infrastructure is unknown, offsite populations could be artificially enhanced by gas development. Because of potential density-dependent influences on breeding and nesting success probabilities (LaMontagne et al. 2002, Holloran and Anderson 2005), maintenance of these enhanced populations could require increasing the carrying capacity of offsite habitats." And, *"adult male displacement and low juvenile male recruitment appear to contribute to declines in the number of breeding males on impacted leks. Additionally, avoidance of gas field development by predators could be responsible for decreased male survival probabilities on leks situated near the edges of developing fields (i.e., lightly impacted leks). Although site-tenacious adult females did not engage in breeding dispersal in response to increased levels of gas development, subsequent generations avoided gas fields, as suggested by the temporal shift in nesting habitat selection and differences in habitat selection by yearling and adult females. This suggests that the nesting population response is delayed avoidance of natural gas development. The results suggest that male and female greater sage-grouse displacement from developing natural gas fields contributes to breeding population declines."*

Rather than being as conclusive as suggested by the DEIS and the NTT Report, this study was speculative (note use of the terms *could, suggested,* and *potentially*) and assumed that hypothetical worst-case scenarios would occur. The BLM cannot rely on the speculative opinion of Holloran (2005) as the basis for its DEIS.

2) The supposed need for a 3% anthropogenic disturbance threshold is based upon subjective opinion rather than data.

The presumed need for a 3% disturbance cap originated with opinion expressed by Walker et al. (2007) in the discussion of their paper. They stated, *"...we believe the conservation strategy most likely to meet the objective of maintaining or increasing sage-grouse distribution and abundance is to exclude energy development and other large scale disturbances from priority habitats, and where valid existing rights exist, minimize those impacts by keeping disturbances to 1 per section with direct surface disturbance impacts held to 3% of the area or less."* However, Walker et al. (2007), like Holloran (2005), who had previously proposed a restriction of one well per section, never actually tested the effectiveness of these disturbance caps. Instead they modeled sage grouse response in lek attendance in terms of distance(s) from potential sources of disturbance. Therefore, the need for a 3% disturbance cap (or 1% or 5% caps, and one-well per section) in the NTT Report and DEIS, represents nothing more than the opinions of Holloran (2005) and Walker et al. (2007) that were stated in the conclusions of their papers, and by the NTT members, at least one of whom was an author of the NTT report. The BLM cannot rely on such untested opinion as a basis for its alternatives in DEIS. If it does, it will have effectively replaced the scientific method in implementation of the NEPA (i.e., data, hypothesis testing, and reproducible results) with the opinions expressed by the authors of the cited studies, especially when those opinions are erroneously represented by the BLM as if they were rigorously tested against the data.

3) The DEIS ignores management of raven predation on sage grouse eggs and broods as a conservation strategy despite the fact that predation has been shown to be a major issue for sage grouse and that the State of Wyoming, in collaboration with the USDA-APHIS, has recently undertaken a major raven management program.

Sage grouse eggs are preyed upon by a wide variety of predators including red foxes, coyotes, badgers, black-billed magpies, and ravens. Juvenile and adult sage grouse predators include golden eagles, prairie falcons, coyotes, badgers, and bobcats. Sage grouse broods are preyed to ravens, red foxes, raptors, ground squirrels, snakes, and weasels. However, of the predators above, ravens are the most ubiquitous. Research (Coates 2007; Coates and Delehanty. 2004; Coates et al. 2008; Coates and Delehanty 2010; Christiansen 2011) and more recent data gathered by the USDA, has shown that ravens have the greatest impact on sage grouse and that their numbers are far in excess of historic levels (Christiansen 2011).

The DEIS and NTT Report ignore the management of ravens as a conservation priority to reduce predation on sage grouse eggs and broods (and thereby a viable management strategy to increase overall survivorship and recruitment of sage grouse). The only mention of ravens in these documents is that their numbers are the result of human activities, and that transmission lines and tanks provide predator roosting opportunities (and therefore sage grouse avoid these structures.) There is an implicit assumption that ravens can be managed indirectly through the regulation of human activities. This is an unproven strategy and is unlikely to be effective at reducing raven predation on sage grouse unless coupled with active / lethal control of ravens to reduce the size their populations (Coates and Delehanty 2010). There is abundant research on raven predation on sage grouse and other species, yet the DEIS all but ignores the importance of this threat (Boarman 1993; Boarman 2003; Boarman et al. 1995; Boarman and Heinrich 1999; Boarman et al. 2006; Bedrosian and Craighead 2010; Bui 2009; Cagney et al. 2010; Coates 2007; Coates and Delehanty 2004; Coates et al. 2008; Coates and Delehanty 2010; Conover et al. 2010; Cote and Sutherland 1997; DeLong 1995; Gregg et al. 1994; Heinrich et al. 1994; Moynahan et al. 2007; Preston 2005: Ramey, Brown, and Blackgoat 2011; Schroeder and Baydack 2001; Snyder et al. 1986, Sovada et al. 1995; Watters et al. 2002; and Webb et al. 2009). The DEIS must include in each alternative a raven management program such as the one undertaken by the USDA-APHIS Animal Damage Control at landfills across southern Wyoming at the request of the Wyoming Game and Fish Dept. (Wyoming Game and Fish 2012, USDA/APHIS/Wildlife Services 2013).

4) The DEIS relies on an archaic and statistically invalid lek-count data collection system to estimate sage grouse population trends as a basis for management.

The DEIS, under Adaptive Management and Monitoring (page 193), describes an "effectiveness monitoring component" to *"identify any changes in habitat conditions related to the goals and objectives of the plan and other range-wide conservation strategies (U.S. Department of the Interior 2004; Stiver et al. 2006; U.S. Fish and Wildlife Service 2013). When available from WAFWA and/or state wildlife agencies, information about population trends will be considered with effectiveness monitoring data (taking into consideration the lag effect response of populations to habitat changes [Garton et al. 2011]). The information collected through the Monitoring Framework Plan outlined in Appendix J will be used by the BLM/FS to determine when adaptive management hard and soft triggers (discussed below) are met."* However, what the DEIS does not acknowledge is that male lek count data is not randomly sampled and is a

statistically invalid measure of population trends, and that the 95% confidence intervals surrounding the estimates are generally larger than the estimates themselves (WAFWA 2008; Ramey et al. *in press*). Therefore, the adaptive management strategy proposed in the DEIS cannot be based upon these statistically invalid measures.

Receiving any mitigation credit is also virtually impossible because it is impossible to produce scientifically defensible trend estimates. Case in point, the DEIS (on page 258) states, *"The populations naturally fluctuate, so it is difficult to determine at any given time if a population is increasing, decreasing, or staying stable."* With this being acknowledged, it is virtually guaranteed that no mitigation credit will be given by the BLM in implementation of the DEIS. Therefore, the DEIS must award mitigation credit based upon the type and extent of mitigation implemented (i.e., see Ramey, Brown, and Blackgoat).

The DEIS adaptive management strategy must take into account the fact that any statistically valid and scientifically defensible trend estimate must also take into account the fact that sage grouse populations naturally fluctuate (i.e., the data must be normalized to account for regional fluctuations).

And finally, the DEIS provides no reproducible, quantitative definition for what is determined to be a "healthy, stable, or increasing" population. This lack of definitional basis puts the BLM squarely in violation of the Information Quality Act and its management decisions under the DEIS are outside the realm of science.

5) The DEIS presents a negative view of virtually all oil and gas development and is biased in its presentation of outdated information.

The DEIS and its cited supporting studies failed to mention the existence of: 1) up to date information on the extensive mitigation and restoration efforts in the Pinedale Planning Area and elsewhere (see http://www.wy.blm.gov/jio-papo/index.htm); 2) advances in technology and efficiency available on the BLM's own website and in the BLM presentations to the NTT ("Managing Oil and Gas" and "Best Management Practices" available in Appendix 5, pp 48-55 of the August 29 to September 2, 2011 NTT meeting summary); and 3) more efficient operations and mitigation efforts further documented in Ramey, Brown, and Blackgoat (2011). And finally, neither the DEIS nor the NTT Report that it relies upon, acknowledges that nearly all of these measures have been implemented in the years since Holloran's (2005) data gathering occurred (from 1997 to 2003). The BLM cannot rely on a selective presentation of outdated information as the basis of its DEIS alternatives. It must rely on data and information that is current.

6) The DEIS relies on recommendations in the NTT Report but does not acknowledge that these recommendations were influenced by special-interest litigants involved in settlement negotiations with the BLM.

Publicly available records, including e-mails obtained under FOIA from the State of Idaho (excerpt below from a December 13, 2011 e-mail from the NTT lead for the BLM) reveal that special interest influence, rather than a transparent, inclusive, and scientifically defensible public process, was used in producing the NTT Report's recommendations:

"Our timeframe is to complete the "updated" draft NTT report by COB tomorrow so I can ship it back to DC. Due to concerns by solicitors in DC the NTT report will look different. However the content is generally the same and due to the science review we did make changes to the Goals and Objectives section, some conservation measure in fluid minerals have been updated (i.e. 2.5% has been changed to 3% with rationale). The Policy recommendation change has undergone significant clarification again based on solicitor concerns in DC. ***The solicitor concerns with the Policy recommendation piece stems from ongoing litigation discussions they currently having with litigants over BLM's recently completed LUPs."***

Clearly, the BLM cannot rely on such tainted sources as a basis for its analysis and alternatives in the DEIS.

7) The DEIS lacks a comprehensive and objectively informative analysis of locally-appropriate conservation alternatives that could be used to guide management of BLM lands, while addressing specific threats to sage grouse.

By ignoring the substance of local conservation plans, especially Garfield County's sage grouse plan, in favor of one-size fits all restrictions, the DEIS elevates speculative benefits of one-size fits all management prescriptions for sage grouse (recommended by the NTT and so-called conservation groups) above other land use activities, in clear violation of the BLM's multiple use mandate.

The DEIS is deficient in that it does not include conservation strategy (like that in the Garfield County sage grouse plan) for analyzing treats, their specific cause and effect mechanisms, and then mitigating each threat within the BLM's adaptive management framework.

Section III. Key differences that make the Garfield County Greater Sage Grouse Plan a more effective conservation tool than those proposed by federal agencies.

1) High-resolution habitat mapping

The habitat mapping provided by State and Federal agencies in 2012 for Greater Sage-Grouse in the Plan Area was at a landscape level that did not accurately address the unique topography of the Roan Plateau, or provide planning information at resolution accurate enough for County to use in the Plan, and for relevant land-use planning activities potentially occurring within the Plan area, including protection of sage grouse habitat. Because of the significant implications on land use and ongoing land management, the Board of County Commissioners deemed that most accurate delineation of habitat was deemed necessary.

This habitat mapping process followed the latest and most relevant peer-reviewed habitat mapping process available for mapping large and diverse areas, using the highest resolution data available (with a two-meter resolution, as compared to the one kilometer, landscape-level resolution used by the agencies).

The sage-grouse habitat in Garfield County is naturally fragmented, as a result of topography and the patchy nature of sagebrush, non-sagebrush shrubs, meadows, aspen, and conifers in the Plan area.

Expanses of contiguous sagebrush, necessary to support a large stable population (as described by the Fish and Wildlife Service in their
2010 candidate determination notice), do not exist in Garfield County.
Additionally, the sage-grouse population inhabiting Garfield County is a peripheral population located on the far southeastern edge of the species range. As a result, the stewardship of the population requires detailed knowledge of local conditions, including accurate mapping of its habitat.

Conservation measures are tailored to local circumstances Rather than rely on one-size-fits-all regulatory prescriptions, such as four mile buffers and three percent anthropogenic disturbance thresholds proposed by the BLM's National Technical Team (NTT), the County has taken a more effective approach: tailoring conservation measures to address specific threats to sage grouse and local circumstances that are unique to Garfield County (i.e. predation and a naturally fragmented habitat). The significance of this strategy to sage grouse conservation is that it allows for a more efficient allocation of conservation effort by focusing on threats that matter most in this sage grouse population.

Voluntary conservation efforts on private land In contrast to the NTT report, where the proposed conservation measures assume that private land management is inferior to federal land management, and requires a regulatory "command and control"
approach, the Garfield County Plan recognizes and builds upon the importance of voluntary conservation by private landowners. The importance of voluntary conservation on private land is recognized by many scholars of the Endangered Species Act, including the current Deputy Assistant Secretary of Fish and Wildlife and Parks, Michael Bean, who has authored multiple papers on the subject.

2) Annual Review and adaptive management

Recognizing that local governments can be more nimble than federal agencies, the Garfield County Plan includes a required annual coordination review with the federal and state agencies that have habitat or species responsibilities within the Plan Area. (A review may also be initiated based on important new information.) This review process will evaluate the availability and condition of habitats, direct and indirect impacts, conservation measures, policies and best management practices being implemented by each agency for their effectiveness and applicability to the Plan Area. Also incorporated in this coordination review is any new scientific information and, if warranted, modifications to the best management practices, policies, and conservation incentives within the Plan. The County will also initiate meetings with private property owners in the Plan Area for the purpose of analyzing their conservation efforts and effectiveness, as well as any new scientific data. The annual coordination review will ensure that Plan updates are timely, adaptive, and based on the best available scientific and commercial data.

3) Consistency with the Information Quality Act

The Garfield County Plan ensures that sage-grouse habitat management decisions shall be made based on the best available scientific information that is applicable to sage-grouse habitat in Garfield County. The scientific information used will be consistent with standards of the Information Quality Act (Quality, Objectivity, Utility and Integrity), as determined by the County. In contrast to the interpretation of the Act by some federal agencies, this means that the data collected by state and federal agencies, or used in published scientific research relied upon by those agencies, must be provided to the County.

The Garfield County Plan acknowledges that many of the purported "universal" negative impacts of fluid mineral development, an important economic activity on the Roan Plateau and Piceance Basin, are based upon outdated information and/or overstated. In fact, none of the studies cited in the NTT report can definitively point to an actual population decline rather than temporary displacement of sage grouse from areas immediately affected by current fluid mineral development. Instead, the extraction of fluid minerals in Garfield County (and increasingly elsewhere) is accomplished using increasingly advanced technologies, more efficient operations, avoidance of important habitat, more effective mitigation measures, and interim habitat restoration, than in the past. As a result, surface disturbances that potentially affect sage grouse tend to be minimal and temporary in nature. The fast pace of these technological developments and more efficient operations has meant that the primary literature on the impacts of fluid mineral extraction on sage grouse in Wyoming is inconsistent with current practices used in Garfield County. It is anticipated that the more advanced technologies under development will continue to allow the efficient extraction of resources while further avoiding or minimizing impacts to sage grouse and other species.

A balance of harms approach ensures responsible stewardship of natural and human resources in Garfield County

In contrast to the approach proposed in the NTT report, that focuses solely on the welfare of sage grouse, the Garfield County Plan requires that the balance of impacts to other species and to human welfare must be weighed prior to approval and implementation.

Section IV. Literature citations that support the issues specifically identified in the forgoing sections

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Testimony of Tom Jankovsky

Commissioner, Garfield County, Colorado

Before the

House Natural Resources Committee

Tuesday, April 8, 2014

Thank you Mr. Chairman and members of the committee.

My name is Tom Jankovsky, County Commissioner from Garfield County, Colorado.

I am here to discuss the issue of transparency between local, state and federal governments regarding the Endangered Species Act as it relates to the potential listing of the Greater Sage Grouse. The underpinning message to be conveyed here is that there is a serious lack of openness and fairness (transparency) in decisions being made by state and federal agencies that are hidden behind the cloak of the ESA that can have enormous impact.

Simply put, information used by these agencies used to make extraordinary decisions such as is done with the ESA should be available for review and verification by those it impacts. To operate otherwise furthers the appearance and perhaps fact that the information is inaccurate, misleading, erroneous, has no scientific basis, and is agenda driven by special interests and therefore by design is meant to remain hidden away from the light of day and objective review. Ironically, the ultimate casualty in this circumstance is the very value of the ESA and the species it is meant to protect.

At the local level, Garfield County experienced this lack of transparency issue in 2012 when we began to question the accuracy of habitat maps produced by the Colorado Department of Parks and Wildlife (CPW) intended for use by the Bureau of Land Management (BLM) in the development of the alternatives in the Greater Sage Grouse Environmental Impact Statement (EIS).

In our research, it was discovered that CPW prepared the map at a 50,000 ft. view and it was based on very coarse vegetation data, a subjective occupied range map, and a four-mile lek buffer that assumes large expanses of intact habitat. Ultimately, contrary to federal requirements, their map is not reproducible and is based on data that the agency refuses to release to the public in order that it is verified despite a Colorado Open Records Act request and offers for data sharing agreement protections. As a result, we were left to create our own habitat maps at considerable expense.

A transparent review and validation of CPW data could have resulted in a habitat map that is effective for proper bird management in Garfield County's highly unique habitat; instead, we have two radically different habitat maps where CPW's grossly inaccurate map will produce lasting extraordinary unintended socio-economic impacts to our struggling region.

To underscore this issue of a lack of transparency, the BLM has adopted policies contained in the NTT Report that lack any serious basis in science such as the so-called 3% disturbance cap on development in

habitat. This winter, our own Governor Hickenlooper wrote to the US Fish & Wildlife Service in the States formal comments, "It is our understanding that there is limited scientific evidence that supports either of the two numbers currently in play for anthropogenic disturbance (3% and 5%)…Imposing an arbitrary cap on the landscape could have catastrophic impacts on resource use."

This highlights the BLM's use tools that have little to no proven basis in science effectively as a 'national experiment' with potentially devastating impacts to the bird and human environment. Greater transparency and sharing of data may help avoid this issue.

At the federal level, we remain concerned over similar issues over the lack of transparency of data being used to make such incredible decision. For example, the currently estimated population numbers for the Greater Sage Grouse has been reported to be between 350,000 and 535,000 birds which is 70 to 107 times greater than the "minimum effective population."

Further, at the reported current rate of decline of 1.4 percent per year (nationally assumed), it would take 300 years for the population to dwindle to the minimum effective population of 5,000 birds. How can the current status warrant inclusion on the endangered species list?

In our view, there remains a fundamental breakdown in the types of information used to make decisions. For example, it has been reported that hunters bagged 207,000 birds around the range from 2001 to 2007. Additionally, 9,000 birds were harvested in Nevada alone in 2009 and 2010 which is just shy of the total number of birds currently estimated for the entire State of Colorado. Similarly, there is an evolving body of science that captures the effect of predation but is largely, if not totally dismissed as a threat to be considered; yet oil and gas development is held out as an enormous threat to habitat with very little science in the literature to back that claim.

As mentioned above, we have requested data being used by state and federal agencies to make decisions (and maps) but have been refused. I would like to take this opportunity to request assistance from this Committee for the second time. First, the Service has withheld valuable data that supports a warranted listing. We only wish to verify their data as required under the Information Quality Act. We would appreciate this Committee's interceding on our behalf to obtain this data as soon as possible.

Thank you for your time and assistance in this matter. We appreciate this opportunity and would be more than happy to answer any questions this Committee may have.

Attachment 1: Topography Differences

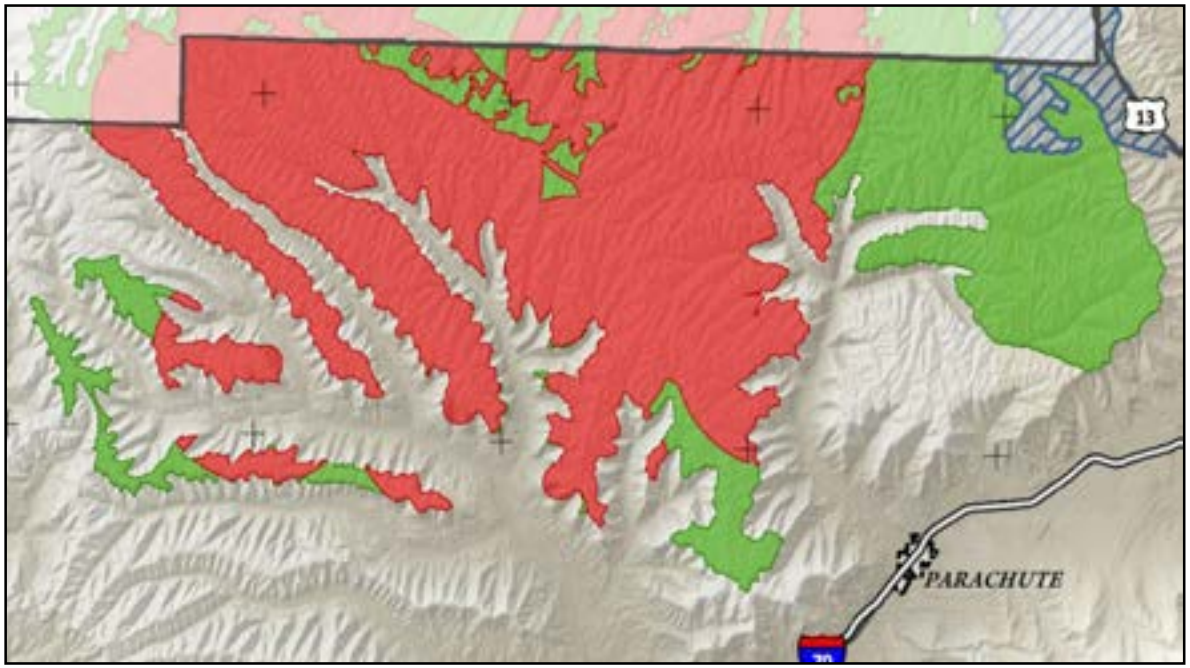
Pinedale, Wyoming Region & primary basis for science in NTT Report →

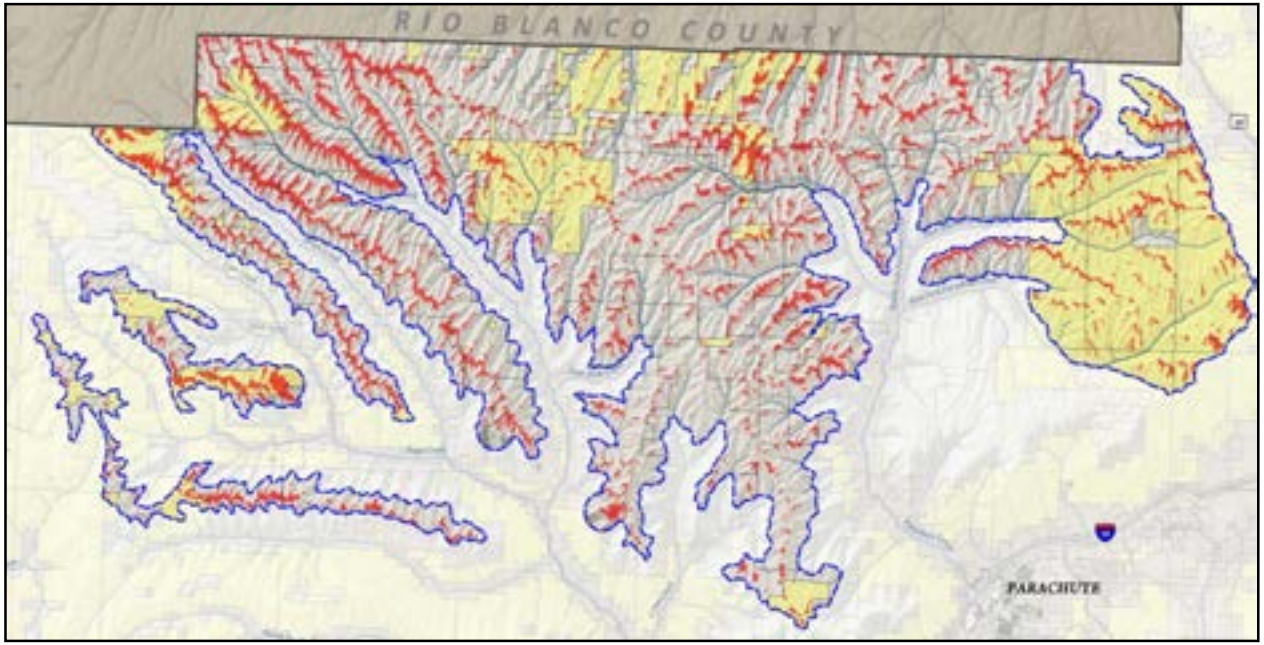
Typical topography and vegetation in Garfield County, CO in the Plan Area of the Greater Sage-Grouse Conservation Plan

←

Attachment 2: Suitable Habitat Mapping Differences

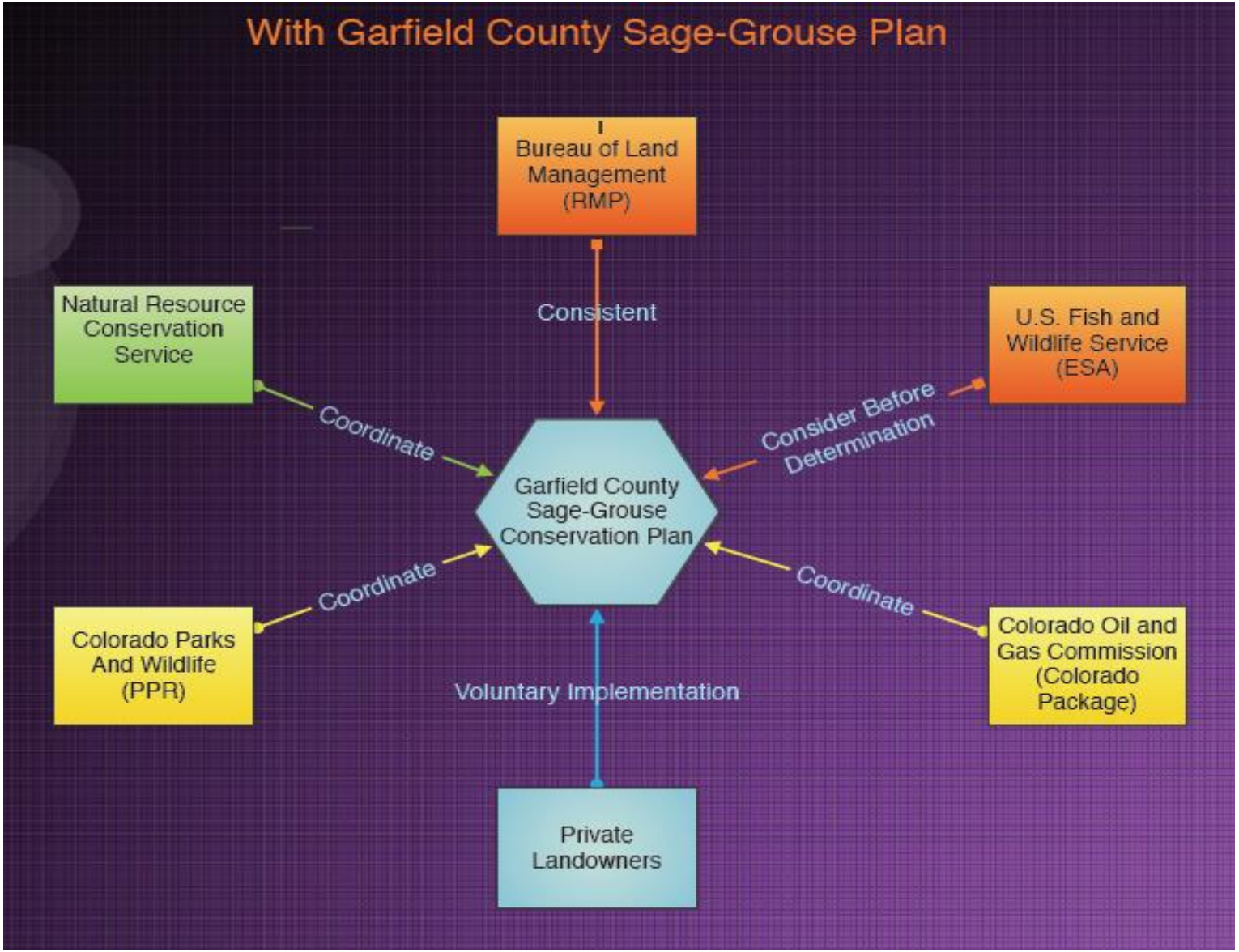
Colorado Parks & Wildlife Map: 220,000 acres of Greater Sage-Grouse Habitat (PPH & PGH)





Garfield County Map: 28,000 acres of Greater Sage-Grouse Suitable Habitat

Attachment 3: Coordination Diagram



Attachment 4: BLM Instructional Memorandum 2012-044

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240
http://www.blm.gov/
December 27, 2011

In Reply Refer To:
1110 (230/300) P
EMS TRANSMISSION 12/27/2011
Instruction Memorandum No. 2012-044
Expires: 09/30/2013

To: All Field Officials
From: Director
Subject: BLM National Greater Sage-Grouse Land Use Planning Strategy
Program Areas: All Programs.

Purpose: This Instruction Memorandum (IM) provides direction to the Bureau of Land Management (BLM) for considering Greater Sage-Grouse conservation measures identified in the Sage-Grouse National Technical Team's - *A Report on National Greater Sage-Grouse Conservation Measures* (Attachment 1) during the land use planning process that is now underway in accordance with the 2011 *National Greater Sage-Grouse Planning Strategy* (Attachment 2).

This IM supplements direction for Greater Sage-Grouse contained in WO IM No. 2010-071 (*Gunnison and Greater Sage-Grouse Management Guidelines for Energy Development*), the BLM's 2004 *National Sage-Grouse Habitat Conservation Strategy* and is a component of the 2011 *National Greater Sage-Grouse Planning Strategy* (Attachment 2). It is also consistent with WO IM No. 2011-138 (*Sage-Grouse Conservation Related to Wildland Fire and Fuels Management*).

In March 2010, the U.S. Fish and Wildlife Service (FWS) published its decision on the petition to list the Greater Sage-Grouse as "Warranted but Precluded." 75 Fed. Reg. 13910 (March 23, 2010). Over 50 percent of the Greater Sage-Grouse habitat is located on BLM-managed lands. In its "warranted but precluded" listing decision, FWS concluded that existing regulatory mechanisms, defined as 'specific direction regarding sage-grouse habitat, conservation, or management' in the BLM's Land Use Plans (LUPs), were inadequate to protect the species. The FWS is scheduled to make a new listing decision in Fiscal Year (FY) 2015.

The BLM has 68 land use planning units which contain Greater Sage-Grouse habitat. Based on the identified threats to the Greater Sage-Grouse and the FWS timeline for making a listing decision on this species, the BLM needs to incorporate explicit objectives and desired habitat conditions, management actions, and area-

wide use restrictions into LUPs by the end of FY 2014. The BLM's objective is to conserve sage-grouse and its habitat and potentially avoid an ESA listing.

In August 2011, the BLM convened the Sage-Grouse National Technical Team (NTT), which brought together resource specialists and scientists from the BLM, State Fish and Wildlife Agencies, the FWS, the Natural Resources Conservation Service (NRCS), and the U.S. Geological Survey (USGS). The NTT met in Denver, Colorado in August and September 2011, and in Phoenix, Arizona in December 2011, and developed a series of science-based conservation measures to be considered and analyzed through the land use planning process. This IM provides direction to the BLM on how to consider these conservation measures in the land use planning process.

In order to be effective in our ability to conserve Greater Sage-Grouse and their habitat, the BLM will continue to work with its partners including: the Western Association of Fish and Wildlife Agencies (WAFWA), FWS, USGS, NRCS, U.S. Forest Service (USFS), and Farm Services Agency (FSA) within the framework of the Sagebrush Memorandum of Understanding (2008) and the *Greater Sage-Grouse Comprehensive Conservation Strategy* (2006).

Policy/Action: The BLM must consider all applicable conservation measures when revising or amending its RMPs in Greater Sage Grouse habitat. The conservation measures developed by the NTT and contained in Attachment 1 must be considered and analyzed, as appropriate, through the land use planning process by all BLM State and Field Offices that contain occupied Greater Sage-Grouse habitat. <u>While these conservation measures are range-wide in scale, it is expected that at the regional and sub-regional planning scales there may be some adjustments of these conservation measures in order to address local ecological site variability</u>. Regardless, these conservation measures must be subjected to a hard look analysis as part of the planning and NEPA processes.

This means that a reasonable range of conservation measures must be considered in the land use planning alternatives. As appropriate, the conservation measures must be considered and incorporated into at least one alternative in the land use planning process. Records of Decision (ROD) are expected to be completed for all such plans by the end of FY 2014. This is necessary to ensure the BLM has adequate regulatory mechanisms in its land use plans for consideration by FWS as part of its anticipated 2015 listing decision.

When considering the conservation measures in Attachment 1 through the land use planning process, BLM offices should ensure that implementation of any of the measures is consistent with applicable statute and regulation. Where inconsistencies arise, BLM offices should consider the conservation measure(s) to the fullest extent consistent with such statute and regulation.
The NTT-developed conservation measures were derived from goals and objectives developed by the NTT and included in Attachment 1. These goals and objectives are a guiding philosophy that should inform the goals and objectives developed for individual land use plans. However, it is anticipated that individual plans may

develop goals and objectives that differ and are specific to individual planning areas.

Through the land use planning process, the BLM will refine Preliminary Priority Habitat and Preliminary General Habitat data (defined below) to: (1) identify Priority Habitat and analyze actions within Priority Habitat Areas to conserve Greater Sage-Grouse habitat functionality, or where possible, improve habitat functionality, and (2) identify General Habitat Areas and analyze actions within General Habitat Areas that provide for major life history function (e.g., breeding, migration, or winter survival) in order to maintain genetic diversity needed for sustainable Greater Sage-Grouse populations. Any adjustments to the NTT recommended conservation measures at the local level are still expected to meet the criteria for Priority and General Habitat Areas.

Preliminary Priority Habitat (PPH): Areas that have been identified as having the highest conservation value to maintaining sustainable Greater Sage-Grouse populations. These areas would include breeding, late brood-rearing, and winter concentration areas. These areas have been/are being identified by the BLM in coordination with respective state wildlife agencies.

Preliminary General Habitat (PGH): Areas of occupied seasonal or year-round habitat outside of priority habitat. These areas have been/are being identified by the BLM in coordination with respective state wildlife agencies.

PPH and PGH data and maps have been/are being developed by the BLM through a collaborative effort between the BLM and the respective state wildlife agency, and are stored at the National Operations Center (NOC). These science-based maps were developed using the best available data and may change as new information becomes available. Such changes would be science-based and coordinated with the state wildlife agencies so that the resulting delimitation of PPH and PGH provides for sustainable populations. In those instances where the BLM State Offices have not completed this delineation, the Breeding Bird Density maps developed by Doherty 2010[1] As LUPs are amended or revised, the BLM State Offices will be responsible for coordinating with the NOC to use the newest delineation of PPH and PGH. To access the PPH and PGH data, please use the following link: \\blm\dfs\loc\EGIS\OC\Wildlife\Transfers\GREATER_SAGE_GROUSE_GIS_DATA.
will be used. The NOC will establish the process for updating files to include the latest PPH and PGH delineations for each state. This information will assist in applying the conservation measures identified in Attachment 1 below.

Timeframe: This IM is effective immediately and will remain in effect until LUPs are revised or amended by the end of FY 2014.

Budget Impact: This IM will result in additional costs for coordination, NEPA review, planning, implementation, and monitoring.

Background: Following a full status review in 2005, the FWS determined that the Greater Sage Grouse was "not warranted" for protection. Decision documents in

support of that determination noted the need to continue and/or expand all efforts to conserve sage-grouse and their habitats. As a result of litigation challenging the 2005 determination, the FWS revisited the determination and concluded in March 2010 that the listing of the Greater Sage-Grouse is warranted but precluded by higher priority listing actions.

In November 2004, the BLM published the *National Sage-Grouse Habitat Conservation Strategy*. The BLM National Strategy emphasizes partnerships in conserving Greater Sage-Grouse habitat through consultation, cooperation, and communication with WAFWA, FWS, NRCS, USFS, USGS, state fish and wildlife agencies, local sage-grouse working groups, and various other public and private partners. In addition, the *Strategy* set goals and objectives, assembled guidance and resource materials, and provided comprehensive management direction for the BLM's contributions to the ongoing multi-state sage-grouse conservation effort.

In July 2011, the BLM announced its *National Greater Sage-Grouse Planning Strategy* (Attachment 2). The goal of the *Strategy* and this IM is to review existing regulatory mechanisms and to implement new or revised regulatory mechanisms through the land use planning process to conserve and restore the Greater Sage-Grouse and their habitat. The Gunnison Sage-Grouse, bi-state population in California and Nevada and the Washington State distinct population segments of the Greater Sage-Grouse will be addressed through other policies and planning efforts.

Manual/Handbook Sections Affected: None.

Coordination: This IM was coordinated with the office of National Landscape Conservation System and Community Partnership (WO-170), Assistant Director, Renewable Resources and Planning, (WO-200), Minerals and Realty Management (WO-300), Fire and Aviation (WO-400), BLM State Offices, FWS and state fish and wildlife agencies.

Contact: State Directors may direct questions or concerns to Edwin Roberson, Assistant Director, Renewable Resources and Planning (WO-200) at 202-208-4896 or edwin_roberson@blm.gov; and Michael D. Nedd, Assistant Director, Minerals and Realty Management (WO-300) at 202-208-4201 or mike_nedd@blm.gov.

Signed by: Authenticated by:
Mike Pool Ambyr Fowler
Acting, Director Division of IRM Governance, WO-560

Attachment 5: Key differences that make the Garfield County Greater Sage Grouse Plan a more effective conservation tool than those proposed by federal agencies.

High-resolution habitat mapping

The habitat mapping provided by State and Federal agencies in 2012 for Greater Sage-Grouse in the Plan Area was at a landscape level that did not accurately address the unique topography of the Roan Plateau, or provide planning information at resolution accurate enough for County to use in the Plan, and for relevant land-use planning activities potentially occurring within the Plan area, including protection of sage grouse habitat. Because of the significant implications on land use and ongoing land management, the Board of County Commissioners deemed that most accurate delineation of habitat was deemed necessary. This habitat mapping process followed the latest and most relevant peer-reviewed habitat mapping process available for mapping large and diverse areas, using the highest resolution data available (with a two-meter resolution, as compared to the one kilometer, landscape-level resolution used by the agencies).

The sage-grouse habitat in Garfield County is naturally fragmented, as a result of topography and the patchy nature of sagebrush, non-sagebrush shrubs, meadows, aspen, and conifers in the Plan area. Expanses of contiguous sagebrush, necessary to support a large stable population (as described by the Fish and Wildlife Service in their 2010 candidate determination notice), do not exist in Garfield County. Additionally, the sage-grouse population inhabiting Garfield County is a peripheral population located on the far southeastern edge of the species range. As a result, the stewardship of the population requires detailed knowledge of local conditions, including accurate mapping of its habitat.

Conservation measures are tailored to local circumstances

Rather than rely on one-size-fits-all regulatory prescriptions, such as four mile buffers and three percent anthropogenic disturbance thresholds proposed by the BLM's National Technical Team (NTT), the County has taken a more effective approach: tailoring conservation measures to address specific threats to sage grouse and local circumstances that are unique to Garfield County (i.e. predation and a naturally fragmented habitat). The significance of this strategy to sage grouse conservation is that it allows for a more efficient allocation of conservation effort by focusing on threats that matter most in *this* sage grouse population.

Voluntary conservation efforts on private land

In contrast to the NTT report, where the proposed conservation measures assume that private land management is inferior to federal land management, and requires a regulatory "command and control" approach, the Garfield County Plan recognizes and builds upon the importance of voluntary conservation by private landowners. The importance of voluntary conservation on private land is recognized by many scholars of the Endangered Species Act, including the current Deputy Assistant

Secretary of Fish and Wildlife and Parks, Michael Bean, who has authored multiple papers on the subject.

Annual Review and adaptive management

Recognizing that local governments can be more nimble than federal agencies, the Garfield County Plan includes a required annual coordination review with the federal and state agencies that have habitat or species responsibilities within the Plan Area. (A review may also be initiated based on important new information.) This review process will evaluate the availability and condition of habitats, direct and indirect impacts, conservation measures, policies and best management practices being implemented by each agency for their effectiveness and applicability to the Plan Area. Also incorporated in this coordination review is any new scientific information and, if warranted, modifications to the best management practices, policies, and conservation incentives within the Plan. The County will also initiate meetings with private property owners in the Plan Area for the purpose of analyzing their conservation efforts and effectiveness, as well as any new scientific data. The annual coordination review will ensure that Plan updates are timely, adaptive, and based on the best available scientific and commercial data.

Consistency with the Information Quality Act

The Garfield County Plan ensures that sage-grouse habitat management decisions shall be made based on the best available scientific information that is applicable to sage-grouse habitat in Garfield County. The scientific information used will be consistent with standards of the Information Quality Act (Quality, Objectivity, Utility and Integrity), as determined by the County. In contrast to the interpretation of the Act by some federal agencies, this means that the data collected by state and federal agencies, or used in published scientific research relied upon by those agencies, must be provided to the County.

The Garfield County Plan acknowledges that many of the purported "universal" negative impacts of fluid mineral development, an important economic activity on the Roan Plateau and Piceance Basin, are based upon outdated information and/or overstated. In fact, none of the studies cited in the NTT report can definitively point to an actual population decline rather than temporary displacement of sage grouse from areas immediately affected by current fluid mineral development. Instead, the extraction of fluid minerals in Garfield County (and increasingly elsewhere) is accomplished using increasingly advanced technologies, more efficient operations, avoidance of important habitat, more effective mitigation measures, and interim habitat restoration, than in the past. As a result, surface disturbances that potentially affect sage grouse tend to be minimal and temporary in nature. The fast pace of these technological developments and more efficient operations has meant that the primary literature on the impacts of fluid mineral extraction on sage grouse in Wyoming is inconsistent with current practices used in Garfield County. It is anticipated that the more advanced technologies under development will continue to allow the efficient extraction of resources while further avoiding or minimizing impacts to sage grouse and other species.

A balance of harms approach ensures responsible stewardship of natural and human resources in Garfield County

In contrast to the approach proposed in the NTT report, that focuses solely on the welfare of sage grouse, the Garfield County Plan requires that the balance of impacts to other species and to human welfare must be weighed prior to approval and implementation.

GARFIELD COUNTY

GREATER SAGE-GROUSE CONSERVATION PLAN

Adopted: March 18, 2013 (via Resolution 2013-23)
First Amendment to Plan: November 17, 2014
(via Resolution 2014-67)

Garfield County

Garfield County Board of County Commissioners
John Martin, Chairman
Mike Samson
Tom Jankovsky

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CHAPTER 1 Purpose of the Plan

The purpose of the Garfield County Greater Sage-Grouse Conservation Plan (the Plan) is to provide private and public land owners with land management principles, policies, incentives, and best management practices based on the best available science that are tailored to fit Garfield County's unique landscape and habitat characteristics for the betterment of the species.

Because of the County's unique landform, elevation, topography and vegetative cover that differ drastically from the rest of the national range, the Board of County Commissioners (the Board) commissioned an in-depth analysis, based on best available science, to determine what suitable habitat exists in the County at a refined level never before completed to obtain a very realistic and accurate picture of suitable habitat.

The land located within the Plan Area is primarily held in private ownership with the Bureau of Land Management (BLM) managing the only public lands within the Plan Area. Most of the public lands and private property in this area contain significant oil and gas resources that are actively being developed or are intended for future development. By design, this Plan will continuously adapt as science expands for the species and its habitats, as well as acknowledging advances in energy exploration technology that continue to reduce the disturbance footprint. Ultimately, this will result in adaptive land management policies intended for the continued survival and persistence of the species within the Plan Area.

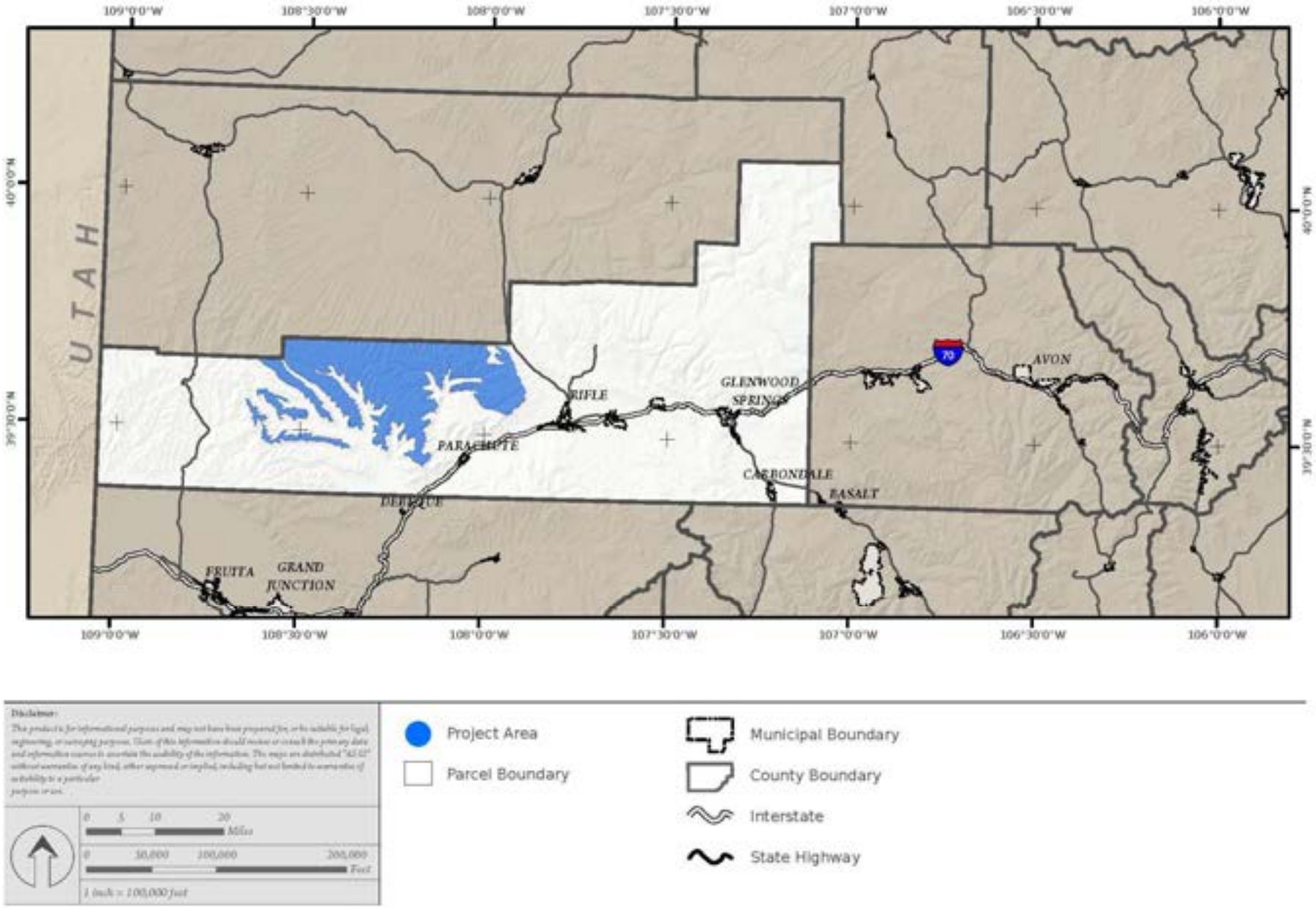
As implemented, this Plan shall require these policies and principles be applied on public lands as 'regulatory assurances' through Coordination and they will be applied on private lands as 'incentive-based assurances.' In this way, this Plan serves as a planning tool for private land owners by informing and improving their conservation efforts on a voluntary basis with the added opportunity to amend this Plan as a result of their stewardship successes.

Finally, because of the scientifically sound habitat modeling conducted to identify the suitable habitat in Garfield County which is the basis of this Plan, the County intends that this Plan may serve as a model for other counties located within the national range. Furthermore, this Plan explicitly relies on the Coordination process that requires federal and state agencies with sage-grouse management responsibilities in Garfield County to ensure that their plans are consistent with this Plan. Ultimately, the Coordination process will be the vehicle that brings disparate parties together with the same intent on making sound land management decisions that benefit the sage-grouse and its habitat recognizing that there are multiple uses being managed at the same time.

CHAPTER 2 Plan Area

The Plan Area includes the greater area where the suitable habitats are located within Garfield County and are primarily limited to the western region of the county in occupied habitats on the Roan Plateau (see **Figure 1**, below). Nearly 70% of the land within the Plan Area does not support habitat characteristics necessary to support the sage-grouse, but within this area there are small but important patches of suitable habitat. In order to ensure that habitat supporting, or has the potential to support sage-grouse is properly managed; this Plan and the associated maps identify the suitable habitats within the Plan Area, utilizing the best available science at the time of this plan's development.

Figure 1: Plan Area



Habitat Categories

Sage-grouse require somewhat different seasonal habitats distributed across sagebrush-dominated communities to complete their life cycle. All of these habitats consist of, are associated with, or are immediately adjacent to, sagebrush. The Plan utilizes the following habitat categories to define habitats in the Plan area, utilizing recent and pertinent research from the Plan area.

1. Suitable Habitat

Suitable Habitat includes all seasonal habitats (including lekking, nesting, brood rearing/summer and winter habitats) within the Plan area. Generalized characteristics of Suitable Habitat include:

- Sagebrush cover is from 10 to 50%, sometimes greater
- Cover of Mixed Mountain Shrubs is not more than 25%
- Distance to nearest forest is over 100 meters
- Distance to shrubby woodlands is over 50 meters
- Slope is flat to shallow
- Location is on or near the top of a ridgeline

Sagebrush- includes all species and sub-species of the genus *Artemisia* except the mat-forming sub-shrub species *frigida.*

Mixed Mountain Shrubs- are shrublands dominated by Utah serviceberry (*Amelanchier utahensis*), Saskatoon serviceberry (*A. alnifolia*), mountain mahogany (*Cercocarpus montanus*), oakbrush (*Quercus gambelii*), bitterbrush (*Purshia tridentata*), and may have a sagebrush component. Mapped Mixed Mountain Shrublands have greater than 10% cover of these non-sagebrush shrub species, as this is the threshold at which sage-grouse begin to show an avoidance of this community type.

Shrubby Woodlands- are vegetation communities dominated by oakbrush or pinyon (*Pinus edulis*) and Rocky Mountain juniper (*Sabina scopulorum*) or Utah juniper (*S. osteosperma*) woodlands. Mapped Shrubby Woodlands have greater than 10% cover of pinyon-juniper, as this is the threshold at which sage-grouse begin to show an avoidance of this community type.

Forests- in the Plan Area include contiguous stands larger than ½ acre of aspen (*Populus tremuloides*), Douglas-fir (*Pseudotsuga menziesii*), mixed conifers (including, but not limited to Douglas-fir, Engelmann spruce [*Picea engelmannii*], subalpine fir [*Abies bifolia*] and ponderosa pine [*Pinus ponderosa*]), pinyon-juniper woodlands, and oakbrush.

2. Seasonal Habitats

While sage-grouse generally change their use of micro-scale habitats throughout the year, sage-grouse may be found within Suitable Habitat at any time of the year. The following definitions describe general characteristics of seasonal habitats.

Nesting- Nesting habitat is generally moderately sized patches of denser and taller sagebrush, further away from roads and other activity areas. General characteristics include:

- Sagebrush cover is generally from 20 to 50%
- Cover of Mixed Mountain Shrubs is generally not more than 10%
- Distance to nearest Forest is generally over 100 meters
- Distance to Shrubby Woodlands is generally over 50 meters

Brood Rearing- Brood rearing habitats are utilized after chicks have hatched, and are generally more mesic (moist) areas with a higher percentage of forbs and grasses which help provide higher densities of insects, plant material, and seeds for chicks, hens, as well as males during the summer and early fall months. General characteristics include:

- Sagebrush cover is generally from 10 to 30%
- Cover of Mixed Mountain Shrubs is generally not more than 10%
- Distance to nearest Forest is generally over 100 meters
- Distance to Shrubby Woodlands is generally over 50 meters

Winter Habitat- Winter habitat is generally utilized by sage-grouse from November through early April. It is primarily determined by the depth and persistence of snow cover. During more severe winters, snow can limit winter habitat to wind-swept ridges and patches of the tallest sage-brush. During the winter sage-grouse food is strictly limited to sage-brush. However, sage-grouse can do quite well on winter diets. General characteristics include:

- Sagebrush cover is generally >25%
- Cover of Mixed Mountain Shrubs is generally not more than 10%
- Distance to nearest Forest is generally over 100 meters
- Distance to Shrubby Woodlands is generally over 50 meters
- Specific areas where sage-grouse congregate should be mapped as information becomes available

3. Temporarily Disturbed

Temporarily disturbed areas have seen recent vegetation disturbance activities (such as pipeline corridors and wildfire events) and may not support sagebrush cover at a density or height suitable for sage-grouse use. If these areas occur within a block of Suitable Habitat, they will be considered Temporarily Disturbed, and still would be considered as long-term as Suitable Habitat. Temporarily Disturbed habitat will need to be tracked spatially within the Plan Area.

4. Unoccupied Suitable Habitat

Colorado Parks and Wildlife (CPW), the BLM, and energy companies within the Plan Area have conducted multiple research and investigation efforts to determine areas where sage-grouse currently occupy habitats and these areas are relatively well-known. There are also areas that support Suitable Habitat, but for which sage-grouse currently do not occupy these areas or the status of occupancy are unknown. These areas, for whatever reason, are deemed less-than-

optimal by sage-grouse (e.g., due to predation pressures, non-lethal disturbances, an ineffectively small area of suitable habitat, etc.) and thus sage-grouse prefer to utilize other areas. These areas may also be degraded with regards to habitat, and do not meet life-history requirements for sage-grouse, or (as an example) may have low levels of invasion by pinyon-juniper trees, and is therefore ineffective habitat.

5. Lek No Surface Occupancy Habitat

Lek No Surface Occupancy (NSO) Habitats are areas where an Active Lek has been cited (and determined by the County to exist), which is not located in Temporarily Disturbed or Unoccupied Suitable Habitat.

CHAPTER 3 Habitat Mapping, Modeling & Methodology

This Chapter details the process by which Suitable Habitats for Greater Sage-Grouse were developed within the Plan Area.

Section 1 Goals and Objectives of Mapping Process

The habitat mapping provided by state and federal agencies in 2012 for Greater Sage-Grouse in the Plan Area previously occurred at a landscape level that did not accurately address the unique topography of the Roan Plateau, or provide planning information at resolution accurate enough for County to use in the Plan, and for relevant land-use planning activities potentially occurring within the Plan Area (Perdue and Petterson 2014). Because of the significant implications on land use and ongoing land management, the most accurate delineation of habitat was deemed necessary by the County. This habitat mapping process followed the latest and most relevant peer-reviewed habitat mapping process available for mapping large and diverse areas.

The project objective was to locate and quantify the availability of suitable sage-grouse habitat on the Roan Plateau within Garfield County, independent of analyses already performed by state and federal agencies, as well as independent of other habitat mapping efforts produced by energy companies, but still incorporating peer-reviewed and accepted habitat parameters for sage-grouse produced by the scientific community.

The process incorporated the following:

- Phase 1: Conducted a literature search and determined relevant criteria for identifying suitable habitat for the Greater Sage-Grouse within northern Colorado. Build generalized multi-criteria suitability spatial models to model areas for general habitat suitability.
- Phase 2: Re-map vegetation within the PPR Study Area to increase habitat accuracy.
- Phase 3: Perform field verifications to validate accuracy of vegetation mapping to on-the-ground habitat conditions.
- Phase 4: Build statistically robust multi-criteria suitability spatial models to delineate suitable Greater Sage-Grouse habitats.

The 220,969-acre Plan Area occurs on the Roan Plateau within Garfield County as shown in **Figure 1**. The spatial extent of the Plan Area represents all areas within the County currently indicated as Preliminary General Habitat (PGH) or Preliminary Priority Habitat (PPH) as mapped by CPW and adopted by the BLM. Of the 220,969-acre PPH analysis area, 61,338 acres (28%) are BLM Lands, while the remaining 159,631 acres (72%) are private lands.

Table 1: Literature References and Habitat Parameters Employed

Author	General Habitat	Lek/ Breeding	Nesting	Brood Rearing Summer	Summer-Fall	Winter
Apa 2010[1]						
Sagebrush	-	-	37%	30%	-	-
Total Shrub	-	-	68%	34%	-	-
Walker 2010						
Sage *dominance*	-	57-96% (100m)	-	50-92% (100m)	-	-
Sage+grass+MMS	-	90-98% (350m)	-	88-91% (350m)	-	-
Forest	-	0.5-6.5% (350m)	-	4.5-11.5% (740m)	-	-
MMS[2]	-	0-1.2% (740m)	-	0-1.3% (740m)	-	-
CO Sage-Grouse Consv. Plan 2008						
Sagebrush cover	-	20-30% around leks	15-38% avg. 27%	10-15% 20-25% for escape	>15%	>25%
NTT Report[3]						
Sagebrush cover	-	-	-	10-25%	-	-
Connelly et al. 2000						
Sagebrush cover	-	15-25%	-	10-25%	-	10-30%
Grass/forb cover	-	>25%	-	>15%	-	NA
Area with suitable habitat	-	>80%	-	>40%	-	>80%
Connelly et al. 2011						
Sagebrush cover	12-48%	Follow Connelly et al. 2000				
Grass/forb cover	-	Follow Connelly et al. 2000				
" – " indicates that no parameters were given in the publication						

Section 2 Model Methodology

To model general Greater Sage-Grouse habitats in the PPH area in Garfield County, multi-criteria suitability models were developed in a Geographic Information System (GIS) using relevant resource criteria (see **Appendix B- Sage-Grouse Habitat Model** for a detailed description of the methodology). The multi-criteria suitability models utilized two distinctly different methods of modeling; **(1) weighted overlay modeling** using a Resource Selection Function (RSF) and **(2) fuzzy modeling**. Furthermore, multi-criteria suitability models can employ two methods in developing the variables as inputs to the model framework; inductive (i.e., empirical, inferred from existing data) or deductive (i.e., non-empirical, developed from expert opinion). Due to the availability of field-collected sage-grouse signage data (e.g., feathers, droppings, located birds, lek locations, etc.), an inductive method was employed for modeling Greater Sage-Grouse habitat suitability.

Weighted overlay models function by applying logical mathematical arithmetic to multiple criteria, allowing for diverse and dissimilar criteria to be inputs to an integrated analysis (Mathworks 2014). When applied to habitat modeling, weighted overlay models are commonly referred to as a Habitat Suitability Index (HSI). In the instance of habitat modeling, the model scales, weights and integrates diverse spatial data to measure the habitat suitability of a given location on a common, relative scale. The weighted overlay approach using an RSF was selected for three reasons. First, HSI's are widely accepted and employed by state and federal wildlife agencies to model species distribution for resource management, planning and population viability analyses. In fact, HSI's are the basis for the U.S. Fish and Wildlife Service's (USFWS) Habitat Evaluation Program (HEP). Secondly, weighted overlay models have previously been employed, and are currently being employed in other ongoing research projects to study Greater Sage-Grouse habitat availability, providing results as a means for direct comparison to other HSI models. Third, using an RSF allows species distribution to be modeled using known selection preferences from statistical inference of field-collected data, thereby predicting suitable habitat patches based on known behavior of the local population.

While HSI's are widely employed as a means for modeling species' habitats, by contrast, the application of fuzzy modeling to predict species distribution has been limited to date. Fuzzy models are based on the mathematical concept of fuzzy logic, which recognizes that most objects do not have clearly defined boundaries and therefore cannot be described as only belonging to one specific category (Kainz 2008). Rather, fuzzy systems recognize the complex nature of behaviors and environments and provide a method for handling the vagueness and uncertainty inherent to both phenomena. Fuzzy models are developed using natural language to compose a set of rules that describe a certain phenomenon. For example, a rule may be stated as: "If a site is flat and the site is near water, then the site is optimal."

Once all fuzzy rules are established for a fuzzy model, fuzzy sets are then developed based on the pre-defined rules. Fuzzy sets are classes that allow for varying degrees of membership, rather

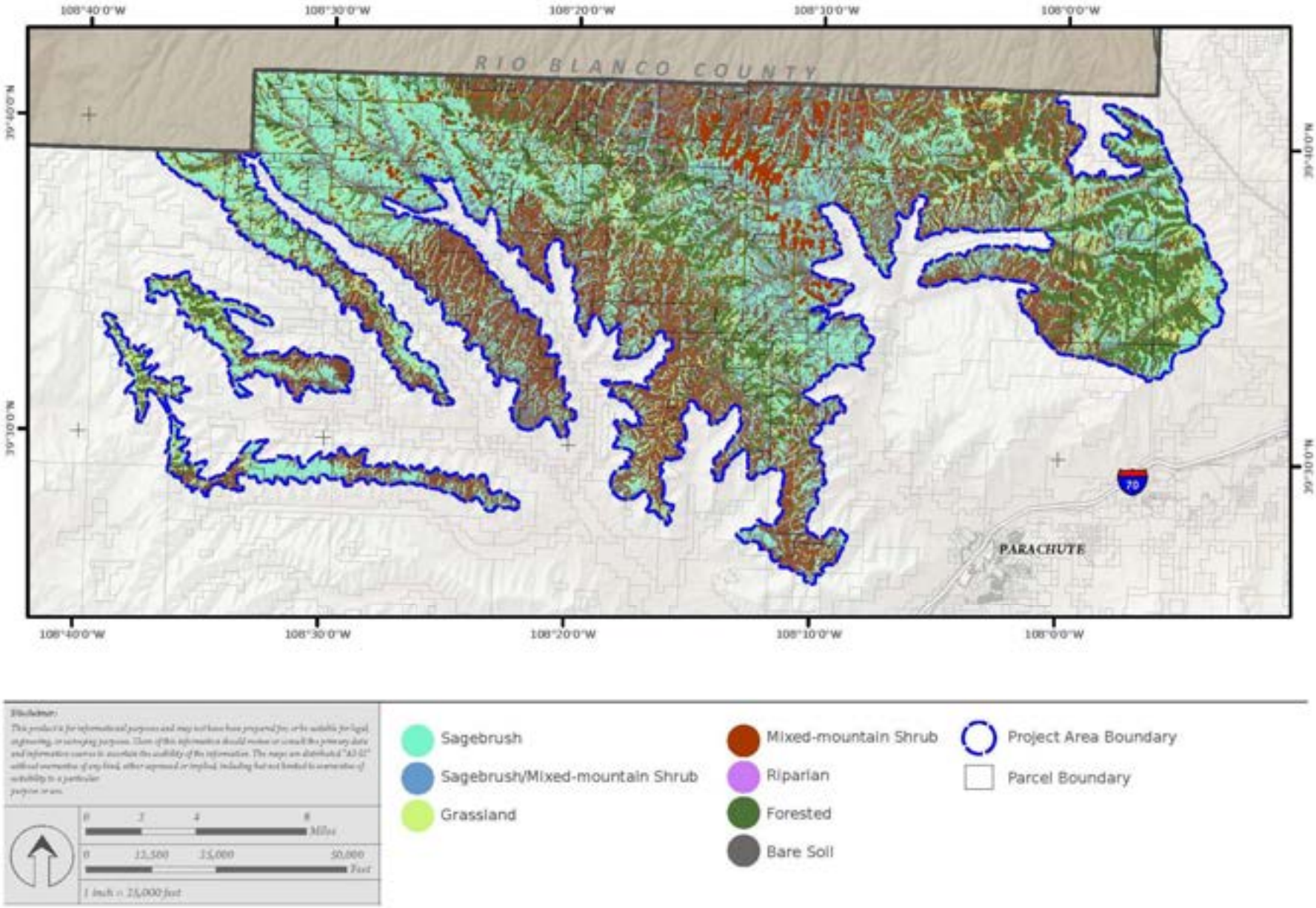
than forcing the set to belong entirely to one class or another. For example, when considering proximity to an existing object, the distance of a given location may be described as near or far. In a weighted overlay model, the response is binary in nature; the distance of the location to the object is either near or far. However, in a fuzzy set, the same distance can be described as both near and far.

The development of a fuzzy model to study Greater Sage-Grouse habitat suitability was pursued for two primary reasons. First, the method has a distinct advantage over other model frameworks in that it considers vagueness and imprecisions that are inherent to spatial data. Secondly, because it is an intuitive system and constructed using natural language, fuzzy models can be easily understood by a wide variety of audiences.

Methods

In both modeling methods, numerous variables were considered in the analysis that may influence sage-grouse habitat selection. The variables were broadly classified as either habitat characteristics or topographical factors. All variables describing habitat characteristics were derived from a digital vegetation map developed at a 2 meter cell resolution through supervised image classification of 1 meter color-infrared aerial photography collected in 2012 as part of the National Agricultural Imagery Program (NAIP) administered by the U.S. Department of Agriculture (USDA 2012). A detailed description of the image classification process is provided in **Appendix B**. Vegetation cover types derived from the image classification process are displayed in **Figure 2**. All variables were analyzed and considered at three spatial scales, because while sage-grouse are known as a landscape level species, most of the contemporary research documenting sage-grouse use has been performed at the local scale. The scales of available habitats that influence sage-grouse selection and non-use are currently unknown; therefore, the contributing variables that may influence habitat selection are tested at multiple scales to determine which scales guide habitat selection. The selected scales employed in this analysis represent a local scale (e.g., 100 meters), an intermediate scale (e.g., 350 meters) and a landscape-level scale (e.g., 1 kilometer).

Figure 2: Vegetation Types



Spatial Data Collection

Field-collected data of point locations of sage-grouse signage were collected and compiled from three individual private landowners within the PPR Study Area (WWE 2008). In total, the compiled dataset contained 1,174 unique signage points collected from 2005 to 2012 across a contiguous area totaling 375 km^2 completely contained within the broader PPR Study Area (WWE 2008). The private lands where the field surveys were conducted occur in the central portion of the broader PPR Study Area and are considered to be representative of the diverse habitat types that naturally occur in the region. The signage point data consisted of locations indicating presence of sage-grouse, including feather and pellet presence, lek locations and physical bird sightings collected during the summer season when the PPR Study Area is snow-free and easily accessible. No telemetry data (i.e., sage-grouse outfitted with a GPS or radio-collar) were available for use in this analysis. Prior to, and after the acquisition of the sage-grouse point data, there has been a number of natural gas exploration and development activities in the analysis area, including road construction, natural gas pad development, compressor station construction, and other natural gas related support facilities. Because of these activities and the changing landscape, there was no attempt to capture these habitat impacts in the analysis, as it would have been very difficult to draw a point-in-time by which to incorporate these anthropogenic impacts.

While this data can show presence and seasonality of use, interpretation of how sage-grouse are using the area (e.g., summer foraging, winter foraging and nesting) is somewhat subjective and difficult to accurately predict. Some sage-grouse sign (such as roost piles) can reliably be used to predict winter time use, but single pellets, feathers, or tracks were assumed to not provide enough data to accurately describe use, therefore our models do not attempt to discern how seasonal habitats are being utilized by sage-grouse.

Weighted Overlay Modeling and the Resource Selection Function

The suitability of sage-grouse habitat using a weighted overlay approach was conducted using a RSF. The RSF was constructed on a presence vs. available habitat design because data contained presence-only records. This approach estimates habitat selection using a logistic function that transforms available resources into habitat suitability (Johnson et al. 2006).

The regression coefficients obtained from the analysis were applied to the respective spatial data layers for each explanatory variable as a weighted linear combination in a GIS to produce an index indicating habitat suitability for Greater Sage-Grouse. The results rank habitat suitability for sage-grouse on a continuous index of 0 to 1; 0 represents 0% probability of suitable sage-grouse habitat while a value of 1 represents 100% probability of suitable habitat for the species.

Fuzzy Modeling

Following development and analysis of the RSF model, a fuzzy model was developed to model suitable sage-grouse habitat within the PPR Study Area. All explanatory variable combinations were used to form the

fuzzy model, excluding mixed sagebrush vegetation communities (e.g. sagebrush-grassland mix and sagebrush-mixed mountain shrub mix). Unlike RSF models that determine the most significant contributing explanatory variables and assign weighted coefficients, fuzzy models utilize all sets of explanatory variables without weighting assigned.

The fuzzy model was developed to distinguish between suitable and unsuitable habitats for sage-grouse in the PPR Study Area. As such, the fuzzy model equation was constructed using linguistic descriptions involving all explanatory variables. The fuzzy rules for the model were developed using 25 explanatory variables and presented in **Table 3** below.

Table 4: Fuzzy Model Rules

A site is considered suitable for Greater Sage-Grouse habitat if it meets the following criteria:		
Criteria	**Scale**	**Definition**
Slope is not steep	100 m	'not steep' defined as < 24%
	350 m	'not steep' defined as < 31%
	1 km	'not steep' defined as < 33%
Location is on or near a ridge	100 m	Defined as TPI value > 435
	350 m	Defined as TPI value > 435
	1 km	Defined as TPI value > 424
Surface curvature is more flat	100 m	'more flat' defined as < 10.71
	350 m	'more flat' defined as <13.62
	1 km	'more flat' defined as <14.46
Surrounding vegetation is dominated by sagebrush	100 m	'dominated' defined as > 48% presence
	350 m	'dominated' defined as > 41% presence
	1 km	'dominated' defined as > 35% presence
Proportion of mixed mountain shrubs are moderately low	100 m	'low' defined as < 22% presence
	350 m	'low' defined as <34% presence
	1 km	'low' defined as < 36% presence
Proportion of grasslands are low	100 m	'low' defined as < 5%
	350 m	'low' defined as < 5%
	1 km	'low' defined as < 5%
Presence of bare surfaces are moderately low	100 m	'low' defined as < 37%
	350 m	'low' defined as < 25%
	1 km	'low' defined as < 25%
Proportion forest is low	100 m	'low' defined as < 6%
	350 m	'low' defined as < 10%
	1 km	'low' defined as < 13%
Distance to forest is far		'far' defined as > 226 ft.

Results

The model results were validated using a cross-validation method used to correlate bins with area-adjusted frequencies of probability of use (see **Appendix B**). The validation technique involves five steps:

1. Divide the resulting prediction surface into a specified number of equal-area bins.
2. Determine the midpoint value for each bin area.
3. Calculate the utilization rate for each bin using the midpoint value of the bin and the area of the bin.
4. Calculate the expected number of validation records in each bin using the utilization rate from Step 3.
5. Compare the expected number of validation records to the observed number of validation records captured in each bin.

RSF Model Results

The RSF model results were split into 6 equal-area bins. The 235 field-collected presence locations withheld for model validation were cross-referenced with the bins to count the number of known observations that fell within each bin. All midpoint values were then determined to calculate the expected utilization rate for each bin. The observed and predicted location numbers were converted to percentages to assess model performance.

The RSF model validated well, supporting a good fit between observed and predicted frequencies. The top two bins predicted 97% occupancy while observed occupancy totaled 99%, representing 73,280 acres of suitable habitat within the PPR Study Area as shown in **Figure 3**. Bins 1-4 did not meet significance criteria, whereby occupancy would not likely occur $\geq$3% of the time (results for bins 1-4 were therefore not displayed on Figure 3).

Fuzzy Model Results

Similar to the RSF model, an attempt was made to split the fuzzy model results into six (6) equal-area ordinal bins. However, due to the similarity of the lower values returned in the predicted surface, only four distinct bins could be produced; the lowest ranked bin (bin 1) captured approximately one-half of the study area, but due to the homogeneity of the results it could not be further subdivided. Excluding the reduced number of bins, the fuzzy model results were validated using the exact same method applied to the RSF model validation explained above.

The fuzzy model validated very well, supporting a strong fit between observed and predicted frequencies. The top two bins predicted 98% occupancy while observed occupancy also totaled 98%, representing 72,852 acres of suitable habitats within the PPR Study Area as shown on **Figure 4**. Bins 1 and 2 did not meet significance criteria, whereby occupancy would not likely occur $\geq$2% of the time (results for bins 1 and 2 were therefore not displayed on Figure 4).

Greater Sage-Grouse Management Area

Based on the results of the Fuzzy and RSF modelling, areas deemed as suitable habitats from both models was combined in order to provide a more conservative habitat map for sage-grouse

within the PPR Area. Within the modelled suitable habitat area, the principles and policies contained within this Plan shall be required for the management of sage-grouse and its habitat as depicted in **Figure 5- Garfield County Greater Sage-Grouse Management Areas**, and as detailed in **Chapter 4 Plan Implementation**. Within the Greater Sage-Grouse Management Areas, Garfield County will require consultation with applicants for activities within this area. A field verification and accompanying assessment of sage-grouse habitat conditions would be required to either dismiss the value of the habitat or that there is a need to avoid or mitigate potential impacts.

Figure 3: RSF Model Results

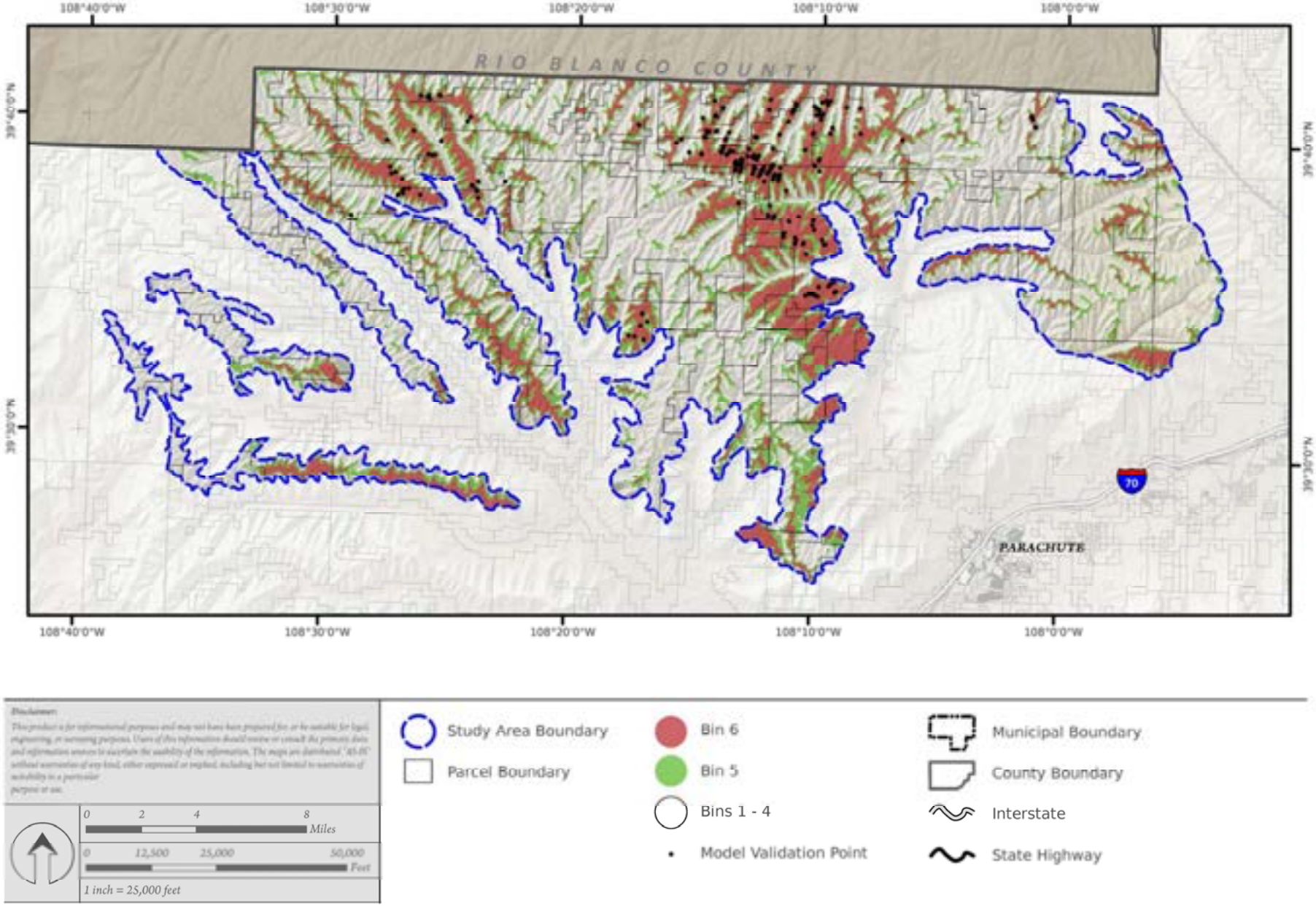
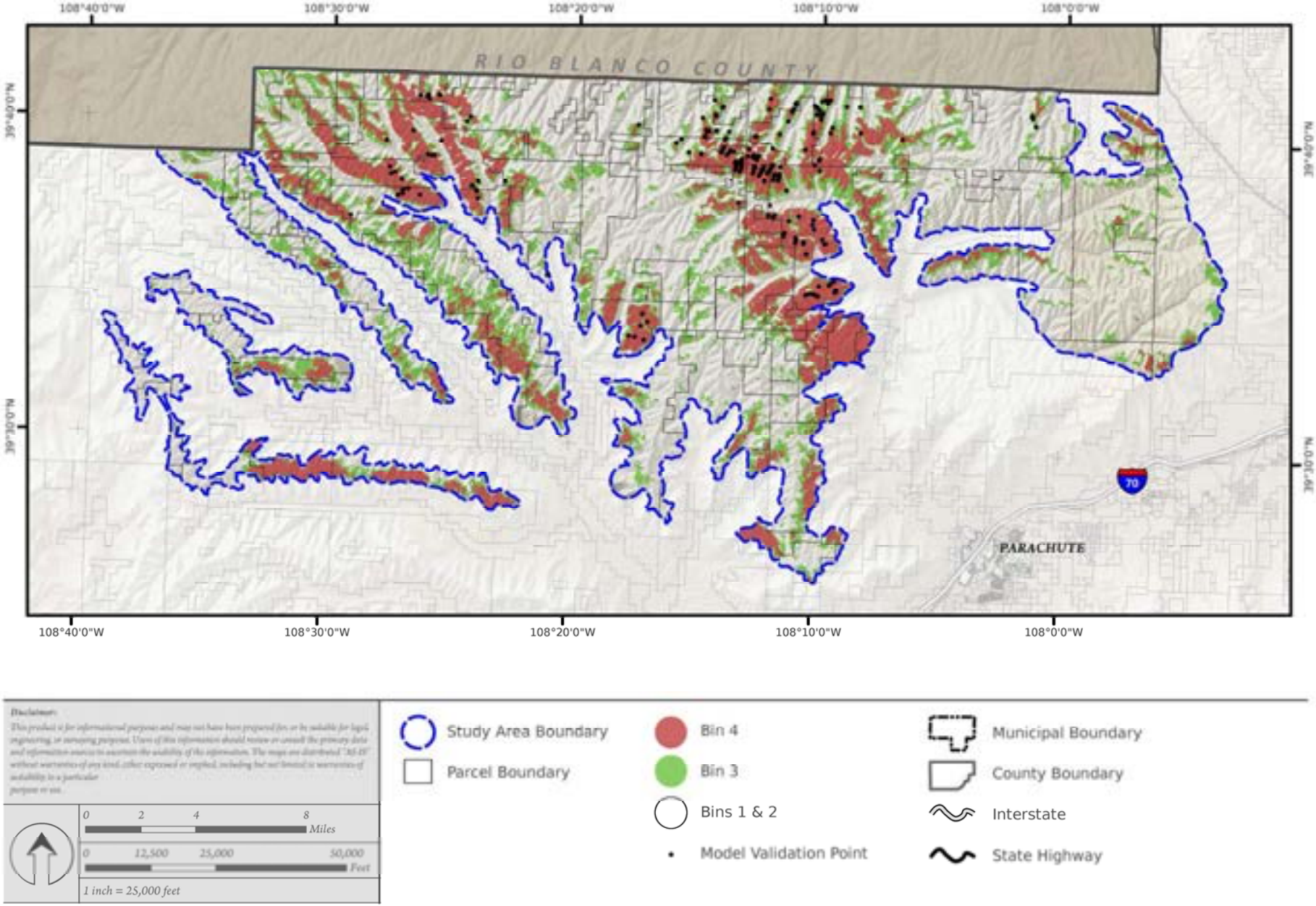


Figure 4: Fuzzy Model Results



CHAPTER 4 Plan Implementation

The Garfield County Board of County Commissioners (the BOCC) shall be responsible for managing and implementing the Plan. The principles and policies contained within the Plan shall be used to address functional surface disturbance within Suitable Habitats in the Plan Area within the political boundaries of the County as depicted on **Figure 5: Greater Sage-Grouse Management Plan Areas**. The Garfield County Greater Sage-Grouse Management Plan Areas (MPAs) were developed by combining the suitable habitat areas resulting from both habitat models described in Chapter 3. In total, the MPA's encompass 93,895 acres within Garfield County, approximately 43% of the PPR Study Area. 74,819 acres (80%) are managed under the Private Lands Management Area Plan while the remaining 19,076 acres (20%) are managed under the Public Lands Management Area Plan.

A. Implementation on Public Lands

The principles, policies, and best management practices contained within this Plan shall be required for the management of sage-grouse and its habitat on public lands that contain suitable habitat as depicted as Public Lands Management Areas shown in **Figure 5: Greater Sage-Grouse Management Plan Areas**.

B. Implementation on Private Lands

For private lands in the Plan Area, the principles, policies, and best management practices contained within this Plan are considered voluntary but are strongly encouraged for the management of sage-grouse and its habitat. In this way, private land identified as Private Lands Management Area in **Figure 5: Greater Sage-Grouse Management Plan Areas** shall serve as a consultation map whereby land use projects requiring Garfield County review and approval under the Garfield County Land Use and development Code of 2013, as amended, are encouraged to consult with a professional biologist who can provide an opinion as to the precise nature of the habitat as well as potential measures / mitigation that could be implemented if needed.

C. Implementation Process

This policy shall serve as the primary conservation policy for the sage-grouse in Garfield County. The BOCC has the unique authority to require federal and state agencies to coordinate their plans and policies with the County, therefore ensuring that all entities with responsibilities for the species and habitat are working together efficiently and effectively and not pursuing counter-

productive measures. This Plan is designed to serve as the comprehensive planning document for the Greater Sage-Grouse in Garfield County.

While recognizing that each agency has its own planning processes, federal agencies are required to not only consider the County's policies, but work to resolve conflicts and make federal plans consistent with the County's policies (43 USC 1712). Federal statues require that the County's policies are integrated into the federal conservation strategy for the sage-grouse on federal lands within the County's borders. The State of Colorado has given Garfield County planning authority over lands within the County's borders, ensuring the coordination of the County's sage-grouse policy with state agencies as well.

Implementation of this Plan will be conducted through a formal coordination process with all agencies that have jurisdiction and/or responsibility for the sage-grouse and/or its habitat. The Plan will serve as the unifying and primary planning document within Garfield County.

Specifically, the BOCC shall utilize this Plan as a tool to evaluate and provide comment regarding land management decisions on both public and private lands for which it has land management jurisdiction. More specifically, the BOCC shall utilize this Plan in evaluating land use / development applications submitted under the Garfield County Land Use and Development Code of 2013, as amended as well as ensuring that any federal or state land management action remains consistent with this Plan.

D. Plan Update / Amendment Process

This Plan is managed under adaptive management principles where it is understood that the scientific understanding of the species and its habitat in will be continually expanding. This requires that the policies, principles, and best management practices of this Plan be frequently evaluated and modified as warranted by the best available science appropriate for the unique Plan Area in Garfield County.

1. Annual Review

The BOCC will conduct an annual Coordination review, commencing one year from the date of enactment of this Plan with the federal and state agencies that have habitat or species responsibilities within the Plan Area. This review process will evaluate the availability and condition of habitats, direct and indirect impacts, conservation measures, policies and best management practices being implemented by each agency for their effectiveness and applicability to the Plan Area.

Also incorporated in this review is any new science and, if warranted, modifications to the best management practices, policies, and conservation incentives within the Plan.

The Coordination review shall take place in government-to-government meetings between the different agencies and the BOCC.

The BOCC will also initiate meetings with entities that have private property interests in the Plan Area for the purpose of analyzing their conservation efforts and effectiveness, as well as any new science they may be able to contribute to the process to ensure Plan updates are also based on the best available science.

The consideration of changes to the Plan shall be discussed in these coordination meetings, followed up with a draft Plan update to be shared with all agencies through the Coordination process and private entities with private property interests for input. The input shall be considered and incorporated where appropriate into a formal written Plan update to be reviewed approved by the BOCC within 120 days of the submittal date of the requested change.

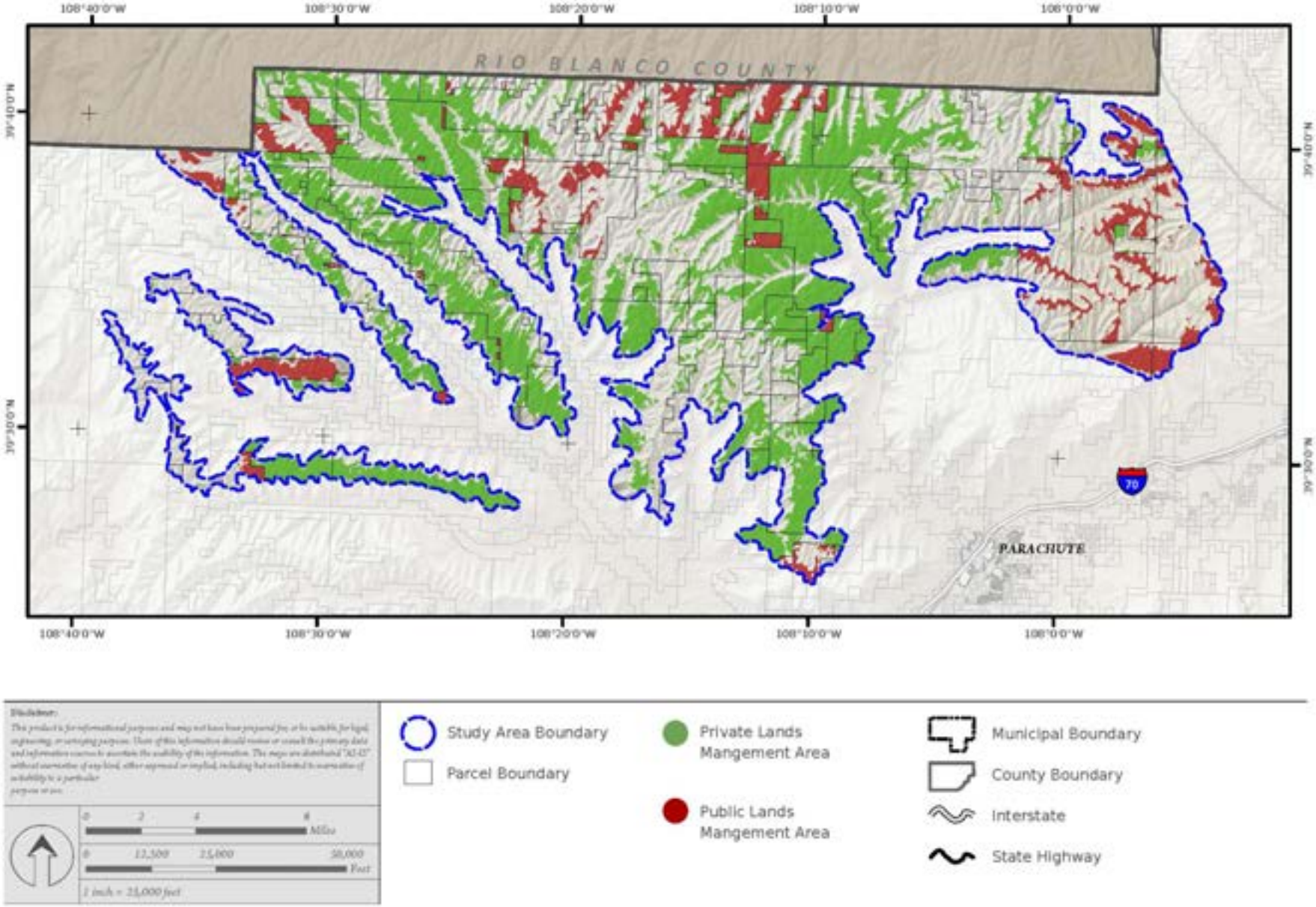
2. New Scientific Information

If at any time between the annual review period where federal or state agencies, or private entities with property interests in the Plan Area become aware of or acquire new science regarding the species or its habitat in the Plan Area within Garfield County that may warrant changes to the best management practices, conservation measures, or policies within this Plan, then they shall submit a written report to the County, including the scientific review and supporting data, for the County's consideration. If the BOCC finds changes to the Plan are warranted then it can initiate a formal review of the Plan in coordination with all entities.

3. Additional Coordination Meetings

Additional Coordination meetings are encouraged beyond the required annual review and new scientific information review for the purpose of keeping apprised of and working to resolve all issues impacting the sage-grouse.

Figure 5: Garfield County Greater Sage-Grouse Management Areas



CHAPTER 5 Principles

Management Plan Areas. The Garfield County greater sage-grouse Management Plan Areas (MPA) were developed by combining the suitable habitat areas resulting from both habitat models described in **Chapter 4**. In total, the MPA's encompass 93,895 acres within Garfield County, approximately 43% of the PPR Study Area. 74,819 acres (80%) are managed under the Private Lands Management Area Plan while the remaining 19,076 acres (20%) are managed under the Public Lands Management Area Plan.

The Plan Principles are designed to inform and guide all decision making, regardless of specific issue or impact, as they relate to the well-being of the sage-grouse in Garfield County.

1. The sage-grouse habitat in Garfield County is naturally fragmented, as a result of topography and the patchy nature of sagebrush, non-sagebrush shrubs, meadows, aspen, and conifers in the Plan Area. Expanses of contiguous sagebrush, necessary to support a large stable population (as described by the USFWS in their March 2010 candidate determination notice), do not exist in Garfield County. Additionally, the sage-grouse population inhabiting Garfield County is a peripheral population located on the far southeastern edge of the species range. As a result, the stewardship of the population requires detailed knowledge of local conditions, including the mapping of Suitable Habitat (as determined by the process in **Appendix B**).

2. Human disturbances to Suitable Habitat are minimal, generally temporary in nature, and can be avoided or successfully mitigated in most cases.

3. Sage-grouse management decisions shall be made based on the best available scientific information that is applicable to sage-grouse habitat in Garfield County. The scientific information used will be consistent with standards of the Information Quality Act (see definitions of Quality, Objectivity, Utility and Integrity), as determined by the County.

4. Land management plans of all government agencies that have ownership or management responsibilities for the lands or species within Garfield County shall be consistent with the policies set forth in this plan subject to valid existing rights.

5. For private lands, the polices set forth in this Plan are incentive-based to be encouraged through conservation incentives and best management practices that do not encumber private property rights of the landowners but do address long-term habitat needs of sage-grouse.

6. No policies shall infringe on the private property rights of any landowner within Garfield County. All species and land coverage information gathered on private property shall be treated as the property of the landowner and shall not be used by any private or government entity for any purpose unless express, written permission has been obtained by the landowner.

7. All sage-grouse habitat and species management programs that impact the County, administered by federal and state government agencies, shall be coordinated with Garfield County, and the data collected by state and federal agencies will be shared with the County in a timely manner or be provided to the County regardless of completeness at the formal request of the County.

8. All Federal lands within the Plan Area containing suitable habitat for sage-grouse shall be managed to continue the multiple-uses of the lands as required by 43 U.S.C 1701(a)(7). No policies shall be implemented that prescribe the management of the land for a single purpose, but all functions of the land, including providing habitat for wildlife and supporting the productive uses of its resources, shall be considered with the objective of balancing and continuing all uses of the land. Unlike government-owned land where there are many property interest holders and the multiple uses must be maintained, private land owners have more discretion to manage their property for the primary purpose of conserving sage-grouse, if so desired.

9. The ability of wildlife, including sage-grouse, to habituate to inanimate manmade structures and changes to the landscape shall be acknowledged.

10. All sage-grouse conservation measures enacted on federal land or through a federal nexus shall be for the purpose of directly benefiting the species and its verified habitats. These measures shall be scientifically defensible. All data and information used to produce conservation measures shall be made available to the public and the County and shall be coordinated with the County. Additionally, the balance of impacts to other species and to human welfare must be weighed prior to approval and implementation. All planning efforts shall be governed through adaptive management principles to ensure use of the latest scientific research on sage-grouse and their habitat, best management practices, technological advances, and incorporation of impact avoidance, minimization, and mitigation opportunities are vetted and utilized.

CHAPTER 6 Policies

The policies set forth in this chapter are for the purpose of providing specific conservation measures that are to be implemented in the Plan Area in order to avoid, minimize and if necessary, mitigate impacts that may affect the suitable (and assumed occupied), temporarily disturbed and unoccupied habitat of the sage-grouse, within suitable habitats as depicted on **Figure 5: Garfield County Greater Sage-Grouse Management Areas**.

Section 1 Travel and Transportation

Because the majority of roads in the Plan Area are private roads with controlled access that are used on a limited /seasonal basis, they do not measurably contribute to bird collisions. These roads do not produce barriers to movement for sage-grouse. These same roads provide necessary access to the area to ensure proper management of resources, infrastructure and assets, and accessibility in the event of emergencies. Very few roads support through traffic. Because of the nature of the terrain, company policies, road surfaces, and driving conditions, vehicles maintain low speeds and the risk of collision with the sage-grouse is minimal.

Policy

A. Limit motorized travel to existing roads, primitive roads, and trails, as verified by Garfield County, at a minimum in Suitable Habitats and in Lek NSO areas.

B. County Roads, as determined by Garfield County and identified on County Maps, within Suitable Habitats, shall only be closed or restricted by Garfield County.

C. Allow no upgrading of existing routes, as verified by Garfield County, in Suitable Habitat or Lek NSO areas that would change route category (road, primitive road, or trail) or capacity unless the upgrading would have minimal impact on sage-grouse habitat, is necessary for motorist safety, or eliminates the need to construct a new road.

D. When reclaiming roads and trails, use locally native seed mixes as prescribed by a professional biologist and use transplanted or seeded sagebrush unless unfeasible.

Section 2 Recreation

Recreational use within the Plan Area is extremely limited because the majority of the land is privately held and access is strictly controlled. This significantly reduces potential direct or indirect impacts to sage-grouse or their habitats by the general public. Any plan for creating new or additional recreational opportunities on federal lands in Suitable Habitats must provide Garfield County a sage-grouse impact analysis for review.

Policy

A. Limit motorized recreational use to existing roads, primitive roads, and trails (as verified by Garfield County), in Suitable Habitat and Lek NSO areas.

B. Avoid all Suitable Habitat and Lek NSO areas as identified on Garfield County Habitat Maps.

Section 3 Lands and Realty Management

Habitats within the Plan Area are naturally fragmented and patchy; therefore, there are opportunities for new roads and energy development infrastructure to be placed outside Suitable Habitats. Further, any land acquisition shall be by mutual agreement between public and private entities.

Policy

A. Placement of new above-ground power lines in Suitable Habitat and Lek NSO areas is prohibited.

B. Bury new powerlines within Suitable Habitats and follow existing corridors unless there is a technical infeasibility, subject to valid existing rights. Anti-perch devices may be used where powerline burial is technically infeasible.

C. Private land ownership in sage-grouse Suitable Habitat areas should be continued and encouraged as private land conservation efforts have been the most effective methods to preserve diverse and healthy habitats for many species, including sage-grouse.

Section 4 Range Management

Garfield County continues to enjoy a long history of livestock grazing on both private and public lands. When properly managed, livestock can coexist with sage-grouse as well as help improve suitable habitat and decrease fire hazards.

Policy

A. Maintain sustainable grazing consistent with historic land use and ranching practices that are sustainable for both agricultural operations as well as sage-grouse habitats, as recommended by the U.S. Department of Agriculture and Natural Resources Conservation Service throughout the Plan Area, utilizing the best available science.

B. Livestock grazing can be utilized as a tool to properly manage sage-grouse habitat, and should not be removed from the Plan Area.

C. Any grazing restrictions or conservation measures that are put in place through a grazing permit shall be based solely on the conditions and activities specific to that permitted grazing allotment.

Section 5 Predation

Predation of sage-grouse eggs, juveniles, and adults occurs naturally, but can increase in association with human development, unless precautions are undertaken. Scientific research has shown that the predators on sage grouse are generalists, meaning that they prey on other species as well, and in some cases their populations are subsidized by human sources of food. Sage-grouse eggs are preyed upon by red foxes, coyotes, badgers, ravens, and (sometimes) black-billed magpies. Common predators of juvenile and adult sage-grouse include golden eagles, prairie falcons (as well as other raptors), coyotes, badgers, red fox and bobcats. Younger birds (especially broods), may be preyed upon by raven, red fox, northern harrier, ground squirrel, snakes, and weasels. However, of these predators, research has shown that ravens are the most abundant and have the greatest impact on the populations studied.

While predation on sage grouse occurs at all stages of the life cycle, it is predation on nests and broods that is generally recognized as having the largest deleterious effect on annual survivorship and recruitment in populations. Adding to this problem is the fact that predators, such as ravens, are subsidized by humans to the point where they exceed historic levels in some areas by as much as 1,500%. In such cases, management actions, especially where predators like ravens are abundant and sage-grouse mortality is high (such as in the Plan Area), may be needed to ensure that sage-grouse populations are not depressed by a known and potentially mitigated source of mortality.

Ravens are clever and highly adaptable in their behavior. They use communication and group foraging which allows them to opportunistically exploit food resources associated with humans (e.g., landfills, trash, road kill, unattended food, and carrion from livestock operations). In contrast, sage-grouse are very stereotypic in their behavior and rely on cryptic coloration, which makes them vulnerable to predation by ravens. As a result of these and other unintended food subsidies, raven populations have greatly expanded in the West. This, in turn, has impacted many species, including desert tortoises, marbled murrelets, least terns, California condors, and sage-grouse.

While reducing human-supplied food subsidies to predators is an essential part of any management strategy, it may not be effective unless coupled with active deterrents or management actions to reduce raven density (i.e., Coates and Delehanty 2010; Dinkins 2013). The last reported research on nest and brood survival in the PPR population (Apa 2010), estimated annual nest success between zero and 40%, and substantially lower chick survival. By the end of that study, *"Only 2 chicks remained radio-marked after 30 days of age. Apparent brood survival was 86% (n = 12/14) at 7 days, 62% (n = 9/14) at 14 days, and 14% (n = 2/14) at 30 days."* Those data indicate predation could be holding back the PPR population.

Policy

A. Encourage and review applicant's use of anti-perch devices, burying of powerlines, closed rubbish bins, removal of road kill and dead livestock, and other methods to discourage predators on sage-grouse and limit excess predation. If predation on sage-grouse is documented to have a deleterious effect on the PPR Area sage-grouse population, then allow for appropriate mitigation of predation under USDA guidance.

B. Encourage public agencies such as CPW, the BLM, and the USFWS to work with private land owners in areas of known Suitable Habitat to better understand the actual predation threat, then collaborate on the implementation of predator mitigation programs that discourage predators, reduce productivity and recruitment of predators, and reduce predator density.

Section 6 Wild Horse and Burro Management

Wild Horses and Burro's are not known to occur within the Plan Area and therefore do not presently impact sage grouse habitat.

Policy

A. Collaborate with appropriate agencies to discourage establishment of (feral) wild horse populations that could be detrimental to sage-grouse habitat.

Section 7 Mineral Development

The extraction of fluid minerals in Garfield County is accomplished using increasingly advanced technologies, more efficient operations, avoidance of critical habitats, impact minimization, mitigation, and more habitat restoration than in the past. As a result, surface disturbances can be minimal and temporary. The fast pace of these technological developments has meant that the primary literature on the impacts of mineral extraction on sage-grouse in Wyoming, that is cited in the majority of the federal government publications, is inconsistent with current practices and habitat types in Garfield County. It is anticipated that the advanced technologies currently in use, as well as future ones under development, will continue to allow the efficient extraction of resources while avoiding or minimizing impacts to sage-grouse and other species.

Policy

A. Close suitable habitat (**Figure 5**) as determined by the County's GIS mapping to future mineral leasing surface disturbance unless the fluid resource cannot be extracted without minimal surface disturbance. In this case, the Best Management Practices (see **Chapter 7**) will be followed and if necessary mitigation utilized to ensure a no net loss to sage grouse habitat and no deleterious demographic effect on the population.

B. All active Leks identified outside of Suitable Habitat shall have a 0.6 mile NSO for all non-functional surface disturbance as defined in the Colorado State Plan. Exceptions for allowing functional disturbance within the 0.6 mile NSO may be allowed for exceptional or unique topography or other non-contributing habitat aspects or circumstances that will not adversely impact sage-grouse. If the resources cannot be accessed without disturbing the active Lek NSO habitat, then Best Management Practices will be followed and necessary mitigation utilized to ensure a no net loss to sage grouse potential habitat and no deleterious demographic effect on the population.

C. No federal land mineral withdrawals shall be made in Suitable Habitat areas if the resources can be accessed and extracted without surface disturbance.

Section 8 Wildfire Suppression, Fuels Management and Fire Rehabilitation

A. Fuels Management Policy

1) Provide technical (GIS) support that can be used by landowners for voluntary fuels management that is consistent with sage-grouse habitat protection and enhancement.

2) Work with landowners to design fuels management projects in Suitable Habitat to strategically and effectively reduce wildfire threats.

3) During fuels management project design, consider the utility of using livestock to strategically reduce fine fuels (Diamond at al. 2009), and implement grazing

management that will accomplish this objective (Davies et al. 2011 and Launchbaugh et al 2007). Consult with ecologists to minimize impacts to native perennial grasses consistent with the objectives and conservation measures of the range management policy.

B. Emergency Stabilization and Rehabilitation Policy

1) Follow the County's habitat restoration policy in developing an emergency rehabilitation plan for temporarily disturbed areas within suitable habitat.
2) Coordinate with appropriate agencies in developing and implementing rehabilitation plans.
3) Collaborate with private landowners and leaseholders to integrate their expertise and knowledge of local conditions into rehabilitation plans.

Section 9 Habitat Restoration

The naturally patchy habitat in the Plan Area requires that habitat restoration projects be planned accordingly and that creating large contiguous landscapes of sagebrush is not consistent with the plant communities in the Plan Area.

Policy

A. Encourage habitat restoration projects on private land. Request that private landowners report annually on the progress of restoration efforts (providing spatial data associated with an API number, date, and status of restoration), so the County may track disturbed vs. restored acreages in and near Suitable Habitat.

B. Recognizing that local conditions in the Plan Area differ from those range-wide for sage-grouse, the County's mapped Suitable Habitat will be used for quantifying habitat conservation objectives of no net loss of Suitable Habitat (excluding that resulting from wildfire and temporary disturbances, as permitted).

C. Require the use of native plant species for restoration based on availability, and probability of successful establishment.

D. Encourage local private landowners to share information among themselves and the County on restoration design and strategies to obtain favorable outcomes.

E. In former sagebrush habitat or in habitat to be converted to sagebrush: make re-establishment of sagebrush and desirable understory plant cover (relative to ecological site potential) the highest priority for restoration efforts.

Section 10 Monitoring and Habitat Category Changes

The primary objective of this plan is to ensure the long-term health and continued existence of sage-grouse in Garfield County. Regular monitoring of the species and its habitat in Garfield County is essential to ensuring the policies and best management practices are updated and implemented within the Plan Area.

Policy

A. All federal and state agencies with management responsibilities in the Plan Area for the species and/or its habitat shall provide the County with an annual update of the monitoring programs they have in place, data collected and specifics about their collection protocols. These agencies will inform the County of proposed research projects and allow for the County's input and collaboration prior to implementation.

B. All data shall be collected and studies prepared using protocols that will ensure the quality, utility, objectivity and integrity of the information as required under the Information Quality Act.

C. All data that is gathered in the Plan Area shall be shared with the County in a timely manner, and supplied to the County regardless of its state of completion at the formal request of the County.

D. Private landowners are also encouraged to monitor and share data collected on private property with the County.

E. All data that is shared with the County that is not public information will be treated as confidential and used by the County only to help inform its policies and best management practices.

CHAPTER 7 BEST MANAGEMENT PRACTICES

1) West Nile Virus

Recommend pond designs based upon current recommendations of the CPW. "*Require treatment of waste water pits and any associated pit containing water that provides a medium for breeding mosquitoes with Bti (Bacillus thuringiensis v. israelensis) or take other effective action to control mosquito larvae."* These actions will reduce the distribution and abundance of mosquitoes that vector West Nile virus and reduce the risk of West Nile virus transmission to sage-grouse and other wildlife (Walker, B. 2008, before the Oil and Gas Commission of the State of Colorado on Draft Rule 1204, DOCKET NO. 0803-RM-02.

http://cogcc.state.co.us/rulemaking/StaffPreHearState/Exhibits/FINAL DOW TESTIMONY/B.Walker Testimony-041808 FINAL.pdf)

2) Fluid Mineral Development within Suitable Habitat

A. Establish speed limits on county roads near suitable sage-grouse habitat that are appropriate to safety and reducing vehicle/wildlife collisions.

B. Encourage clustering / centralization of disturbances, operations (fracture stimulation, liquids gathering, etc.), and facilities.

C. Encourage use of directional and horizontal drilling to reduce surface disturbance, and adoption of new technologies.

D. Encourage placement of infrastructure in already disturbed locations where the habitat has not been restored.

E. Encourage use of wood (or other material) mats for drilling activities to reduce vegetation disturbance and for roads between closely spaced wells to reduce soil compaction and maintain soil structure to increase likelihood of vegetation reestablishment following drilling.

F. Encourage a phased development approach with concurrent reclamation.

G. Encourage placement liquid gathering facilities outside of priority areas. Have no surface tanks at well locations within priority areas (minimizes perching and nesting opportunities for ravens and raptors and truck traffic). Pipelines must be under or immediately adjacent to the road (Bui et al. 2010).

H. Restrict the construction of tall facilities and fences to the minimum number and amount needed. To discourage avian predators, require installation of anti-perch devices on new

fences and facilities within 4 miles of Suitable Habitat where avian predation has been identified as a cause of mortality. Additionally, encourage retrofitting of existing fences and structures with anti-perch devices that are also located within 4 miles of Suitable Habitat where avian predation has been identified as a cause of mortality.

I. Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats.

CHAPTER 8 GLOSSARY OF TERMS

Active Lek. Active leks are defined as locations where two or males have been observed and documented as actively courting females in the last two years the lek was surveyed (Doherty et al. 2011).

Adaptive Management. A scientific approach to adaptive management of wildlife populations requires that threats and management actions be treated as potentially falsifiable hypotheses, rather than certain knowledge. If the presumed threats to a population are ranked in order of importance (based on plausible cause and effect mechanisms), then even hypothetical threats can be prioritized and subsequently investigated in a scientific manner.

Best Management Practices (BMPs). A suite of techniques that guide or may be applied to management actions to aide in achieving desired outcomes. BMPs are often developed in conjunction with land use plans, but they are not considered a planning decision unless the plans specify that they are mandatory.

Brood Rearing Habitat. Brood rearing habitats are utilized after chicks have hatched, and are generally more mesic (moist) areas with a higher percentage of forbs and grasses which help provide higher densities of insects, plant material, and seeds for chicks, hens, as well as males during the summer and early fall months. Specifically:

- Sagebrush cover is generally from 10 to 30%
- Cover of Mixed Mountain Shrubs is generally not more than 10%
- Distance to nearest Forest is generally over 100 meters
- Distance to Shrubby Woodlands is generally over 50 meters

Consistent: possessing firmness or coherence; marked by harmony, regularity, or steady continuity: free from variation or contradiction. (Webster Revised Dictionary)

Coordinate. Equal in rank or order; not subordinate. (Webster's Revised Unabridged Dictionary)

Coordination. The act of coordinating; the act of putting in the same order, class, rank, dignity, etc.; as, the coordination of the executive, the legislative, and the judicial authority in forming a government; the act of regulating and combining so as to produce harmonious results; harmonious adjustment as, a coordination of functions. (Webster's Revised Unabridged Dictionary)

Coordination Process. A process mandated by federal law that requires federal agencies to coordinate their plans, programs and management activities with local governments. The minimum parameters of this process were defined by Congress at 43 USC 1712(c)(9) and

prescribe that the agencies (1) keep apprised of State, local, and tribal land use plans; (2) assure that consideration is given to those State, local, and tribal plans that are germane in the development of land use plans for public lands; (3) assist in resolving, to the extent practical, inconsistencies between Federal and non-Federal Government plans; (4) provide for meaningful public involvement of State and local government officials, both elected and appointed, in the development of land use programs, land use regulations, and land use decisions for public lands, including early public notice of proposed decisions which may have a significant impact on non-Federal lands; and (5) make land use plans consistent with State and local plans to the maximum extent the Secretary finds consistent with Federal law. (Federal Land Policy and Management Act, 43 USC 1701)

Coordination Meeting. A government-to-government meeting between a government agency or agencies and the BOCC. These meetings are public meetings, publicly noticed with agenda provided in advance. While public comment is not received during the meeting, the public is encouraged to attend and provide comments during later regular BOCC meetings as the intent is for the coordination process to be open and transparent to the public. The discussion is between the agency and the BOCC and is for the purpose of fulfilling the coordination duty, informing the agencies and BOCC of relevant projects, plans, studies and management activities. It is also the forum for discussion towards the resolution of unresolved conflicts between the counties policies and plans and the agencies programs.

Cooperation. The act of cooperating, or operating together to one end; joint operation; concurrent effort or labor. (Webster's Revised Unabridged Dictionary)

Collaborate. To work together with another toward a common goal, especially in an intellectual endeavor; as, four chemists collaborated on the synthesis of the compound; three authors collaborated in writing the book. (Webster's Revised Unabridged Dictionary)

Conserve. To cause no degradation or loss of sage-grouse habitat. Conserve can also refer to maintaining intact sagebrush steppe by fine tuning livestock use, watching for and treating new invasive species and maintaining existing range improvements that benefit sage-grouse etc.

Development. Active drilling and production of natural gas and oil wells.

Development Area. Areas primarily leased with active drilling and wells capable of production in payable quantities.

Enhance. The improvement of habitat by increasing missing or modifying unsatisfactory components and/or attributes of the plant community to meet sage-grouse objectives. Examples include modifying livestock grazing systems to improve the quantity and vigor of desirable forbs, improving water flow in riparian areas by modifying existing spring developments to return more

water to the riparian area below the development, or marking fences to minimize sage-grouse hits and mortality.

Exploration. Active drilling and geophysical operations to 1) determine the presence of the mineral resource; or 2) determine the extent of the reservoir.

Forests. Forests in the Plan area include contiguous stands larger than 1/2 acre of aspen (*Populus tremuloides*), Douglas-fir (*Pseudotsuga menziesii*), mixed conifers (including, but not limited to Douglas-fir, Engelmann spruce [*Picea engelmannii*], subalpine fir [*Abies bifolia*] and ponderosa pine [*Pinus ponderosa*]), pinyon-juniper woodlands, and oakbrush.

Inactive Lek. Any lek where sufficient data suggests that there was no strutting activity throughout a strutting season. Absence of strutting grouse during a single visit is insufficient documentation to establish that a lek is inactive. This designation requires documentation of either: 1) an absence of sage-grouses on the lek during at least 2 ground surveys separated by at least seven days. These surveys must be conducted under ideal conditions (April 1-May 7 (or other appropriate date based on local conditions), no precipitation, light or no wind, half-hour before sunrise to one hour after sunrise) or 2) a ground check of the exact known lek site late in the strutting season (after April 15) that fails to find any sign (tracks, droppings, feathers) of strutting activity. Data collected by aerial surveys should not be used to designate inactive status as the aerial survey may actually disrupt activities.

Late Brood Rearing Area. Habitat includes mesic sagebrush and mixed shrub communities, wet meadows, and riparian habitats as well as some agricultural lands (e.g. alfalfa fields, etc).

Lek Complex. A lek or group of leks within 2.5 km (1.5 mi) of each other between which male sage-grouse may interchange from one day to the next. Fidelity to leks has been well documented. Visits to multiple leks are most common among yearlings and less frequent for adult males, suggesting an age-related period of establishment (Connelly et al. 2004).

Lek. A traditional courtship display area attended by male sage-grouse in or adjacent to sagebrush dominated habitat. A lek is designated based on observations of two or more male sage-grouse engaged in courtship displays. Sub-dominant males may display on itinerant strutting areas during population peaks. Such areas usually fail to become established leks. Therefore, a site where less than five males are observed strutting should be confirmed active for two years before meeting the definition of a lek (Connelly et al 2000, Connelly et al. 2003, 2004).

Mitigation. Compensating for resource impacts by replacing or providing substitute resources or habitat.

Mixed Mountain Shrubs. Shrublands dominated by Utah serviceberry (*Amelanchier utahensis*), Saskatoon serviceberry (*A. alnifolia*), mountain mahogany (*Cercocarpus montanus*), oakbrush (*Quercus gambelii*), bitterbrush (*Purshia tridentata*), and may have a sagebrush component. Mapped Mixed Mountain Shrublands have greater than 10% cover of these non-sagebrush shrub species, as this is the threshold at which sage-grouse show a strong avoidance of this community type.

Multiple Use: The management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less than all of the resources; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output. (Federal Land Policy and Management Act, 43 USC 1702(c)).

Nesting Habitat. Nesting habitat is generally moderately sized patches of denser and taller sagebrush, further away from roads and other activity areas. Specifically:

- Sagebrush cover is generally from 20 to 50%
- Cover of Mixed Mountain Shrubs is generally not more than 10%
- Distance to nearest Forest is generally over 100 meters
- Distance to Shrubby Woodlands is generally over 50 meters

Occupied Lek: A lek that has been active during at least one strutting season within the prior 10 years.

Offsite Mitigation. Compensating for resource impacts by replacing or providing substitute resources or habitat at a different location than the project area.

Range Improvement. Any activity, structure or program on or relating to rangelands which is designed to improve production of forage; change vegetative composition; control patterns of use; provide water; stabilize soil and water conditions; and provide habitat for livestock and wildlife. The term includes, but is not limited to, structures, treatment projects, and use of mechanical means to accomplish the desired results.

Reclamation. Rehabilitation of a disturbed area to make it acceptable for designated uses. This normally involves re-contouring, replacement of topsoil, re-vegetation, and other work necessary to ensure eventual restoration of the site.

Restoration. Implementation of a set of actions that promotes plant community diversity and structure that allows plant communities to be more resilient to disturbance and invasive species over the long term. The long-term goal is to create functional, high quality habitat that is occupied by sage-grouse. Short-term goal may be to restore the landform, soils and hydrology and increase the percentage of preferred vegetation, seeding of desired species, or treatment of undesired species.

Sagebrush. Includes all species and sub-species of the genus *Artemisia* except the mat-forming sub-shrub species *A. frigida.*

Shrubby Woodlands. Vegetation communities dominated by oakbrush or pinyon (*Pinus edulis*) and Rocky Mountain juniper (*Sabina scopulorum*) or Utah juniper (*S. osteosperma*) types. Mapped Shrubby Woodlands have greater than 10% cover of pinyon-juniper, as this is the threshold at which sage-grouse show a strong avoidance of this community type**.**

Suitable Habitat. Suitable Habitat includes all seasonal habitats (including lekking, nesting, brood rearing/summer and winter habitats) within the Plan Area. Suitable Habitat has been mapped by Garfield County, and is considered a Consultation Area for activities requiring Garfield County permitting. Specifically, Suitable Habitat includes:

- Sagebrush cover is generally from 10 to 50%
- Cover of Mixed Mountain Shrubs is generally not more than 20%
- Distance to nearest Forest is generally over 100 meters
- Distance to Shrubby Woodlands is generally over 50 meters
- Grass/forb dominated habitats (with >10% sagebrush cover) within 20 meters of sagebrush habitat
- Contiguous habitats >3 acres in size, or part of a block of Suitable Habitats in close proximity

Temporarily Disturbed Areas. Areas that have seen recent vegetation disturbance activities (such as pipeline corridors and wildfire events) may not support sagebrush cover at a density or height suitable for sage-grouse use. If these areas occur within a block of Suitable Habitat, they will be considered Temporarily Disturbed, and still would be considered as long-term as Suitable Habitat. Temporarily Disturbed habitat will need to be tracked spatially within the Plan area.

Unoccupied Lek. A lek that has either been “destroyed” or “abandoned.”

Unoccupied Suitable Habitat. Areas that support Suitable Habitat, but for which sage-grouse currently do not occupy these areas or the status of occupancy are unknown. These areas, for whatever reason, are deemed less-than-optimal by sage-grouse (e.g., due to predation pressures, non-lethal disturbances, too small an area of suitable habitat, etc.) and thus sage-grouse prefer to utilize other areas.

Winter Habitat. Winter habitat is generally utilized by sage-grouse from November through early April. It is primarily determined by the depth and persistence of snow cover. During more severe winters, snow can limit winter habitat to wind-swept ridges and patches of the tallest sage-brush. During the winter sage-grouse food is strictly limited to sage-brush. However, sage-grouse can do quite well on winter diets. Specifically:

- Sagebrush cover is generally >25%
- Cover of Mixed Mountain Shrubs is generally not more than 10%
- Distance to nearest Forest is generally over 100 meters
- Distance to Shrubby Woodlands is generally over 50 meters

Appendix A- Literature Cited and General References

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Appendix B- Sage-Grouse Habitat Modelling Process

The following paper described in detail the methodologies employed to map vegetation community types and model greater sage-grouse habitats within Garfield County.

USE OF MODELLING IN A GEOGRAPHIC INFORMATION SYSTEM TO PREDICT GREATER SAGE-GROUSE HABITAT

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ABSTRACT In Colorado (and across many western States) the Bureau of Land Management (BLM) is in the process of producing a greater sage-grouse (*Centrocercus urophasianus* [sage-grouse]) Resource Management Plan Amendment/ Environmental Impact Statement (RMPA/EIS) for the BLM's Northwest Colorado District, to assess impacts of potentially implementing sage-grouse habitat management conservation strategies (BLM 2013). If approved, the RMPA/EIS would amend current BLM Resource Management Plans and U.S. Forest Service Land and Resource Management Plans that would guide the management of greater sage-grouse habitat on public lands administered by the BLM and the U.S. Forest Service and on private lands with a federal nexus to the BLM planning process (e.g., projects extracting federal minerals or accessing federal lands across private lands). A key component of implementing sage-grouse conservation strategies is accurately predicting where sage-grouse habitat occurs; however, the current sage-grouse Preliminary Priority Habitat and Preliminary General Habitat used in the RMPA/EIS was in large part based on habitat modeling conducted at large scales (Doherty et al. 2010, Rice et al. 2013), which makes land use planning, accurate impact assessments and project implementation at the project level difficult due to the inherent inaccuracies of large scale habitat maps. We employed two different methods to map and quantify at a finer and more accurate scale the extent of suitable sage-grouse habitat found in Garfield County, Colorado. We started by mapping vegetation at a 2 m cell resolution in order to capture nuances in sage-grouse habitats given sage-grouse preference of habitat at smaller scales (Connelly et al. 2000, Hagen et al. 2007), and then employed: (1) a weighted overlay as a habitat suitability index (HSI) using a resource selection function (RSF) and (2) fuzzy modeling at 10 m cell resolution. We validated this technique against tracked (i.e., radio-collar and Global Positioning System [GPS]) sage-grouse as well as data from previous pedestrian surveys documenting where evidence of sage-grouse occupancy had occurred.

KEY WORDS *Centrocercus urophasianus*, greater sage-grouse, Colorado, fuzzy model, resource selection model, habitat suitability index, Geographic Information System (GIS).

Within the Piceance, Parachute, Roan (PPR) area (Figure 1), there have been a number of studies investigating greater sage-grouse (*Centrocercus urophasianus* [sage-grouse]) and the uniqueness of the habitats in this area (Braun 1995, Hagen 1999, Apa 2006, Apa et al. 2007, Colorado Parks & Wildlife [CPW] 2008, Sauls et al. 2006-2008, WestWater Engineering [WWE] 2008, Walker et al. 2010[3], and Apa et al. 2010[4]). The PPR area habitats are known for the steepness of habitats, the

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[3] The information in Walker et al. 2010 is considered preliminary and subject to further evaluation, therefore our research does not utilize or rely on this information, and our citation of this work is for general information regarding CPW's in-process investigations.

variety in vegetation conditions, and the limited spatial extent of "typical" sage-grouse habitats. Additionally, the number of studies in the PPR is also due to a combination of the significant mineral resources in this area; primarily natural gas and oil shale, but also the presence of sage-grouse and the atypical habitat found in this area. Instead of the large expanses of rolling sagebrush (*Artemisia tridentata*) steppe typically occupied by sage-grouse (Knick and Connelly 2011, Sage-grouse National Technical Team 2011), the PPR area has narrow ridgelines supporting sagebrush, which quickly grade into mixed mountain shrub habitats and other unsuitable habitat types on side slopes (Apa 2006). Of note, is that the rough topography and patches of non-habitat do not appear to pose a movement barrier to sage-grouse (Apa 2006, Apa et al. 2007, WWE 2008). Because of the mineral resources, energy company exploration and energy development is very common; much of the private lands within the PPR area are owned by energy companies. Energy companies have funded a number of CPW, consultant, and university studies in this area, and of these studies a number have been focused on mapping the unique habitats and discerning how sage-grouse utilize these atypical habitats (Hagen 1999, Sauls et al. 2006, 2008, WWE 2008, Apa et al. 2007, 2010 and Walker et al. 2010).

Of all the studies reviewed, they have all been relatively consistent with reporting how sage-grouse utilize habitats in the PPR area; sage-grouse are still strongly associated with sagebrush-dominated habitats, generally at the higher elevations, and favor sagebrush-dominated habitats at multiple spatial scales. In other words, sage-grouse favor larger areas of sagebrush dominated habitats, but can also be found in smaller patches of sagebrush. As these patches get smaller, or occur in landscapes more dominated by unsuitable habitats (e.g., mixed mountain shrublands), their use of sagebrush habitats can decline (Apa 2006, Apa et al. 2007, WWE 2008). Sage-grouse in the PPR area are unique in that their occupied habitats are much smaller in spatial extent and patch size when compared to other more "typical" sage-grouse habitats occupied by other populations (Connelly et al. 2000, et al. 2004). Sage-grouse also are found to utilize sagebrush habitats with a notable presence of other shrub species (e.g., snowberry [*Symphoricarpos oreophilus*], Utah serviceberry [*Amelanchier utahensis*]), but generally when these other shrub species occupy >25% of the shrub component, sage-grouse use of these areas appears to decline based on preliminary research (Sauls et al. 2006-2008, Apa et al. 2007, WWE 2008).

We have found that there have been multiple efforts to map suitable sage-grouse habitats in the area, and all are fairly accurate and relevant (given the acknowledged limitations of the data and methods employed). Some of the more accurate habitat maps have likely been "hand draw" or delineated from aerial imagery and topography (e.g., Sauls et al. 2006-2008, WWE 2008), but this technique is difficult or impossible to repeat, and is highly dependent upon the knowledge and biases of the authors conducting the habitat delineations. Nevertheless, these products appear to be very accurate when compared to on-the-ground conditions.

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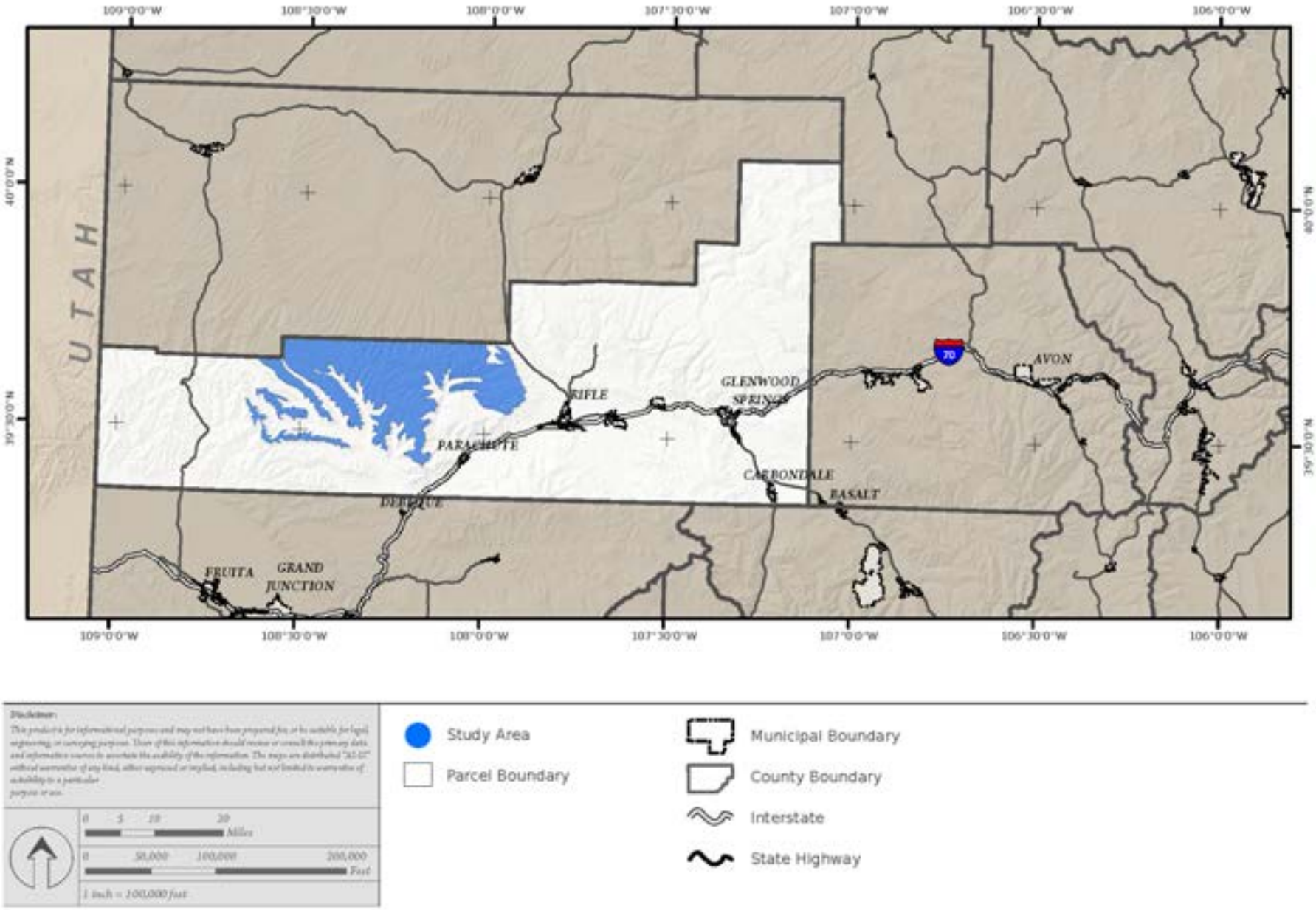
[4] The information in Apa et al. 2010 is considered preliminary and subject to further evaluation, therefore our research does not utilize or rely on this information, and our citation of this work is for general information regarding CPW's in-process investigations.

Figure 1: The PPR Study Area in Colorado.



Rice et al. (2013) published their sage-grouse habitat mapping technique which was used to develop Preliminary Priority Habitat/Preliminary General Habitat (PPH/PGH) habitat maps in Colorado, including the PPR area. When compared to previous habitat mapping efforts produced by the BLM, private consultants, and interim work by CPW (Sauls et al. 2006-2008, WWE 2008, Walker et al. 2010), the PPH/PGH mapping appeared to over-predict habitat. Despite available vegetation datasets, their model was not able to discern between the sagebrush and sagebrush/mixed mountain shrubland habitats known to be used by sage-grouse, and the non-habitat areas of steeper draws, canyons, aspen (*Populus tremuloides*) stands, contiguous mixed mountain shrubland or Douglas-fir (*Pseudotsuga menziesii*) stands in the PPR area.

Because of the large change in previous characterizations of sage-grouse habitat in Garfield County to what is now shown in PPH and PGH maps, we attempted a new, repeatable habitat modelling technique in a Geographic Information System (GIS) to accurately locate and quantify the availability of suitable greater sage-grouse habitat in the PPR area within Garfield County (PPR Study Area), independent of maps already produced by the BLM, CPW, or other interested parties (including energy companies, which have performed a number of sage-grouse habitat mapping efforts). Yet we still incorporated the data that documented existing sage-grouse research, information, data and peer-reviewed and accepted habitat parameters for sage-grouse in development of our suitable habitat model. Predictive models that locate and quantify the availability of suitable habitats for a given species are predominately based on quantifying the relationships between species selection and surrounding environmental factors. This paper discusses the two different methods used to map and quantify the extent of suitable sage-grouse habitat found in the PPR area: (1) weighted overlay as a habitat suitability index (HSI) using a resource selection function (RSF) and (2) fuzzy modeling.

In recent years, the approaches to modelling species habitat availability have advanced significantly, providing a number of statistically rigorous methods for predicting and evaluating species distribution (Rushton et al. 2004, Guisan and Thuiller 2005). Our approach to mapping and quantifying the extent of suitable sage-grouse habitat within the PPR Study Area utilized two distinctly different methods of modeling within a geospatial environment; (1) weighted overlay modeling using an RSF and (2) fuzzy modeling. The weighted overlay approach using an RSF was selected for three reasons. First, weighted overlay models, commonly known as Habitat Suitability Indexes (HSI), are widely accepted and employed by State and Federal wildlife agencies to model species distribution for resource management, planning and population viability analyses, including the U.S. Fish and Wildlife Service (USFWS) Habitat Evaluation Program (HEP) (USFWS 1980, 1981). Secondly, weighted overlay models have previously been employed, and are currently being employed in other ongoing research projects to study sage-grouse habitat availability, which provides results from our efforts as a means for direct comparison to other RSF/HSI models in Colorado (Sauls et al. 2008, Walker et al. 2010, Rice et al. 2013). Third, using an RSF allows species distribution to be modeled using known selection preferences from statistical inference of field-collected data, thereby predicting suitable habitat patches based on known behavior of the local population. By contrast, the application of fuzzy modeling to predict species distribution has been much more limited to date; however, at least one study has occurred whereby fuzzy logic was employed to map suitable sage-grouse and mule deer habitats in northwest Colorado (Hibbs 2011). This

method is gaining acceptance and increased utilization based on the ability of the model to consider vagueness and imprecisions inherent in the attributes of spatial data; a limitation of other model methods. Fuzzy logic is intuitive and constructed using natural language, allowing the reasoning behind a fuzzy system to be simple and easily understood by a wide variety of audiences (Mathworks 2014a). For this reason, we also selected the fuzzy model approach to predict species habitat distribution within the PPR Study Area.

Weighted Overlay and Resource Selection Function

Weighted overlay models function by applying logical mathematical arithmetic to multiple criteria, allowing for diverse and dissimilar criteria to be inputs to an integrated analysis (Mathworks 2014a). In the instance of an HSI, the model scales, weights and integrates diverse spatial data to measure the habitat suitability of a given location on a common, relative scale. Furthermore, an HSI can employ two methods in developing the criteria as inputs to the model framework; inductive (i.e., empirical, inferred from existing data) or deductive (i.e., non-empirical, developed from expert opinion). We pursued an inductive approach to our habitat modeling for two reasons: (1) we had access to spatially-explicit field-collected data of sage-grouse sign and occupancy, and (2) deductive approaches have the possibility of introducing bias from expert-opinion.

An RSF model is a form of an HSI with statistical rigor (Boyce et al. 2002); it is a mathematical function that predicts resource or habitat use proportional to probability of use (Manley et al. 2002). While other models are developed based on expert opinion, RSF models are estimated directly from empirical data (Boyce et al. 2002). Empirical models analyze a species' habitat selection by relating known occurrences of the species (presence) with data quantifying background environmental variables. An RSF model predicts species distribution based on the theory of habitat selection; where habitat use exceeds availability, habitat selection is inferred; and where habitat use is less than availability, habitat avoidance is inferred (Johnson and Gillingham 2005).

An RSF is generally developed from observations of either presence vs. absence or presence vs. available resource units. Both methods employ a logistic regression model utilizing a binary response (observation) that either implies presence (y=1) or absence or random location (y=0). For each observation, a set of measured habitat criteria exist, χ. For the probability of occurrence [$P(y=1|\chi)$], the dependent variable can be estimated with the following equation:

$$P(y=1|\chi)=\left(\frac{\exp(\beta_0+\beta_1\chi_1+\ldots+\beta_p\chi_p)}{1+\exp(\beta_0+\beta_1\chi_1+\ldots+\beta_p\chi_p)}\right)$$

where $(\beta_0 \ldots \beta_p)$ are maximum likelihood estimates of logistic regression coefficients and $(\chi_1 \ldots \chi_p)$ represent values for environmental criteria as a set of independent variables (Pearce and Boyce 2006). The equation returns values on a continuous scale of zero to one, with higher values indicating a higher level of habitat suitability.

Fuzzy Modeling

Behavioral and environmental phenomena are inherently complex, demonstrating vagueness and uncertainty that are difficult to express with crisp class boundaries. Most phenomena do not have clearly defined boundaries and are better expressed linguistically with degrees of membership to a set, rather than forcing a rigid classification to a single class (Kainz 2008). Fuzzy systems are a method that handles vagueness and uncertainty in spatial data. Fuzzy logic recognizes that most objects cannot be defined as belonging to one specific category or another (Zadeh 1965). When applied to habitat models, species presence does not imply absolute favorability or absolute un-favorability, but rather a degree of favorability.

Fuzzy inference is the process of mapping linguistic terms to an output using a fuzzy logic system. Generally speaking, fuzzy inference involves three steps: (1) identifying input terms and constructing linguistic if-then rules, (2) defining fuzzy sets and assigning fuzzy membership and (3) performing fuzzy overlay with a fuzzy operator.

The objective of fuzzy inference is to use the set of if-then statements to map results to an output space. The if-then statements, also known as fuzzy rules, refer to explanatory variables and adjectives that describe them. Fuzzy rules are constructed with both an antecedent and a consequent; the "If" portion of a statement is the antecedent, while the "then" portion of the statement is the consequent (Mathworks 2014b). Prior to developing the set of fuzzy rules, all variables must first be identified including their descriptive adjectives.

A typical rule in a fuzzy system may take the following form:

If A_1 *is* X_1*, And* A_2 *is* X_2*,… And* A_n *is* X_n*, Then B is Y.*

where $X,\ldots Xn$ and Y are fuzzy sets defined by $A1\ldots A_n$ fuzzy membership functions. In natural language, the form may be expressed as: "If site is flat and site is near water, then site is optimal."

Once all fuzzy rules are established for the fuzzy system, fuzzy sets are developed based on the pre-defined rules. Fuzzy logic is based on classical set theory, whereby an element must be either fully part of a set or fully excluded from a set; such a set is known as a "crisp" set. Extending this theory, fuzzy logic is based on fuzzy sets that allow for various degrees of membership to a class rather than forcing a response whereby the element is either asserted or denied.

For example, when considering proximity to an existing object, the distance of a given location may be described as near or far. In a classical set, the elicited response is binary in nature; the distance of the location to the object is either near or far. However, in a fuzzy set, the same distance can be described as both near and far.

Elements are related to a fuzzy set by fuzzy membership functions. Fuzzy membership assigns a fuzzy score for an element to a class based on a sliding scale between zero and one, where zero implies no membership and one implies full membership. The membership functions transform explanatory data in terms of suitability to a continuous scale of 0 to 1 using a variety of functions and arithmetic operators. The transformation method utilized depends on how the data are distributed and contribute to suitability. While numerous fuzzy membership functions exist,

three fuzzy membership functions were utilized in this analysis; fuzzy linear membership, fuzzy small membership and fuzzy large membership. These membership functions are demonstrated in Figures 2 - 4.

Figure 2: Fuzzy linear membership function

Fuzzy Linear Membership

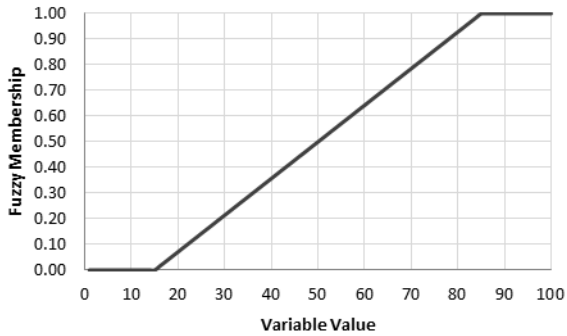
Equation:

$$\mu(x) = 0 \text{ if } x < \min,$$

$$\mu(x) = 1 \text{ if } x > \max,$$

$$\mu(x) = \frac{(x - \min)}{(\max - \min)}$$

Description
A linear increasing or decreasing membership between user-specified minimum and maximum inputs.



Required Inputs
Min: *User-defined value to assign threshold for non-membership*
Max: *User-defined value to assign threshold for full membership*

Figure 3: Fuzzy small membership functions

Fuzzy Small Membership

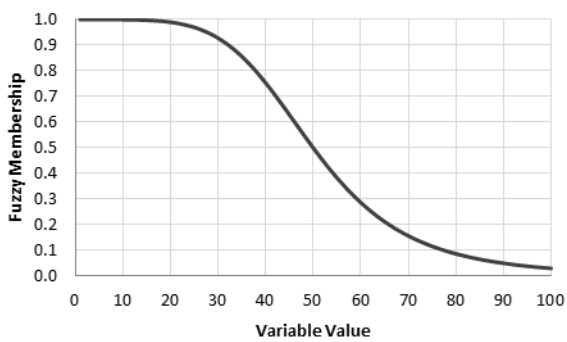
Equation:

$$\mu(x) = \frac{1}{1 + \left(\frac{x}{f_2}\right)^{f_1}}$$

f_1 = spread

f_2 = midpoint

Description
Sigmoid curve function where shape is defined by a user-specified midpoint and spread. Lower variable values are assigned higher degrees of membership.



Required Inputs

Midpoint: *User-defined value to specify crossover point; assigned 0.5 membership value. Values lower than the midpoint have a higher degree of membership; values higher than the midpoint have a lower degree of membership.*

Spread: *User-defined value to prescribe the shape and character of the sigmoid curve.*

Figure 4: Fuzzy large membership function

Fuzzy Large Membership

Equation:

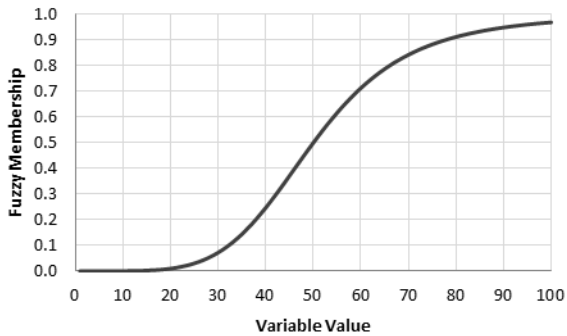
$$\mu(x) = \frac{1}{1+\left(\frac{x}{f_2}\right)^{-f_1}}$$

f_1 = spread

f_2 = midpoint

Description

Sigmoid curve function where shape is defined by a user-specified midpoint and spread. Higher variable values are assigned higher degrees of membership.



Required Inputs

Midpoint: *User-defined value to specify crossover point; assigned 0.5 membership value. Values higher than the midpoint have a higher degree of membership; values lower than the midpoint have a lower degree of membership.*

Spread: *User-defined value to prescribe the shape and character of the sigmoid curve.*

When all explanatory data have been transformed to membership data, fuzzy overlay functions are used to combine the data to produce a single truth value that ranges in degree from 0 to 1. Once all inputs are fuzzified, the degree to which each part of the antecedent is satisfied for each rule is known (Mathworks 2014b). The overlay functions investigate the relationship between membership data and attempt to quantify the interaction between them, ultimately returning the degree of membership to the final set for all areas included in the analysis. The fuzzy overlay functions are listed and described in Figure 5. The fuzzy model returns a raster dataset with cell values ranging on a continuous scale from zero to one, with higher values indicating a higher degree of truth.

Figure 5: Fuzzy overlay functions

Overlay Function	Equation	Description
Fuzzy AND	$= Min(\chi_1, \chi_2, \ldots \chi_n)$	*Decreasing function. Fuzzy AND returns the minimum value of all sets at each cell location.*
Fuzzy OR	$= Max(\chi_1, \chi_2, \ldots \chi_n)$	*Increasing function. Fuzzy OR returns the maximum value of all sets at each cell location.*
Fuzzy PRODUCT	$= \chi_1 * \chi_2 \ldots \chi_n$	*Decreasing function. For each cell location, Fuzzy PRODUCT multiplies the fuzzy values of each set.*
Fuzzy SUM	$= 1 - ((1-\chi_1) * (1-\chi_2) \ldots (1-\chi_n))$	*Increasing function. For each cell location, Fuzzy SUM adds the fuzzy values of each set.*
Fuzzy GAMMA	$= (1 - ((1-\chi_1) * (1-\chi_2) \ldots (1-\chi_n)))^{\gamma} * (\chi_1 * \chi_2 \ldots \chi_n)^{1-\gamma}$	*Increasing/Decreasing function. Fuzzy GAMMA is the product of Fuzzy PRODUCT and Fuzzy SUM, both raised to the power of gamma.*

Study Area

The 894-km^2 project Study Area occurs on the Roan Plateau within Garfield County, at the southern end of the Piceance Basin in an area known as the PPR area (PPR Study Area, Figure 1). The spatial extent of the analysis area represents all areas within Garfield County currently indicated as PPH and PGH as mapped by CPW (Rice et al. 2013) and adopted by the BLM in their Resource Management Plan Amendment/ Environmental Impact Statement (RMPA/EIS) for the BLM's Northwest Colorado District. Our study area is limited to just Garfield County within the greater PPR area. Of the Study Area, 248 km^2 (28%) of surface lands are managed by the BLM, while the remaining 646 km^2 (72%) are private and State lands. Land use in the Study Area continues to be managed for summertime cattle ranching and energy development of primarily natural gas, with some limited oil shale resource exploration.

Vegetation is relatively heterogeneous, and was dependent upon slope, aspect, and elevation. Three subspecies of big sagebrush occupy the Study Area, and the location of these subspecies is dependent upon soil type. Basin big sagebrush (*A. t. tridentata*) is the prevalent vegetation throughout the lower drainages at elevations of 1,800 m – 1,980 m (Cottrell and Bonham 1992). *A. t. wyomingensis* is restricted to upland ridges at elevations of 1,900 m – 1,980 m (Cottrell and Bonham 1992). *A. t. vaseyana* is confined to high mountain areas at elevations > 2,070 m. Pinyon pine (*Pinus edulis*) and juniper (*Sabina* [*Juniperus*] *osteosperma* and *S. scopulorum*) woodlands dominate the landscape until approximately 1,980 m. Big sagebrush, Utah serviceberry, oakbrush (*Quercus gambelii*), and antelope bitterbrush (*Purshia tridentata*) comprise most of the transitional ecotone vegetation type. Pinyon/juniper habitat types are relatively uncommon within the PPR Study Area in Garfield County, and were much more common to the north in Rio Blanco County where elevations are lower. Elevations of 2,380 m to 2,590 m are dominated by big sagebrush interspersed with grass and forb-dominated meadows. North aspects often host substantial groves of aspen, serviceberry, and mountain snowberry. Big sagebrush and Douglas-fir dominate south and northwest aspects at elevations > 2,500 m respectively. Free water can be scarce in dry years or late in the summer as most springs are in the bottom of steep canyons. There are scattered stock tanks and dugouts for watering cattle, which are usually associated with roadways.

METHODS

Biophysical Habitat Factors

Numerous variables were considered in our analysis that may influence sage-grouse habitat selection. The variables were broadly classified as either habitat characteristics or topographical factors. All variables describing habitat characteristics were derived from a digital vegetation map developed at a 2 m cell resolution through supervised image classification of 1 m color-infrared aerial photography collected in 2012 as part of the National Agricultural Imagery Program (NAIP) administered by the U.S. Department of Agriculture (USDA 2012). A detailed description of the image classification process is provided in Appendix A. Vegetation cover types derived from the image classification process are displayed in Figure 6. Topographic variables were derived from a 10-meter digital elevation model (DEM) acquired from the U.S. Geologic Survey (USGS), National Elevation Dataset. Topographic variables considered in this analysis include percent slope, topographic position index (TPI) and surface roughness, or curvature.

Percent slope were derived directly from the 10-meter USGS DEM. TPI is a relative measure of a locations elevation, or slope position, as compared to surrounding elevations or positions. TPI was calculated using Jenness Enterprises DEM Surface Tools v. 2.1.375. Curvature, or surface roughness, was developed by computing the standard deviation of slope within a defined neighborhood.

Vegetation variables were developed as percent proportion of specified vegetation communities within a defined scale; likewise, all topographic variables were derived as mean values within a defined scale. All variables were analyzed and considered at three spatial scales, because while sage-grouse are known as a landscape level species, most of the contemporary research documenting sage-grouse use has been performed at the local scale. The scales of available habitats that influence sage-grouse selection and non-use are currently unknown; therefore, the contributing variables that may influence habitat selection are tested at multiple scales to determine which scales guide habitat selection. The selected scales employed in this analysis represent a local scale (e.g., 100 meters), an intermediate scale (e.g., 350 meters) and a landscape-level scale (e.g., 1 kilometer). While the distances are somewhat arbitrary (i.e., a distance of 300 or 400 meters would equally be considered an intermediate scale), they reflect distances used in other contemporary studies of sage-grouse habitat selection conducted both within the PPR Study Area and the defined national range. At each scale, statistics were generated using a moving circular window across the project Study Area, at distances of 100 m, 350 m and 1 km, respectively. A detailed summary of all variables considered in the scope of this analysis are presented in Table 1. Table 2 shows the summary of explanatory variables at 939 sites indicating sage-grouse presence in the defined analysis area.

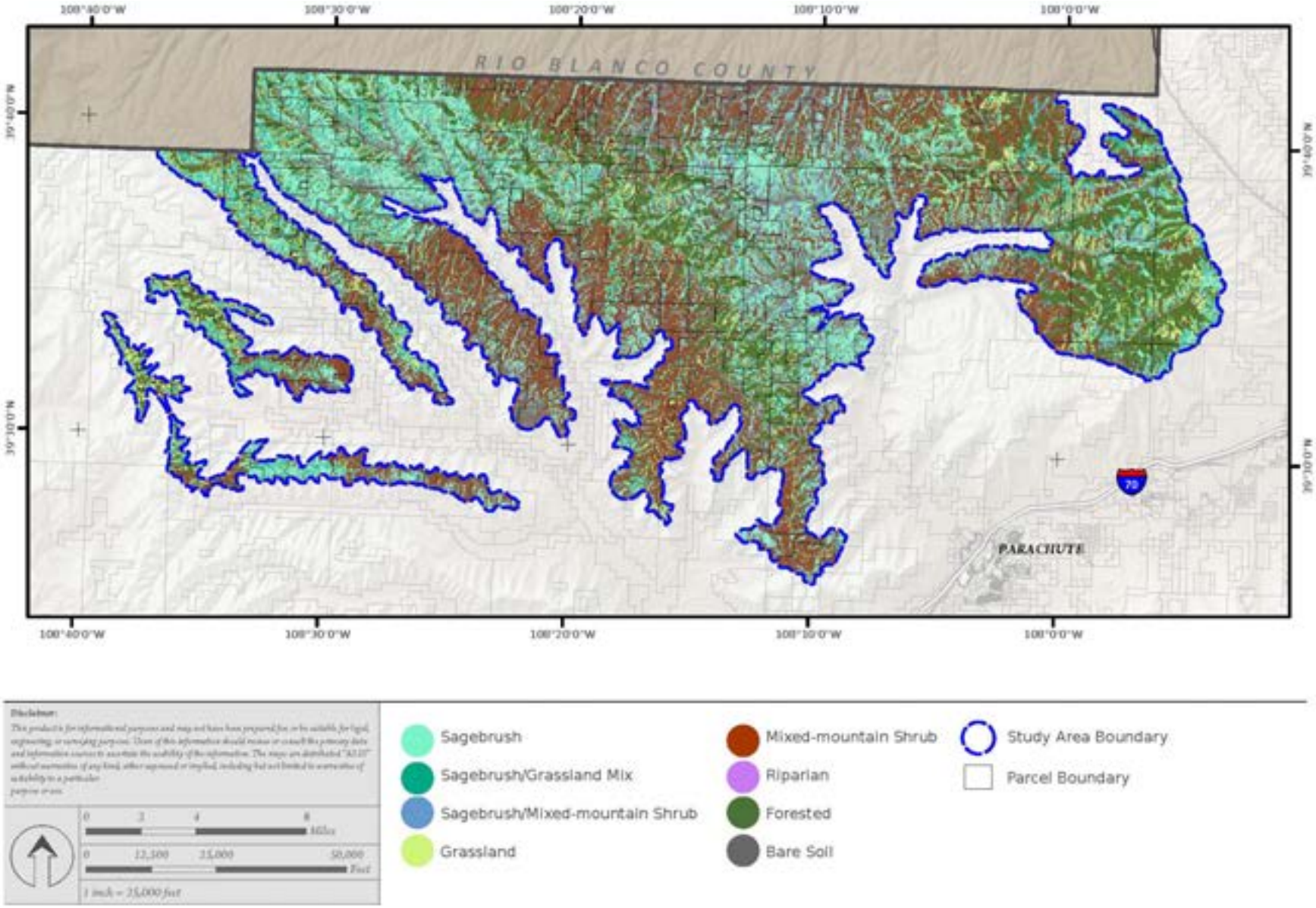
Table 1: Summary and Description of all Explanatory Variables. Summary and description of all explanatory variables used in assessing sage-grouse habitat suitability in the defined analysis area.

Variable	Name	Description
Vegetation		
sg100	Sage-dominated, 100-meters	*Percent proportion of all sage-dominated vegetation communities within a 100-meter radius.*
sg350	Sage-dominated, 350-meters	*Percent proportion of all sage-dominated vegetation communities within a 350-meter radius.*
sg1k	Sage-dominated, 1-kilometer	*Percent proportion of all sage-dominated vegetation communities within a 1-kilometer radius.*
sgmms100	Sage-dominated + mixed mountain shrubs, 100-meters	*Percent proportion of all sage-dominated and mixed mountain shrub vegetation communities within a 100-meter radius.*
sgmms350	Sage-dominated + mixed mountain shrubs, 350-meters	*Percent proportion of all sage-dominated and mixed mountain shrub vegetation communities within a 350-meter radius.*
sgmms1k	Sage-dominated + mixed mountain shrubs, 1-kilometer	*Percent proportion of all sage-dominated and mixed mountain shrub vegetation communities within a 1-kilometer radius.*
mms100	Mixed mountain shrubs, 100-meters	*Percent proportion of all mixed mountain shrub vegetation communities within a 100-meter radius.*
mms350	Mixed mountain shrubs, 350-meters	*Percent proportion of all mixed mountain shrub vegetation communities within a 350-meter radius.*
mms1k	Mixed mountain shrubs, 1-kilometer	*Percent proportion of all mixed mountain shrub vegetation communities within a 1-kilometer radius.*
sggr100	Sage-dominated + grasslands, 100-meters	*Percent proportion of all sage-dominated and grassland vegetation communities within a 100-meter radius.*
sggr350	Sage-dominated + grasslands, 350-meters	*Percent proportion of all sage-dominated and grassland vegetation communities within a 350-meter radius.*
sggr1k	Sage-dominated + grasslands, 1-kilometer	*Percent proportion of all sage-dominated and grassland vegetation communities within a 1-kilometer radius.*
gr100	Grasslands, 100-meters	*Percent proportion of all grassland vegetation communities within a 100-meter radius.*
gr350	Grasslands, 350-meters	*Percent proportion of all grassland vegetation communities within a 350-meter radius.*
gr1k	Grasslands, 1-kilometer	*Percent proportion of all grassland vegetation communities within a 1-kilometer radius.*
bare100	Barren surface, 100-meters	*Percent proportion of all bare surface within a 100-meter radius.*
bare350	Barren surface, 350-meters	*Percent proportion of all bare surface within a 350-meter radius.*
bare1k	Barren surface, 1-kilometer	*Percent proportion of all bare surface within a 1-kilometer radius.*
for100	Forested areas, 100-meters	*Percent proportion of all forested vegetation communities within a 100-meter radius.*
for350	Forested areas, 350-meters	*Percent proportion of all forested vegetation communities within a 350-meter radius.*
for1k	Forested areas, 1-kilometer	*Percent proportion of all forested vegetation communities within a 1-kilometer radius.*
for_dist	Distance to forest	*Distance to forested areas.*
Topographic		
slope100	Percent slope, 100-meters	*Mean percent slope within a 100-meter radius.*
slope350	Percent slope, 350-meters	*Mean percent slope within a 350-meter radius.*
slope1k	Percent slope, 1-kilometer	*Mean percent slope within a 1-kilometer radius.*
tpi100	Topographic position index, 100-meters	*Mean topographic position index within a 100-meter radius.*
tpi350	Topographic position index, 350-meters	*Mean topographic position index within a 350-meter radius.*
tpi1k	Topographic position index, 1-kilometer	*Mean topographic position index within a 1-kilometer radius.*
curve100	Curvature, 100-meters	*Mean curvature within a 100-meter radius.*
curve350	Curvature, 350-meters	*Mean curvature within a 350-meter radius.*
curve1k	Curvature, 1-kilometer	*Mean curvature within a 1-kilometer radius.*

Table 2: Summary of Explanatory Variable. Summary of explanatory variables at 939 sites indicating Greater Sage-grouse presence in the defined analysis area.

Variable	Mean ± Std. Dev.	Median	25% - 75% Quartiles	Min.	Max.
Vegetation					
sg100	0.7348 ± 0.2549	0.7981	0.5757 – 0.9606	0.0	1.0
sg350	0.6339 + 0.2278	0.6819	0.4792 – 0.8229	0.0183	0.9725
sg1k	0.5441 + 0.1935	0.5662	0.3852 – 0.712	0.0794	0.8579
sgmms100	0.8117 + 0.2206	0.8886	0.6963 – 0.9973	0.0	1.0
sgmms350	0.8046 + 0.1219	0.8229	0.7355 – 0.9098	0.2744	0.9725
sgmms1k	0.7472 + 0.0896	0.7674	0.6804 – 0.8166	0.406	0.9367
mms100	0.0792 + 0.1363	0.0	0.0 – 0.112	0.0	1.0
mms350	0.1707 + 0.1647	0.1226	0.0177 – 0.2908	0.0	0.7918
mms1k	0.203 + 0.1546	0.1936	0.0571 – 0.3236	0.0046	0.7236
sggr100	0.6589 + 0.2944	0.7056	0.4456 – 0.9324	0.0	1.0
sggr350	0.5556 + 0.2523	0.5729	0.3455 – 0.7901	0.0032	0.9777
sggr1k	0.4736 + 0.1993	0.4687	0.3265 – 0.6536	0.0719	0.8721
gr100	0.0127 + 0.0407	0.0	0.0 – 0.0	0.0	0.5066
gr350	0.0236 + 0.0305	0.0119	0.0018 – 0.0329	0.0	0.2354
gr1k	0.0267 + 0.0203	0.0227	0.0123 – 0.0364	0.0	0.1782
bare100	0.1642 + 0.2082	0.0883	0.0 – 0.2429	0.0	1.0
bare350	0.134 + 0.1119	0.0897	0.0496 – 0.1968	0.0	0.7104
bare1k	0.1596 + 0.0891	0.1472	0.087 – 0.2032	0.0205	0.4628
for100	0.0088 + 0.0463	0.0	0.0 – 0.0	0.0	0.511
for350	0.0378 + 0.0646	0.0048	0.0 – 0.0514	0.0	0.439
for1k	0.0663 + 0.0621	0.049	0.018 – 0.1042	0.0	0.3586
for_dist	452.19 + 396.17	320.16	190.26 – 551.73	0.0	2,568.6
Topographic					
slope100	17.08 + 6.93	15.98	11.6 – 21.65	4.6167	45.1652
slope350	25.43 + 5.39	25.3	21.26 – 28.84	13.8007	44.647
slope1k	29.28 + 3.72	28.78	26.5 – 31.55	23.0494	40.4389
tpi100	483.93 + 22.0	482.42	468.24 – 501.61	384.584	551.082
tpi350	463.76 + 18.29	464.6	452.22 – 478.16	405.514	520.361
tpi1k	442.38 + 11.77	444.83	435.05 – 451.61	405.554	465.649
curve100	7.9699 + 2.7441	7.604	5.838 – 9.8535	2.7412	19.3061
curve350	11.1652 + 2.4527	11.134	9.2925 – 12.6971	6.0214	20.107
curve1k	12.738 + 1.725	12.4362	11.4627 – 13.9053	10.0158	17.5551

Figure 6: Vegetation Types. Vegetation types within the PPR Study Area derived from image classification of color-infrared National Agricultural Imagery Program (NAIP) aerial photography collected in 2012.



Spatial Data Collection

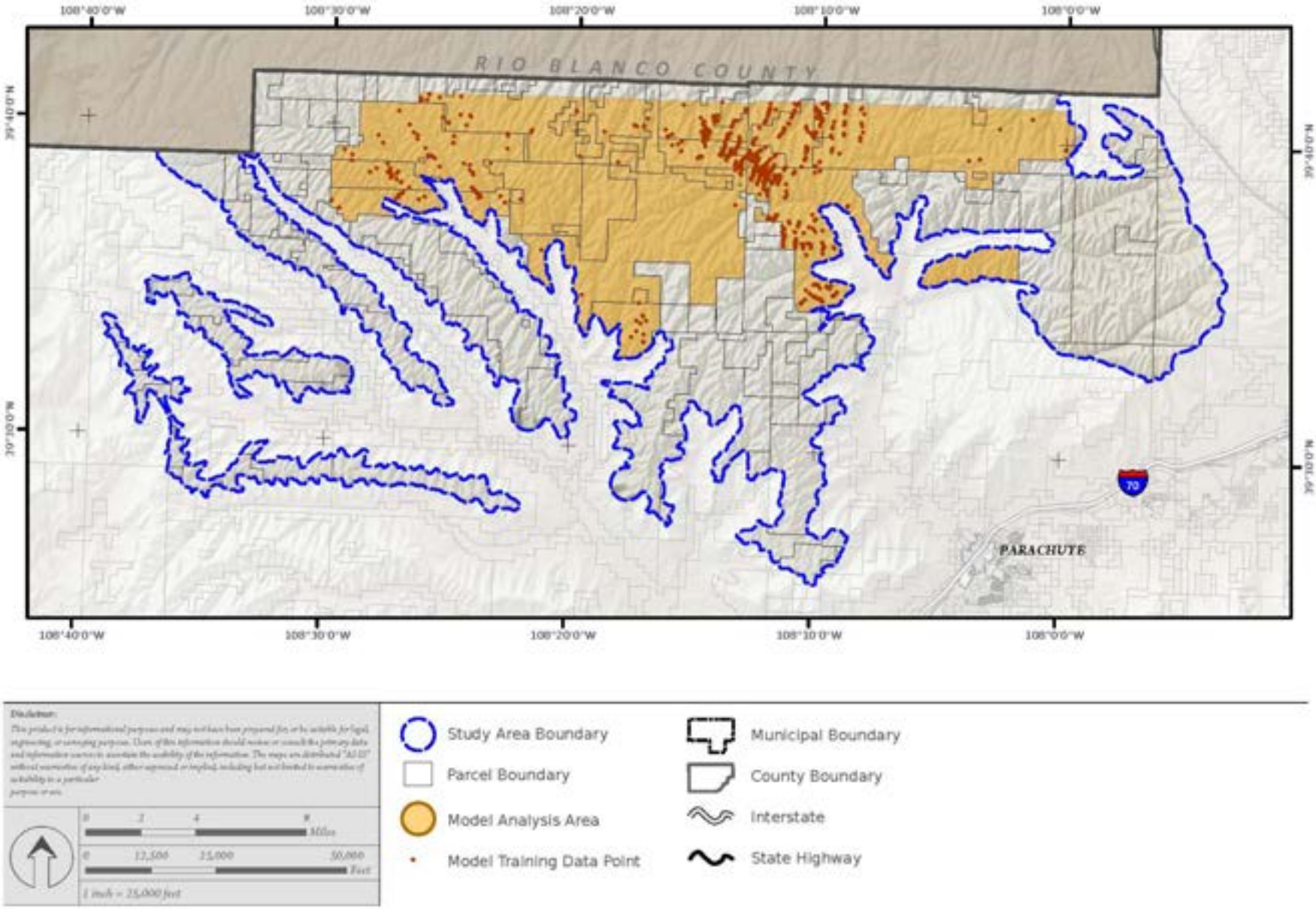
Field-collected data of point locations of sage-grouse signage were collected and compiled from three individual private landowners within the PPR Study Area (WWE 2008). In total, the compiled dataset contained 1,174 unique signage points collected from 2005 to 2012 across a contiguous area totaling 375 km^2 completely contained within the broader PPR Study Area (WWE 2008). The private lands where the field surveys were conducted occur in the central portion of the broader PPR Study Area and are considered to be representative of the diverse habitat types that naturally occur in the region; the surveyed area is displayed on Figure 7. The signage point data consisted of locations indicating presence of sage-grouse, including feather and pellet presence, lek locations and physical bird sightings collected during the summer season when the PPR Study Area is snow-free and easily accessible. All signage data were collected using resource-grade Global Positioning Systems (GPS) with an assumed 2 m horizontal precision. No telemetry data (i.e., sage-grouse outfitted with a GPS or radio-collar) were available for use in this analysis. Prior to, and after the acquisition of the sage-grouse point data, there has been a number of natural gas exploration and development activities in the analysis area, including road construction, natural gas pad development, compressor station construction, and other natural gas related support facilities. Because of these activities and the changing landscape, we did not attempt to capture these habitat impacts in our analysis, as it would have been very difficult to draw a point-in-time by which to incorporate these anthropogenic impacts. An incorporation of these habitat impacts could be incorporated into subsequent modelling analysis investigating direct and indirect impacts to sage-grouse habitats, but such an analysis was beyond the scope of our efforts.

While this data can show presence and seasonality of use, interpretation of how sage-grouse were using the area (e.g., summer foraging, winter foraging and nesting) is somewhat subjective and difficult to accurately predict. Some sage-grouse sign (such as roost piles) can reliably be used to predict winter time use, but single pellets, feathers, or tracks were assumed to not provide enough data to accurately describe use, therefore our models do not attempt to discern how habitats are being utilized by sage-grouse.

Analysis Area

While the model analysis area covered the entire extent of the 894 km^2 PPR Study Area, the model was trained on available point locations collected within the 375 km^2 acres of private lands. The training area, displayed in Figure 7, occurs in the central portion of the broader PPR Study Area, containing a variety of habitat types and topographical features that are assumed to represent the diverse topography and vegetation communities of the broader PPR Study Area.

Figure 7: *Model training area. Defined area used for habitat model training and locations of signage points collected from 2005-2012 within the broader PPR Study Area.*



Resource Selection Function

We first assessed suitability of sage-grouse habitat using a weighted overlay approach utilizing a RSF. The RSF was constructed on a presence vs. available habitat design because our data contained presence-only records, with no attempt to track absence locations. The presence vs. available habitat design characterizes a sample of sites where species' presence is recorded from a sample of resources available in the surrounding environment (Boyce et al. 2002). By contrast, a presence vs. absence design characterizes a sample of sites where species' presence is recorded by contrasting a sample of resources in sites the species are known to be absent. A concern with the presence vs. absence approach is the potential for a false negative error for presence thereby introducing potential bias to the model. While we can ensure that presence records indicate species use, we cannot say with certainty that unused sites (or absence records) are not actually utilized (Boyce et al. 2002). By contrast, a presence vs. available habitat design allows for contamination, defined as having a mixture of both used and unused resources present in the random sample of available resource units. This approach estimates habitat selection using a logistic function that transforms available resource distribution into the used distribution (Johnson et. al. 2006)

The field-collected sage-grouse data contained 1,174 unique point features (WWE 2008). For model analysis, we implemented a 5-1 training-to-validation ratio which is commonly recommended in k–fold partitioning designs to reduce cross-validation variance and bias (Breiman and Spector 1992). As such, 939 point features (80%) were randomly selected to represent presence locations; the remaining 235 point features (20%) were withheld for model validation. An additional 939 point features were randomly generated within the analysis area to quantify resource availability. In total, the compiled training dataset contained a total of 1,878 point features, with half of the features identifying known presence locations and the remaining half used for sampling available resources within the defined analysis area.

We first assessed linear correlation among the potential set predictor variables using Pearson correlation coefficients. When two parameters were correlated ($r > 0.65$), the variables were allowed to compete to determine which independent parameter better explained variance in the dependent variable. The remaining variables were tested for significance ($\rho < 0.1$) using both forward and backward stepwise selection to test all possible explanatory variable combinations and construct a model that best fit the training data; models were evaluated on the basis of samples size corrected Akaike Information Criterion (AIC) scores. AIC scores attempt to minimize model bias while maximizing model precision (Gunn et al. 2004). Models with the lowest AIC scores are considered the most parsimonious and have maximum support for the model (Goodenough et al. 2012). The selected model was further evaluated using bootstrap methods; the data was randomly re-sampled 10,000 times to generate 95% confidence intervals for regression coefficients and estimate standard errors of regression parameters. The full set of explanatory variables retained for model analyses with estimated coefficients, standard errors, upper and lower confidence intervals and significance values are summarized in Table 3. All statistical analyses were performed in the R Project for Statistical Computing using the stats (R Core Team 2013), aod (Lesnoff and Lancelot 2012), Hmisc (Harrell and Dupont 2014) and boot packages (Cantey and Ripley 2013).

After determining the best fit model, the regression coefficients obtained from the analysis were applied to the respective spatial data layers for each explanatory variable as a weighted linear combination in a GIS to produce a predictive surface.

The regression equation for the final model is expressed in the following form:

Y= -16.037746

- 1.841643 * for350

- 18.10309 * gr1k

- 1.829971 * mms100

- 2.321588 * mms1k

+ 14.394478 * sg1k

- 14.473146 * sggr1k

- 0.10506 * slope_100

- 0.122239 * slope_1k

+ 0.044144 * tpi_100

where Y is the probability of occurrence of sage-grouse.

The probability of occurrence was logit transformed using the equation:

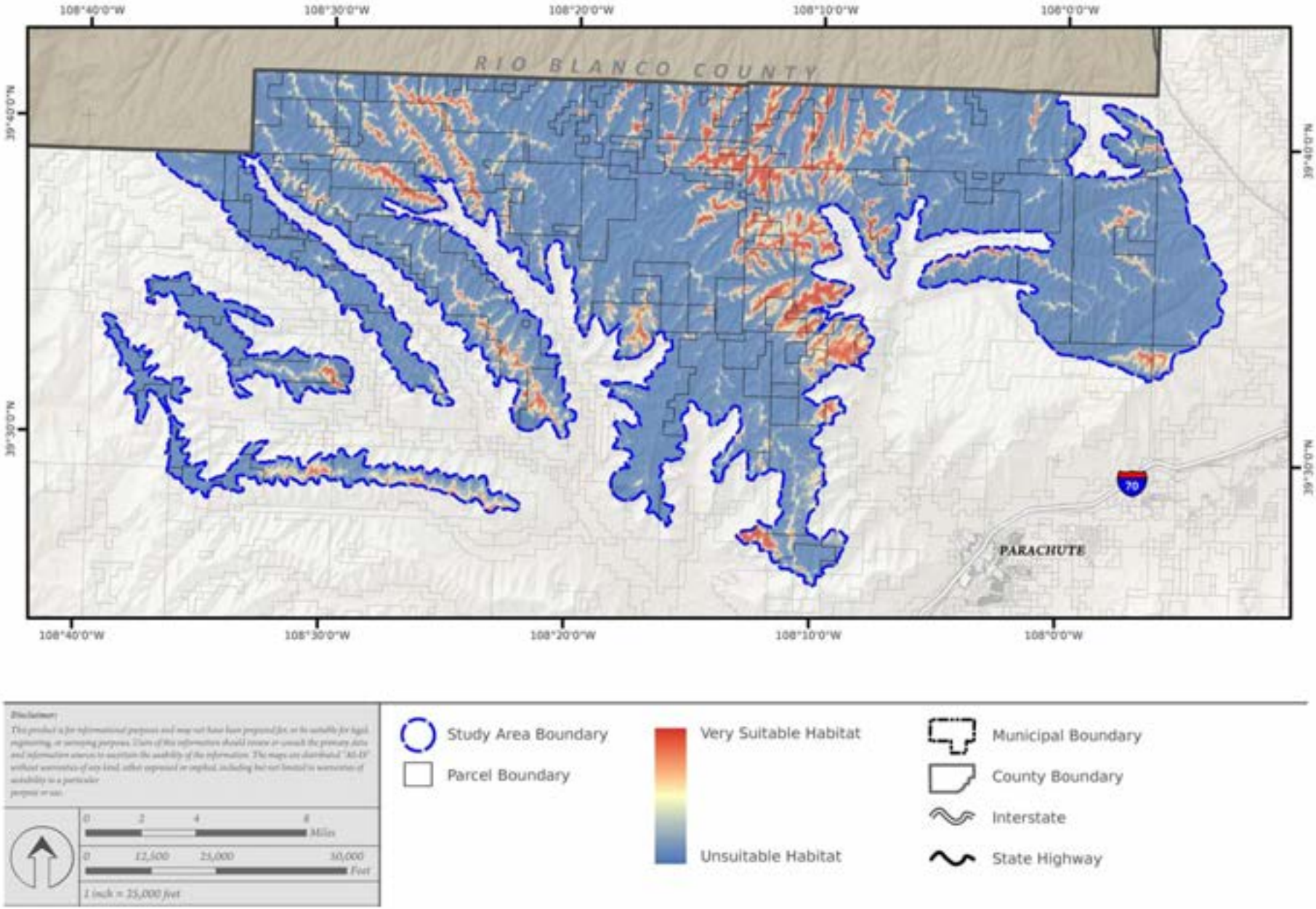
$$P = e^{Y} / (1 + e^{Y})$$

The resulting output (Figure 8) predicts probability of occurrence for sage-grouse on a continuous index of 0 to 1; 0 represents 0% probability of suitable sage-grouse habitat while a value of 1 represents 100% probability of suitable habitat for the species.

Table 3: RSF model variable coefficients. Summary of Coefficients of Explanatory Variables used to Predict Suitable Sage-Grouse Habitat

Variable	Coefficient	Std. Error	95% Confidence Interval		ρ Value
			Lower	***Upper***	
Intercept	-16.037746	3.0156	-22.811554	-10.918313	< 0.0001
sg1k	14.394478	2.229340	10.536357	19.309086	< 0.0001
mms100	-1.829971	0.698993	-3.279840	-0.542836	0.0037
mms1k	-2.321588	1.559011	-5.482815	0.583278	0.0841
sggr1k	-14.473146	2.161593	-19.251208	-10.785774	< 0.0001
gr1k	-18.103090	4.942620	-29.617783	-10.155660	< 0.0001
for350	-1.841643	1.155621	-4.152190	0.376809	0.0964
slope100	-0.105060	0.015353	-0.139571	-0.079109	< 0.0001
slope1k	-0.122239	0.047573	-0.216595	-0.031149	0.003
tpi100	0.050775	0.004596	0.044144	0.062215	< 0.0001

Figure 8: RSF model results. Raw RSF model results for PPR sage-grouse habitat.



Fuzzy Model

Following development and analysis of the RSF model, a fuzzy model was developed to model suitable sage-grouse habitat within the PPR Study Area. We utilized all explanatory variable combinations to form our fuzzy model, excluding mixed sagebrush vegetation communities (e.g. sagebrush-grassland mix and sagebrush-mixed mountain shrub mix). Unlike RSF models that determine the most significant contributing explanatory variables and assign weighted coefficients, fuzzy models utilize all sets of explanatory variables without weighting assigned. Because fuzzy logic examines the degree to which a specific location belongs to multiple sets, assigning weights to explanatory variables is illogical as increasing the weight of one factor over another does not increase the potential of belonging to one or more sets; the location is either a member of the set or not (ESRI 2014).

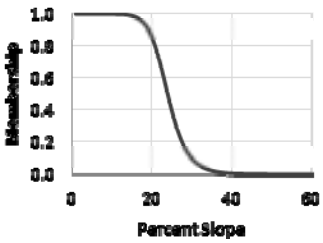
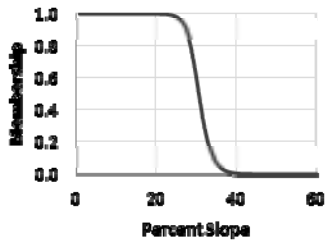
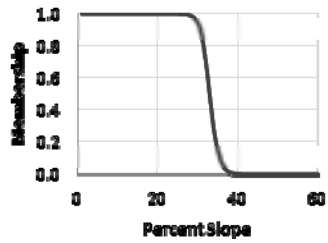
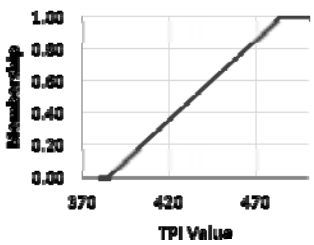
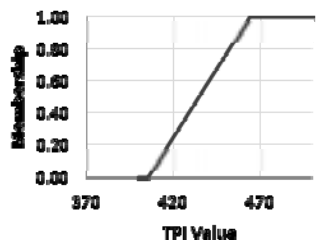
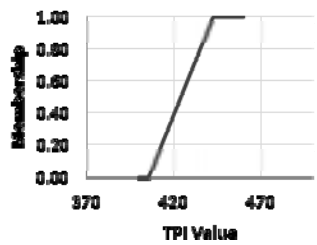
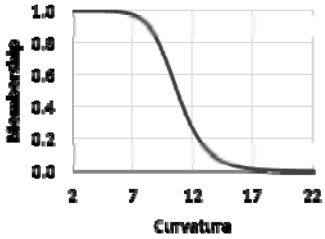
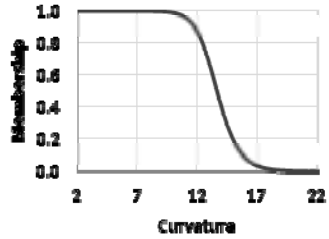
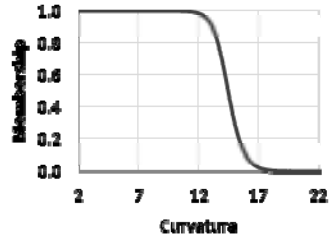
The fuzzy model was constructed to distinguish between suitable and unsuitable habitats for sage-grouse in the PPR Study Area. No attempt was made to model seasonal habitats or model effectiveness and quality of habitats. As such, the fuzzy model equation was constructed using linguistic descriptions involving all explanatory variables; the linguistic descriptions were qualified using the statistics derived for all explanatory variables listed in Table 4. The fuzzy rule for the model was developed using 25 explanatory variables.

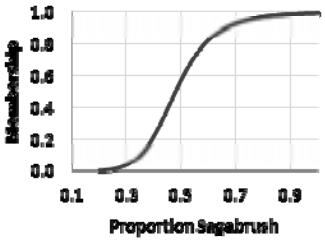
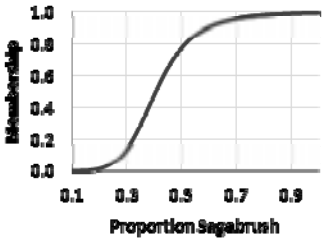
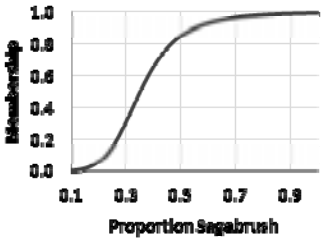
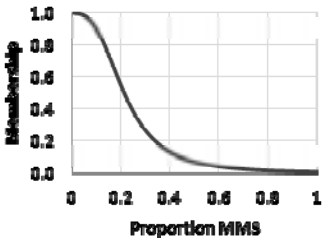
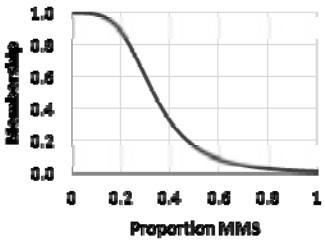
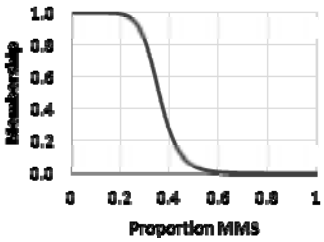
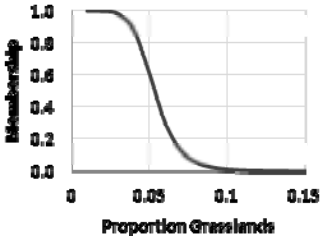
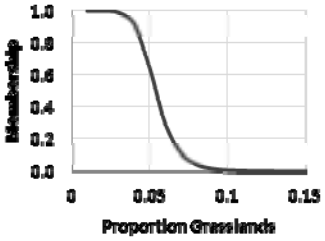
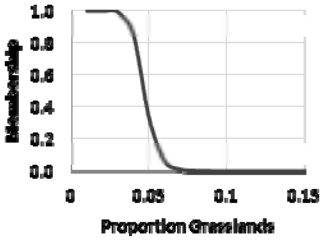
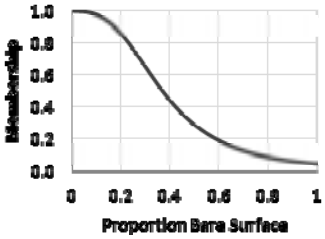
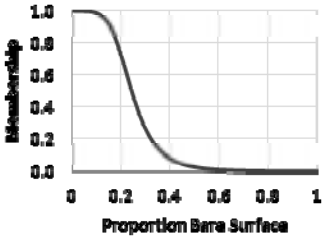
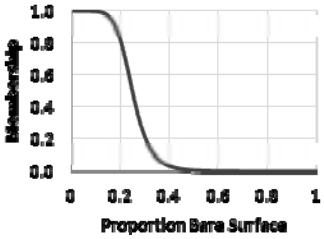
The fuzzy memberships were fitted from the statistics gathered for each variable in Table 4. Sinusoidal memberships were formed using the variable's mean plus or minus one standard deviation for the midpoint value with a spread value that assigned near full membership at the variable's mean. Linear memberships were formed using the minimum value of the variable as the minimum point and the mean specified as the maximum point allowing full membership. The fuzzy membership equations and graphs defining probability of membership for each explanatory variable are listed in Table 5.

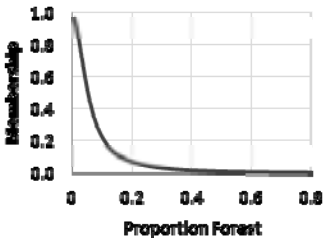
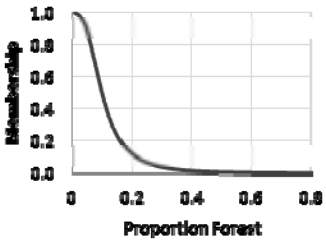
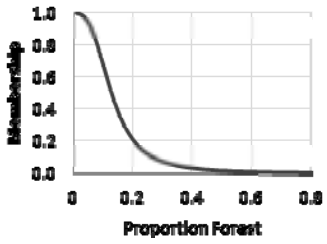
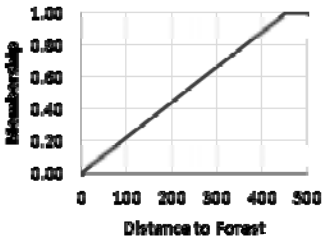
Table 4: Fuzzy Model Rule

A site is considered suitable for Greater Sage-grouse habitat if it meets the following criteria:		
Criteria	**Scale**	**Definition**
Slope is not steep	100 m	'not steep' defined as < 24%
	350 m	'not steep' defined as < 31%
	1 km	'not steep' defined as < 33%
Location is on or near a ridge	100 m	Defined as TPI value > 435
	350 m	Defined as TPI value > 435
	1 km	Defined as TPI value > 424
Surface curvature is more flat	100 m	'more flat' defined as < 10.71
	350 m	'more flat' defined as <13.62
	1 km	'more flat' defined as <14.46
Surrounding vegetation is dominated by sagebrush	100 m	'dominated' defined as > 48% presence
	350 m	'dominated' defined as > 41% presence
	1 km	'dominated' defined as > 35% presence
Proportion of mixed mountain shrubs are moderately low	100 m	'low' defined as < 22% presence
	350 m	'low' defined as <34% presence
	1 km	'low' defined as < 36% presence
Proportion of grasslands are low	100 m	'low' defined as < 5%
	350 m	'low' defined as < 5%
	1 km	'low' defined as < 5%
Presence of bare surfaces are moderately low	100 m	'low' defined as < 37%
	350 m	'low' defined as < 25%
	1 km	'low' defined as < 25%
Proportion forest is low	100 m	'low' defined as < 6%
	350 m	'low' defined as < 10%
	1 km	'low' defined as < 13%
Distance to forest is far		'far' defined as > 226 ft.

Table 5: Fuzzy Set Membership Functions

Percent Slope		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{24.01}\right)^{10}}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{30.82}\right)^{20}}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{33.0}\right)^{30}}$
		
Topographical Position Index (TPI)		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = 0$ if $x < 385$, $\mu(x) = 1$ if $x > 484$, $\mu(x) = \dfrac{(x-385)}{(484-385)}$	$\mu(x) = 0$ if $x < 406$, $\mu(x) = 1$ if $x > 464$, $\mu(x) = \dfrac{(x-406)}{(464-406)}$	$\mu(x) = 0$ if $x < 406$, $\mu(x) = 1$ if $x > 442$, $\mu(x) = \dfrac{(x-406)}{(442-406)}$
		
Surface Curvature		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{10.71}\right)^{9}}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{13.62}\right)^{15}}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{14.46}\right)^{23}}$
		
Proportion Sagebrush		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{0.48}\right)^{-7}}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{0.41}\right)^{-6}}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{0.35}\right)^{-5}}$

		
Proportion Mixed Mountain Shrubs		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = \frac{1}{1+\left(\frac{x}{0.22}\right)^3}$	$\mu(x) = \frac{1}{1+\left(\frac{x}{0.34}\right)^4}$	$\mu(x) = \frac{1}{1+\left(\frac{x}{0.36}\right)^9}$
		
Proportion Grasslands		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = \frac{1}{1+\left(\frac{x}{0.05}\right)^7}$	$\mu(x) = \frac{1}{1+\left(\frac{x}{0.05}\right)^8}$	$\mu(x) = \frac{1}{1+\left(\frac{x}{0.05}\right)^{11}}$
		
Proportion Bare Surface		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = \frac{1}{1+\left(\frac{x}{0.37}\right)^3}$	$\mu(x) = \frac{1}{1+\left(\frac{x}{0.25}\right)^5}$	$\mu(x) = \frac{1}{1+\left(\frac{x}{0.25}\right)^7}$
		
Proportion Forest		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***

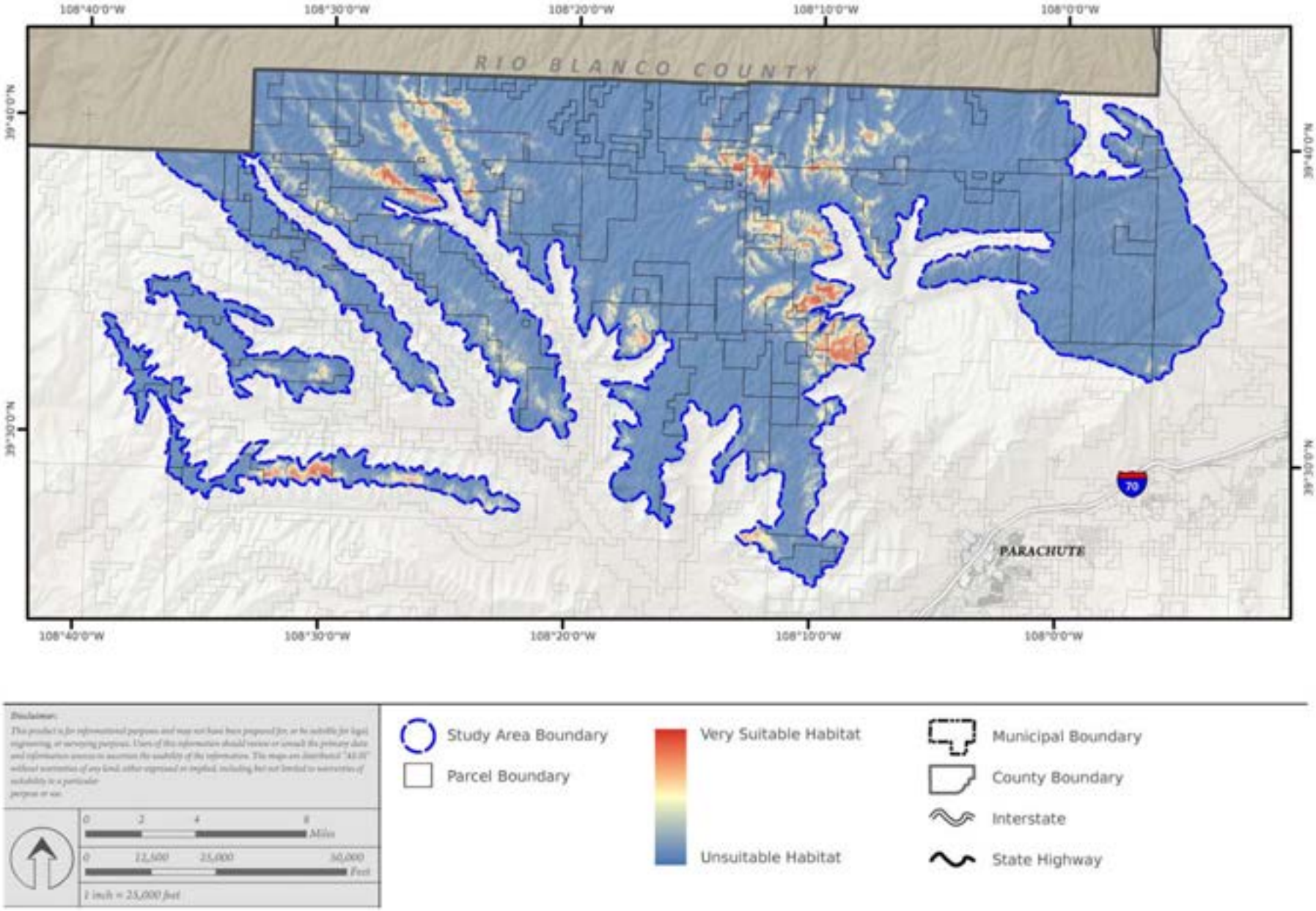
$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{0.06}\right)^2}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{0.10}\right)^3}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{0.13}\right)^3}$
		
Distance to Forest		
$\mu(x) = 0$ if $x < 0$, $\mu(x) = 1$ if $x > 452$, $\mu(x) = \dfrac{(x-0)}{(452-0)}$		
		

After fitting memberships to all model sets, the sets were combined and analyzed using the Gamma overlay operator using a gamma power of 0.9. The Gamma overlay technique is a combination of the Fuzzy Sum and Fuzzy Product overlay techniques. Fuzzy sum, an increasive function, is employed when the combination of evidence from all sets is more important than any single piece of evidence; by contrast, the Fuzzy Product technique, a decreasive function, is employed when the combination of evidence from all sets is less important than any single piece of evidence. When the Gamma value is applied as 1.0, the results are precisely the same as the Fuzzy Sum technique; when the Gamma value is 0, the results are precisely the same as the Fuzzy Product technique. Initially the Fuzzy Sum technique was employed as no single piece of evidence influenced sage-grouse habitat selection, but rather selection was determined by variety of combined factors. However, the results of the Fuzzy Sum technique ranged from 0.999504 – 1.0, far too similar to accurately distinguish between habitat types and probable selection. As such, the Gamma overlay technique was employed to decrease the results, increasing the range of values returned and provide greater contrast in suitable habitats across the Study Area landscape. Initially, we knew the gamma operator would be higher to maintain the increasing function of the combined evidence. As such, we explored various results using a gamma value of 0.8, 0.85, 0.9 and 0.95. Results using a gamma operator of 0.8 and 0.85 did not adequately delineate utilized habitats, a conclusion based on observing known signage points that were not captured by the model results. By contrast, using the gamma operator of 0.95 greatly over-predicted habitat utilization, a conclusion gained by observing broad forested areas on gentler slopes delineated as suitable habitats. As such, the selected model employed a

gamma value of 0.9 which maintains the increasive function of the combined evidence, yet provides adequate distinction between areas of non-utilization.

The resulting output (Figure 9) predicts probability of occurrence for sage-grouse on a continuous index of 0 to 1 using fuzzy logic; 0 represents 0% probability of suitable sage-grouse habitat while a value of 1 represents 100% probability of suitable habitat for the species.

Figure 9: Fuzzy model results. Raw fuzzy model results for PPR sage-grouse habitat.



RESULTS

RSF Model Validation

The RSF model results were validated using a k-fold cross-validation method used to correlate ranked bins with area-adjusted frequencies of predicted values (Johnson et al. 2006). The validation technique involves five steps:

1. Divide the resulting prediction surface into a specified number of progressively ranked equal-area bins.
2. Determine the midpoint value of the RSF score for each bin area.
3. Calculate the utilization rate for each bin using the following formula:

   $$U(x_i) = w(x_i)A(x_i) / \sum_j w(x_j)A(x_j)$$

   where $w(x_i)$ is the midpoint RSF value of bin i and $A(x_i)$ is the area of bin i (Boyce and McDonald 1999).
4. Estimate the expected number of validation records within each bin using the following formula:

   $$N_i = N * U(x_i)$$

   where N is the total number of validation observations used and $U(x_i)$ is the utilization function from step 3.
5. Calculate the observed number of validation records within each bin and regress against the predicted number of locations for each bin.

A well-fit model, one proportional to probability of use, would have a slope equal to 1, an intercept of 0, with a high R^2 value and an insignificant X^2 goodness-of-fit value (Johnson et al. 2006).

RSF Model Results

The RSF model results were split into 6 equal-area ordinal bins. The 235 field-collected presence locations withheld for model validation were cross-referenced with the ordinal bins to count the number of known observations that fell within each bin. We then determined all midpoint values to calculate the expected utilization rate $U(x_i)$ for each bin. The observed and predicted location numbers were converted to percentages to assess model performance and fit using linear regression. In addition, chi-square tests were used to assess model fit, while Spearman correlation coefficients were calculated to assess significance between predicted and observed frequencies.

The RSF model validated well, having a slope of 0.779 (95% CI: 0.626 – 0.932), an intercept of 0.037 (95% CI: -0.024 – 0.097) and an R^2 value of 0.9615. The chi-square goodness-of-fit test supported a good fit between observed and predicted frequencies (χ^2 = 18, ρ = 0.2627). The top two bins predicted 97% occupancy while observed occupancy totaled 99% in bins 5 and 6, totaling 297 km^2 within the PPR Study Area (Figure 10). Bins 1-4 did not meet significance

criteria, whereby occupancy would not likely occur ≥3% of the time (results for bins 1-4 were therefore not displayed on Figure 10).

In addition, the RSF model was validated against an independent dataset of known lek locations collected by CPW within the PPR Study Area from 1997 – 2012, containing a total of 85 unique point locations (CPW 2013). The model produced a slope of 0.926 (95% CI: 0.814 – 1.034), an intercept of 0.012 (95% CI: -0.027 – 0.051) and an R^2 value of 0.985. The chi-square goodness-of-fit test supported a good fit between observed and predicted frequencies (χ^2 = 24, ρ = 0.2424).

The validation results indicate the RSF model is a good predictor for sage-grouse habitat suitability within the PPR Study Area. Model validation results are summarized in Figure 11, which shows expected versus observed proportion of presence observations for withheld validation sample (n = 235) and independent CPW lek samples (n = 85). The dashed line represents perfect fit, having a slope of 1 with intercept of 0. Solid line depicts the fitted regression with point markers displayed as black diamonds.

Figure 10: RSF model bins. RSF model habitat map for PPR sage-grouse habitat.

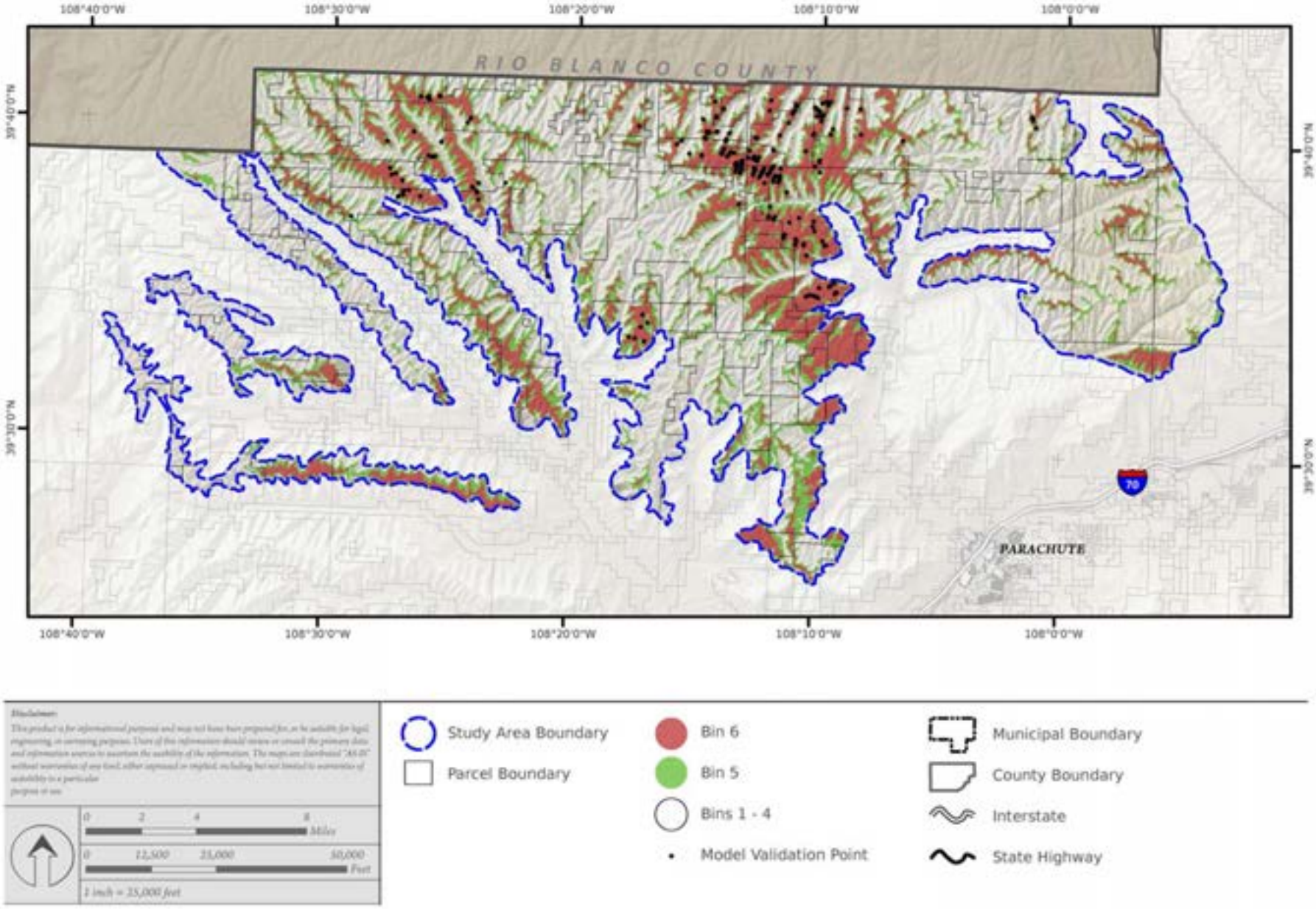
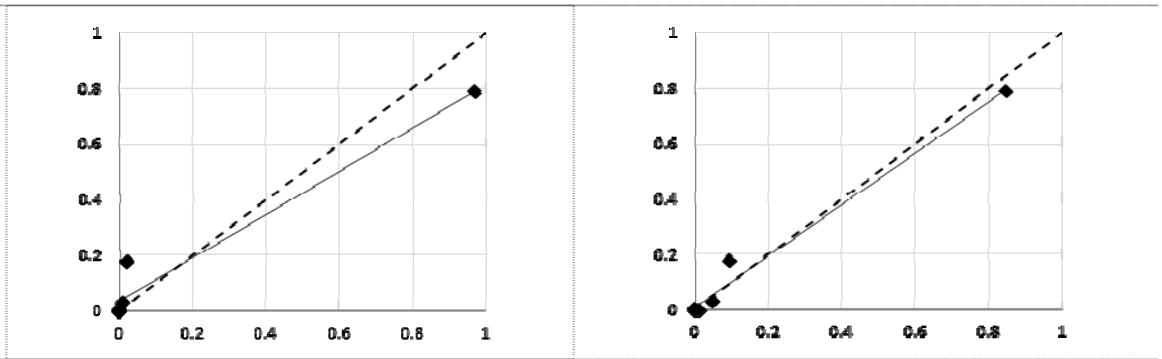


Figure 11: RSF Validation Results: Expected vs. Observed Proportion of Presence Observations.



	Withheld Validation Set			CPW Lek Validation Set		
Regression	$y = 0.779x + 0.037$, Adj.. r^2 **= 0.9519**			$y=0.926x+0.012$, Adj. r^2 **= 0.9814**		
Chi-square	χ^2	**Deg. Of Freedom**	ρ	χ^2	**Deg. Of Freedom**	ρ
	18	15	0.2627	24	20	0.2424
Spearman correlation	r^2	ρ		r^2	ρ	ρ
	0.9411	0.005		0.8986	0.015	0.015

Fuzzy Model Validation

Validation of the fuzzy model habitat results followed the same k-fold cross-validation procedure applied to the RSF habitat model as outlined above.

Fuzzy Model Results

Similar to the RSF model, we attempted to split the fuzzy model results into six (6) equal-area ordinal bins. However, due to the homogeneous nature of the lower values returned in the predicted surface, only four distinct bins could be produced; the lowest ranked bin (bin 1) captured approximately one-half of the study area, but due to the homogeneity of the results it could not be further subdivided. Therefore a total of four bins for the fuzzy model results are shown in Figure 12, with bin 1 being non-suitable habitat.

The 235 field-collected presence locations withheld for model validation were cross-referenced with the ordinal bins to count the number of known observations that fell within each bin. We then determined all midpoint values to calculate the expected utilization rate $U(x_i)$ for each bin.

The observed and predicted location numbers were converted to percentages to assess model performance and fit using linear regression. In addition, chi-square tests were used to assess model fit, while Spearman correlation coefficients were calculated to assess significance between predicted and observed frequencies.

The fuzzy model validated very well, having a slope of 1.031 (95% CI: 0.998 – 1.064), an intercept of 0.005 (95% CI: -0.017 – 0.007) and an R^2 value of 0.9989. The chi-square goodness-of-fit test supported a good fit between observed and predicted frequencies (χ^2 = 18, ρ **=** 0.1157). The top two bins (bins 3 and 4) predicted 98% occupancy and observed occupancy totaled 98% totaling 294.8 km^2 within the PPR Study Area. Bins 1-2 did not meet significance criteria, whereby

occupancy would not likely occur ≥2% of the time (results for bins 1-2 were therefore not displayed on Figure 12).

In addition, the fuzzy model was validated against the independent dataset of known lek locations collected by CPW within the PPR Study Area from 1997 – 2012, containing a total of 85 unique point locations (CPW 2013). The model produced a slope of 1.22 (95% CI: 1.069 – 1.37), an intercept of -0.037 (95% CI: -0.083 – 0.01) and an R^2 value of 0.984. The chi-square goodness-of-fit test supported a good fit between observed and predicted frequencies (χ^2 = 24, ρ = 0.0895).

The validation results indicate the fuzzy model is a good predictor for sage-grouse habitat suitability within the PPR Study Area. Model validation results are summarized in Figure 13.

Figure 12: Fuzzy model bins. Fuzzy model habitat map for PPR sage-grouse habitat.

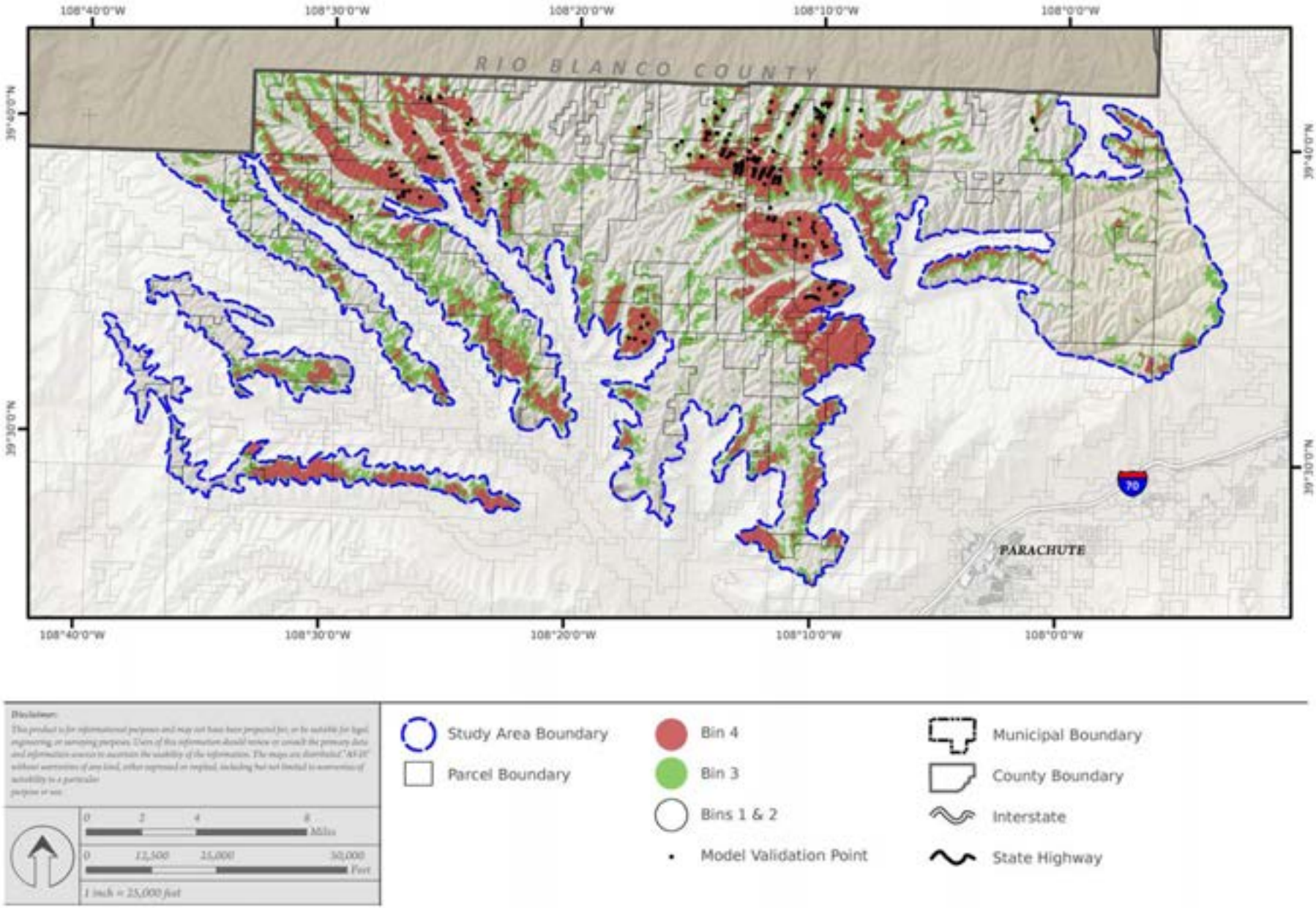
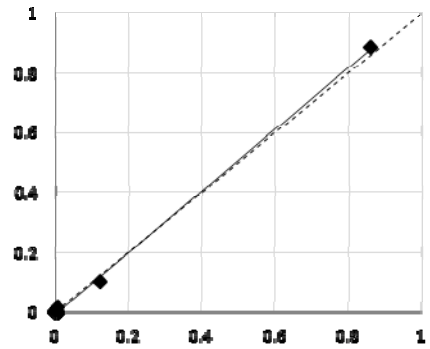
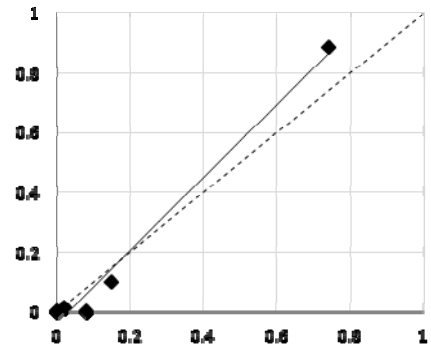


Figure 13: Fuzzy Validation Results: Expected vs. Observed Proportion of Presence Observations.





	Withheld Validation Set			CPW Lek Validation Set		
Regression	$y = 1.031x + 0.017$, Adj. r^2 **= 0.9987**			$y = 1.22x - 0.037$, Adj. r^2 **= 0.9805**		
Chi-square	χ^2	**Deg. Of Freedom**	ρ	χ^2	**Deg. Of Freedom**	ρ
	18	12	0.1157	24	16	0.0895
Spearman correlation	r^2	ρ		r^2	ρ	
	0.9852	0.0003		0.9412	0.005	

Model Assumptions and Limitations

Two primary subjects limit the predictive accuracy of the habitat models developed in this exercise; explanatory variables and uncertainties inherent to the sage-grouse signage points. Concerning explanatory variables, issues that may influence habitat selection beyond the scope of this analysis include 1) accuracy of the classified vegetation dataset, 2) omission of other potentially influential explanatory variables and 3) temporal discrepancies that exist between the signage points and explanatory variables. Regarding signage points, uncertainty exists in terms of understanding the full context of sage-grouse use and behavior at each signage location, as well as the limitation of not being able to discern seasonal use and occupation of an area.

As sage-grouse are a sagebrush obligate species, utilization of a vegetation dataset that accurately depicts vegetation communities and distribution of sagebrush is paramount to understanding habitat selection. Our decision to develop and utilize a vegetation dataset derived from classification of 1 m 4-band aerial photography was motivated by the both the attribute and spatial inaccuracies inherent to both the CVCP (Colorado Vegetation Classification Project [CPW 2003), and LANDFIRE (2010) vegetation datasets. Furthermore, the cell resolutions of each dataset, 25 m and 3 m respectively, are more applicable to development of a regional scale model, as opposed to the local scale model produced for this analysis.

While the results of the vegetation validation indicate an acceptable level of accuracy, only 45 of the 98 field validation locations were able to be field validated due to timing restrictions that prevented access to some private lands. For that reason, additional ocular assessments were performed by visually comparing the classified vegetation communities to underlying high-resolution photography (i.e. 30-cm cell resolution), as well as comparing the classified vegetation

dataset results to other areas were data was verified in the field, including field-collected photographs and vegetation plot data. Following these secondary assessments, we were satisfied with the vegetation dataset produced from the image classification process and firmly believe it is the best available data to employ for habitat modeling for this location and scale of analysis. Nevertheless, a limited level of inaccuracy still exists in the data thereby influencing the predictive ability of the habitat models.

A second model limitation is the omission of other potentially influential explanatory variables, including anthropogenic factors and other resource-related criteria including canopy heights and densities, understory vegetation composition, soil types, wildfire risks and others. Anthropogenic variables (e.g., roads, well pads, compressors, pipeline corridors, water facilities, etc.) were excluded due to the lack of available data depicting these features and the inability to accurately produce data that adequately represented anthropogenic factors in a timely manner. Furthermore, recent literature reveals conflicting results on what types of anthropogenic factors and to what degree these features may impact habitat selection for the greater sage-grouse (Ramey, Brown and Blackgoat 2011). For example, a number of currently active and historical natural gas well pad sites exist across the PPR Study Area; based on photo interpretation, it is not evident in every case to determine which sites are active versus inactive. While an inactive pad site is still considered an anthropogenic impact, we know that some of historical pad sites in the PPR Study Area are used as lek locations (based on CPW lek count data). Due to the uncertainty in identifying anthropogenic factors in a timely manner, as well as the uncertainty in how they influence habitat selection, anthropogenic factors were excluded as an explanatory variable in this analysis.

Several other resource-related explanatory variables were omitted from this analysis as well, primarily due to the fact that literature and expert opinion do not indicate them to be primary indicators of habitat selection for sage-grouse, but also due to inadequate or inaccurate data sources. Data depicting canopy heights and densities are available for the project area from the LANDFIRE (2011) suite of data products, but review of the data revealed broad areas where the data did not accurately reflect on-the-ground conditions. Other omitted resource explanatory variables (e.g., soil types, wildfire risks, livestock grazing pressure, climatic change) were excluded due to either their marginal influence in determining habitat selection or lack of data at the project level scale. While these variables are not considered to be key predictors of sage-grouse use and occupation, inclusion of these variables in the models would marginally strengthen the predictive ability of the habitat models.

The temporal discrepancies between the sage-grouse signage points and explanatory variables are an additional limitation of the habitat models. While we know the precise locations of when the signage points were collected, we do not know with certainty what the ground conditions were during the period that the bird was present at the location. The vegetation dataset we developed was produced from NAIP photography collected in 2012, therefore reflecting recent ground conditions. However, the collection of the signage points occurred from across a seven year period from 2005 – 2012. For that reason, uncertainty exists in accurately defining the conditions that existed at the precise point in time that the sage-grouse was present at the signage location.

Lastly, due to the inability to discern the duration of sage-grouse presence in a defined area, as well as the type of habitat use and behavior at each signage locations, the models are unable to classify seasonal habitats. In fact, the sage-grouse signage points are a collection of a data that most likely include indications of use across all seasons. Without knowing the precise time that the grouse were at the signage locations, it is not possible to predict seasonal use with these models.

Recognizing the limitations and uncertainties in the habitat models, we are satisfied with the predictive ability of the models as confirmed through significance in our model validation results, as well as concurrence with other similar models performed at similar scales within the PPR Study Area (Sauls et al. 2006, Walker et al. 2010). Future modeling efforts could be strengthened through inclusion of some of the omitted variables, as well as utilization of telemetry datasets that depicts marked bird locations at precise dates and times to generate a larger dataset of points for model training, including the ability to model and predict seasonal habitats.

DISCUSSION

RSF and fuzzy models utilizing field-collected sage-grouse data both accurately predicted use of habitats at local (100 m), intermediate (350 m) and landscape scales (1 km). These models were validated using randomly selected unique point features, which resulted in ranked bins accurately predicting frequencies of use. The RSF model validated with an R^2 value of 0.9615. The top two bins predicted 97% occupancy while observed occupancy totaled 99% in bins 5 and 6, totaling 297 km^2 within the PPR Study Area. The RSF model was also validated against known lek locations, which also produced an R^2 value >0.98.

The fuzzy model utilized all sets of explanatory variables, without weighting, allowing a variable to exist in multiple bins at various degrees of membership. The results clearly showed that the fuzzy habitat model accurately validated against randomly selected sage-grouse location data and lek sites. The fuzzy model validated with an R^2 value of 0.9989. The top two bins predicted 98% occupancy and observed occupancy totaled 98% in bins 3 and 4, totaling 295 km^2 within the PPR Study Area. In addition, the fuzzy model was validated against the independent dataset of known lek locations, with the model producing an R^2 value of 0.984 against lek locations.

MANAGEMENT IMPLICATIONS

We constructed two predictive models using distinctly different methods to assess sage-grouse habitat suitability within the PPR Study Area. The models demonstrate that of the 894 km^2 Study Area mapped as PPH and PGH by CPW, only 295 km^2 (34%) of the Study Area actually supported suitable sage-grouse habitats. Results suggest that a combination of both vegetation and topographic variables at multiple scales best explain habitat selection by sage-grouse in the PPR Study Area. The RSF model indicates a strong preference for sagebrush-dominated vegetation communities, while demonstrating negative associations with grassland, mixed mountain shrub and forested vegetation communities.

This is further supported by the vegetation selection index (Table 6), a generalized method of quantifying resource selection whereby the amount of a resource utilized is compared to resource availability; ratios producing a value greater than one indicate selection while ratios less

than one indicate avoidance (Manly et al. 1992). The vegetation selection index indicates a selection rate of 54% for sagebrush-only and dominated landscapes, and 19% for sagebrush communities containing a marginal mixed mountain shrub component. Topographic variables indicate a negative association with slope and a positive association with a higher topographical position index (TPI), implying that local sage-grouse population prefer flatter areas on the top of ridgelines. These results are consistent with other previous and ongoing fine-scale modeling efforts conducted in the Study Area (Sauls et al. 2008; Walker et al. 2010) which indicate the PPR sage-grouse population select for sage-dominated vegetation communities that occur along ridge tops with shallow slopes. Sage-grouse preference of flatter terrain is also observed in other populations (Hupp and Braun 1989, Doherty et al. 2008) and can be an important habitat factor (Knick and Connelly 2011).

Table 6: Vegetation Selection Index

	Available		**Utilized**			
Vegetation Type	**Acres**	**%**	**Points**	**%**	**Selection Rate**	**Calibrated Selection Rate**
Bare	28,302.8	13%	287	24%	1.91	26%
Forest	33,992.1	15%	2	< 1%	0.01	< 1%
Grassland	19,611.1	9%	7	1%	0.07	1%
Mixed mountain shrub	69,614.7	31%	22	2%	0.06	1%
Riparian	70.9	< 1%	0	< 1%	0.00	< 1%
Sage dominant	59,995.1	27%	786	67%	4.01	54%
Sage/Mixed Mountain Shrub	9,496.0	4%	70	6%	1.39	19%

By contrast, the results of our two fine-scale predictive models differed dramatically from the CPW sage-grouse mapping that delineates PPH and PGH habitats for the species within the PPR Study Area. The disparate results are likely explained by differences in 1) spatial resolution of the data employed in the model analyses and 2) explanatory variables employed in the models. Regarding spatial resolution, our models used raster data with 10 m cell resolution, similar to the Sauls (et al. 2008) and Walker (et al. 2010) models, as compared to the Rice (et al. 2013) model that utilized raster data with a 1-kilometer cell resolution. The difference in cell resolution equates to a loss of information in the model results that are invaluable for local management policies and practices; for every possible single response in the Rice (et al. 2013) model analyses, there were 10,000 possible responses in our model results.

Secondly, the Rice (et al. 2013) model, once an area was known to be occupied sage-grouse, only considered vegetative explanatory variables, omitting significant topographical variables including slope, surface roughness and topographic or slope position. Particularly to the PPR Study Area, topographical variables are significant predictors of sage-grouse utilization; omission of these critical explanatory variables in assessing habitat suitability fails to recognize the diverse

environment of the PPR Study Area, the limited areas of gentler terrain, and how the naturally fragmented landscape is selectively utilized by the local sage-grouse population.

While Rice (et al. 2013) omitted the use of topographic variables in their models due to model scale, they recognized that localized studies indicate these factors strongly contribute to actual sage-grouse habitat utilization. Furthermore, Rice (et al. 2013) did emphasize that "finer-scale and site-specific information" should be used to identify priority areas for sage-grouse conservation. Our results support and quantify the conclusions of Rice (et al. 2013) that finer-scale analysis is needed to adequately assess sage-grouse habitat suitability.

While the Rice (et al. 2013) model analysis is not technically flawed, the dramatically broader spatial resolution of the data employed, combined with the omission of critical explanatory topographic variables, has the unintended consequence of over-predicting habitat by a three-fold factor in the PPR Study Area; the Rice (et al. 2013) model results indicate the entirety of the Study Area is suitable sage-grouse habitat to some degree.

Gross over-prediction of habitats may not help support habitat management or species conservation, but rather may unnecessarily dilute conservation activities and priorities resulting in ineffective allocation of habitat improvement strategies. Preliminary Priority Habitat is defined by the Sage-Grouse National Technical Team (NTT 2011) as "Areas that have been identified as having the highest conservation value to maintaining sustainable sage-grouse populations. These areas would include breeding, late brood-rearing, and winter concentration areas. These areas have been identified by state fish and wildlife agencies in coordination with respective BLM offices". Designated PPH/PGH habitats within the BLM's Draft RMPA/EIS have certain goals, objectives and management guidance associated for PPH/PGH areas. For example, the RMPA/EIS has: habitat restoration objectives to improve sagebrush habitats, wildfire management priorities, seasonal restrictions for fuels management activities, access restrictions, grazing restrictions, and other actions which may not actually benefit sage-grouse if PPH/PGH designations were erroneously applied to non-habitat. Goals and objectives tied to erroneously designated PPH/PGH areas could burden land management agencies with unnecessary management targets and "habitat improvement" targets in areas that were never, and will never actually be occupied by sage-grouse.

Additionally, applying erroneously mapped PPH/PGH designations on areas which do not support sage-grouse habitat may burden or restrict other land use activities; for example, the RMPA/EIS would impose a 3% surface disturbance cap on PPH/PGH areas, and even if the area is field-validated as being non-habitat, the validation process could be time consuming and burdensome for both land owners, land managers and regulatory agencies. When PPH/PGH areas may be over predicting habitat by around 60% in the PPR Study Area alone, this could impose significant burdens on landowners and land managers across very large areas.

With potential listing of the species under the Endangered Species Act, truly understanding and spatially depicting sage-grouse habitat could further inform policy and management of the species. Omission of critical explanatory data, or utilizing over-predicting habitat models could also lead managers to the conclusion that there is more available habitat than there truly is. The use of coarse models to map PPH/PGH attempts to predict important ("priority") habitats for sage-grouse conservation, yet as Rice (et al. 2013) indicates "At the broad scale of these models,

detecting specifics for individual birds or individual locations is not possible." We believe that even our models are still not accurate enough to detect specifics for "individual birds or individual locations", but the results presented by utilizing higher resolution vegetation data and more accurate modelling techniques still paints a much different picture of sage-grouse habitat suitability. While our model is not intended to drive regional policy, it presents additional information to help land use managers make more informed and hopefully more accurate and relevant decisions regarding management of sage-grouse habitats, and to help conservation efforts become more effective and meaningful at a scale and in locations that are more relevant to sage-grouse.

ACKNOWLEDGMENTS

This report was reviewed by three anonymous reviewers, considered experts in the fields of biological statistics, GIS and sage-grouse ecology; their comments greatly improved this research paper. We thank landowners in the PPR Study Area that granted access to private lands, including the Oldland Ranch, Oxy (USA) Inc., Chevron North America Exploration and Production, and Encana Oil & Gas (USA), Inc. We thank Christopher Rey and Mindy Paulek (with URS Corporation) for their outstanding efforts in the field. Funding for this project came from Garfield County Department of Community Development. We thank Colorado Parks and Wildlife for reviewing and validating initial model efforts, and we thank WestWater Engineering (Mike Klish and John Grey) for their assistance and comments on their experience and their insights on sage-grouse studies in the PPR area.

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SAGE-GROUSE HABITAT MODEL
APPENDIX A: USING IMAGE CLASSIFICATION TO DEVELOP VEGETATION COVER TYPES

Introduction

Publicly available datasets depicting vegetation cover types across the project area were initially employed in the spatial models; the datasets include LANDFIRE vegetation cover (LANDFIRE 2011) and the Colorado Vegetation Classification Project (CVCP) (CPW 2003). However, review of the data revealed widespread inaccuracies in correctly identifying and classifying the vegetative cover types when compared to high-resolution aerial photography. In addition, the cell resolution of both the LANDFIRE and CVCP datasets, measured at 30-meters and 25-meters respectively, were too coarse to accurately delineate vegetation communities at the local scale. As a result, the spatial inaccuracies combined with the mistyped vegetative in both datasets led to our conclusion that the datasets were inadequate in appropriately identifying suitable vegetative cover types at the local scale.

In an effort to increase the accuracy of the spatial data depicting existing vegetative cover types within the Study Area, an image classification process involving color-infrared aerial photography was performed to better represent vegetation communities. Image classification is achieved by combining multiple bands from the same image to detect relative color, color intensity and texture to form clusters based on similar return values. Two major categories of image classification include supervised and unsupervised classification. Supervised classification is a method whereby the user defines training sites of known vegetation types within the analysis area; the training sites are subsequently used to as reference for classifying all other remaining pixels in the image into respective vegetation groups (Busch n.d.). By contrast, an unsupervised classification process relies on software analysis to identify and define similar pixel groups without user-defined training sites; the software uses a variety of statistical algorithms and techniques to identify related pixels and group them into similar classes (Busch, n.d.). Subsequently, the user assigns vegetation communities to the resulting classes using a combination of photo-interpretation and field-collected data.

Color-infrared photography provides four bands that detect specific wavelength ranges of reflected solar radiation; three bands within the visible light spectrum (e.g., red, green and blue), and a fourth near infrared band that measures reflected radiation beyond the visible light spectrum. The band combinations can yield a variety of properties and characteristics of the objects and vegetation interpreted in the aerial photography, including vegetation health, vegetation moisture and species identification (USDA 2008). For example, using the near infrared, red and green spectral bands to produce a 'false color' image (e.g., mapping the near infrared, red and green bands to RGB) provides high contrast between heavily vegetated areas (i.e., aspen, mixed conifer, and mixed mountain shrubs), less vegetated areas (grasslands, shrublands, etc.) and barren areas. Furthermore, within forested areas, image combinations utilizing the near infrared band help to distinguish between deciduous and coniferous tree species. Deciduous trees contain more chlorophyll and therefor reflect an intense bright red,

while coniferous trees contain less chlorophyll and reflect lighter tones of red, magenta or pink. Within grassland and shrub communities, delineations were detected in a similar manner; the higher chlorophyll content in grasses and forbs caused these communities to reflect much brighter as compared to adjacent sagebrush communities.

Materials and Methods

The image classification for this project was performed on four-band 1-meter resolution photography acquired in 2011 from the USDA as part of the NAIP (USDA 2012) within the defined PPR Study Area. The NAIP imagery was re-sampled from 1-meter, to 2-meter cell resolution to facilitate accurate grouping of similar vegetation classes by minimizing noise that results from mixed vegetation stands. The four-bands were subsequently combined using a number of techniques to yield band derivatives that distinguished and delineated presence of vegetation, amount of chlorophyll, band reflectance values and relative textures. The band derivatives were finally employed in an unsupervised image classification exercise to identify and delineate distinct vegetation communities within the PPR Study Area.

Initially, the classification effort sought to identify the following vegetation cover types described in Table 1 below.

Table 1: Cover type classifications.

Cover Type	
Sagebrush	Gambel Oak
Sagebrush-dominated/grassland mix	Pinyon-Juniper
Sagebrush-dominated/mixed mountain shrub mix	Aspen
Grassland	Mixed conifer
Grass-dominated/mixed mountain shrub mix	Riparian
Mixed mountain shrubs	Bare surface

The primary intent of the classification exercise was to delineate both cohesive and mixed communities at a fine scale to study how they might influence habitat selection at the local scale. Secondarily, we hoped to distinguish Gamble oak and pinyon-juniper dominated stands from mixed mountain shrubs, consisting primarily of snowberry, service berry and bitterbrush, to examine if one cover type exerted greater influence in habitat selection within the PPR Study Area.

Results and Discussion

The cover type map units were broadly defined and included several vegetation communities. The forested cover type included woodland areas dominated by aspen or conifers with mixed understories. The mixed mountain shrublands consisted of Utah serviceberry, mountain snowberry, bitterbrush and Gamble oak interspersed with grassland and herbaceous understories. The grasslands included bunchgrass meadows, allowing for encroachment of mixed mountain shrubs up to 25%. Sagebrush communities were dominated by a variety of sagebrush species, interspersed with bunchgrass and herbaceous understories. Both sagebrush-

dominated/mixed mountain shrub and sagebrush-dominated/grassland mixed cover types contained a variety of sagebrush species intermixed with mixed mountain shrublands and bunchgrass meadows, with sagebrush cover ranging from 50% - 75%, respectively within these two cover types.

98 random points were generated across the project area for the purposes of field validation. Excluding bare surface and riparian cover types, each community was assigned 10 randomly generated points to inspect and confirm via field verification, with mixed conifer stands being assigned 8 randomly generated points for verification. Of the 98 potential points, only 45 were able to be field verified due to timing restrictions/limitations and limited access to some private lands.

The initial image classification exercise attempted to distinguish Gamble oak and pinyon-juniper from the broader mixed mountain shrublands cover type. In addition, aspen stands were classified separately from mixed conifer stands. The initial classification effort correctly identified 31 of the 45 of the randomly sampled field plots. Results of the initial classification effort are provided in Table 2 below.

Table 2: Accuracy assessment of initial image classification.

Cover Type	# Correct	Total Plots	% Correct
Aspen	7	7	100%
Gamble Oak	2	3	67%
Grasslands	1	3	33%
Grassland/mixed mountain shrubs	0	6	0%
Mixed Conifer	7	7	100%
Mixed mountain shrubs	4	5	80%
Pinyon-juniper	0	4	0%
Sagebrush	3	3	100%
Sagebrush-dominated/grass	3	3	100%
Sagebrush-dominated/mixed mountain shrubs	4	4	100%
Total	**31**	**45**	**68%**

The validation of the initial classification effort resulted in a total of 68% of the field plots being correctly identified which falls below the acceptable interpretation accuracy of 85% (Anderson et al. 1976). While several communities validated with 100% accuracy, the low predictive accuracy for Gamble oak, pinyon-juniper, grasslands and grassland/mixed mountain shrubs cover types hampered the accuracy of the overall classified dataset.

Field validation revealed that map units typed as pinyon-juniper cover type were, in fact, mixed mountain shrubland communities. Consequently, the pinyon-juniper mapped units were converted to mixed mountain shrubland communities. Likewise, while two of the three Gamble oak sample plots were correctly verified, they nevertheless contained a high percentage of mixed mountain shrublands; the third sample plot was field verified as mixed mountain shrublands. As such, the Gamble oak map units were also converted to mixed mountain shrublands, based on

limitations in the model accurately distinguishing between Gamble oak and other mixed mountain shrub species.

In addition, the poor predictive accuracy of grassland and grassland/mixed mountain shrub communities warranted a second review of the data. Of the six field plots for grass/mixed mountain shrub cover types, none were accurately verified. Rather five of the six sample plots revealed a much higher percentage of shrubs, while the sixth plot was verified as sagebrush. Furthermore, only one of the three grassland field sample plots was correctly verified; the remaining two plots were identified as sagebrush communities. Subsequently, the units originally mapped as either grasslands or grass/mixed mountain shrub cover types were re-analyzed and re-typed as either grassland, mixed mountain shrublands or sagebrush. Lastly, both aspen and mixed conifer cover types were combined to form a single forested cover type.

The revised classified dataset was re-validated using the original 45 field verified sample plots. The secondary validation effort against the revised dataset correctly identified 41 of the 45 randomly sampled field plots. Results of the revised vegetation classification accuracy assessment are presented in Table 3 below.

Table 3: Accuracy assessment of final image classification.

Cover Type	# Correct	Total Plots	% Correct
Grassland	1	3	33%
Forested	14	14	100%
Mixed mountain shrubs	16	18	89%
Sagebrush	3	3	100%
Sagebrush-dominated/grass	3	3	100%
Sagebrush-dominated/mixed mountain shrubs	4	4	100%
Total	**31**	**45**	**87%**

The second validation of the revised classification effort resulted in a total of 87% of the field plots being correctly identified, indicating the dataset meets acceptable interpretation accuracy. Overall, most mapped communities validated exceptionally well, excluding grassland communities which still had a low predictive accuracy of 33%, and to a lesser degree, mixed mountain shrubland cover types. An error matrix for the mapped cover types are presented in the Table 4 below.

Table 4: Error matrix for final mapped cover types.

Mapped Cover Type	**Actual Cover Type**					
	Grassland	Forested	Mixed mountain shrubs	Sagebrush	Sage-dominated/grass	Sage-dominated/mixed mountain shrubs
Grassland	1			2		
Forested		14				
Mixed mountain shrubs		1	16	1		
Sagebrush				3		
Sagebrush-dominated/grass					3	
Sagebrush-dominated/mixed mountain shrubs						4
Total	**1**	**15**	**16**	**6**	**3**	**4**

Overall, the final classified cover type dataset resulted in seven distinct cover types within the PPR Study Area. The results of the classification are quantified in Table 5 below.

Table 5: Final image classification cover types quantified.

Cover Type	**Acres**	**% of Study Area**
Bare	28,303	13%
Grassland	19,611	9%
Forested	33,992	15%
Mixed mountain shrubs	69,615	31%
Riparian	71	< 1%
Sagebrush	38,240	17%
Sagebrush-dominated/grass	21,756	10%
Sagebrush-dominated/mixed mountain shrubs	9,496	4%
Total	**221,084**	**100%**

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Appendix C- Original Plan Resolution

Reception#: 832867
03/20/2013 10:21:59 AM Jean Alberico
1 of 56 Rec Fee:$0.00 Doc Fee:0.00 GARFIELD COUNTY CO

STATE OF COLORADO)
)ss
County of Garfield)

At a regular meeting of the Board of County Commissioners for Garfield County, Colorado, held in the Commissioners' Meeting Room, Garfield County Administration Building in Glenwood Springs on Monday, the 18th day of March A.D. 2013, there were present:

John Martin, Commissioner Chairman
Mike Samson, Commissioner
Tom Jankovsky, Commissioner
Andrew Gorgey, County Manager
Frank Hutfless, County Attorney
Jean Alberico, Clerk of the Board

when the following proceedings, among others were had and done, to-wit:

RESOLUTION NO. 2013-23

A RESOLUTION APPROVING THE "GARFIELD COUNTY GREATER SAGE-GROUSE CONSERVATION PLAN"

Recitals

A. Portions of western Garfield County are currently managed for Greater Sage-Grouse (sage-grouse) and habitat protection as detailed in the ***Parachute - Piceance - Roan Sage-grouse Conservation Plan*** (PPR Plan) approved by Colorado Parks and Wildlife (CPW) in April, 2008 which was a multiple year planning effort with broad-base support from private land owners, state and federal agencies and special interest groups. The PPR Plan serves as the primary management framework for both public and private lands in Garfield County that have been identified as having suitable sage-grouse habitat by CPW.

B. To date, the PPR Plan has provided valuable guidance to private landowners and state and federal agencies in Garfield County since its completion in 2008. The Garfield County Greater Sage-Grouse Conservation Plan (the Plan) serves as a necessary refinement of the PPR Plan, which enhances the ability to effectively protect and manage key habitat components. This is achieved primarily through a high-resolution habitat identification and mapping effort, which utilizes the best available science. The Plan is designed to reflect the unique characteristics of the habitat in Garfield County and to acknowledge the latest research and technological advances in energy development.

C. The U.S. Fish and Wildlife Service (the Service) listed the sage-grouse as a Candidate species (warranted but precluded) for Endangered status in 2010, with a pending decision for a final determination anticipated in September, 2015.

D. Garfield County has entered into a Memorandum of Understanding (MOU) with the Bureau of Land Management (BLM) as well as participated as a Cooperating Agency in the review of the Northwest Colorado Sage-grouse Fnvironmental Impact Analysis (EIS).

E. In addition to participating as a Cooperating Agency, on June 18, 2012 Garfield County adopted Resolution 2012-51, "Asserting Coordination Regarding the Sage-grouse with all Federal and State Agencies Maintaining Jurisdiction Over Lands and/or Resources Located within Garfield County, Colorado." As a result, the County has requested the BLM, through this Coordination process, to reconcile their planning efforts such as the Alternatives proposed in the BLM EIS with local planning efforts in Garfield County.

F. At the direction of the U.S. Department of Interior, a National Technical Team (NTT) was assembled which produced a set of conservation strategies, known as the NTT Report in December, 2011. While the NTT Report used the Wyoming region as the basis for the national habitat range characteristics and subsequent land use management recommendations, it does not address the unique landscape qualities, habitat characteristics or land uses found in western Garfield County.

G. As a result of an attempt to reproduce the Preliminary Priority Habitat mapping and the methodologies employed by CPW and adopted by the BLM, Garfield County was unable to reproduce that mapping due to the coarseness of the data. Because of this, much of the habitat mapping used to delineate populations and habitat had serious validity issues and inaccurately classified large areas of unsuitable habitat as potential grouse habitat. As a result, Garfield County commissioned a highly accurate mapping exercise of potential sage-grouse habitat in Garfield County using a much more sophisticated and robust model that ultimately revealed that suitable and effective habitat in the County exists in a significantly different pattern, which is considerably different to the habitat supported by and cited by the NTT Report.

H. The BLM has a statutory duty to manage lands under their direct or indirect jurisdiction for multiple uses of resources, and not for a single purpose. The implementation of the NTT recommendations across large areas of Garfield County through an amendment to the applicable Resource Management Plans would burden large areas of private lands that are not suitable sage-grouse habitats with severe land use restrictions.

I. Garfield County remains concerned that if NTT recommendations are adopted across all currently proposed Preliminary Priority Habitat, Preliminary General Habitat, and Linkage Areas as mapped by CPW without regard to local conditions and using accurate data,

then large swaths of non-habitat on public and private lands in the County would be encumbered and burdened with unnecessary regulations that would 1) significantly hurt local economies and 2) would misallocate resources which would not help recover the species.

J. As stated by CPW and the BLM through the Coordination process, the habitat maps for the Sage-grouse using CPW data is very inaccurate as it was gathered at very coarse resolution for broad-scale planning efforts, and no verification studies of habitats have been conducted for these mapped areas. As a result, much of the habitat described as Preliminary Primary Habitat and Preliminary General Habitat includes conifer forests, aspen stands, oakbrush, grasslands, steep slopes, cliffs and rocky outcrops, and contiguous areas of mixed mountain shrublands, all of which are not suitable for the sage-grouse.

K. The Service's Candidate notice identifies oil and gas development as a key impact leading to the reduction of sage-grouse habitat, while this impact is estimated to directly impact less than 1% of habitats, and indirectly impact 8% of habitats. This is a significantly smaller impact than other, larger impacts to habitats, but is consistently cited as a major impact. Further, the determinations regarding oil and gas impacts has been made relying on studies prepared from data collected in high density natural gas fields established in the 1980's – 1990's in the Pinedale and Powder River Basin areas in Wyoming. Such intensive pad density is no longer utilized by the industry in Wyoming or in Garfield County due to advances in technology and a shift in the BLM's fluid minerals policies, which are significantly reducing the industry's impact on the land and further minimizing impacts to the species.

L. Garfield County's primary source of revenue that supports the operations and welfare of the County and its citizens comes directly and indirectly from the oil and gas industry. Garfield County's ability to protect the health, safety and welfare of its citizens, as well as ensure continued protection for all wildlife and their habitats, and the productive use of lands depends on the continuation of balanced development by the oil and gas industry, agriculture and recreation interests.

M. The Board of County Commissioners held a public hearing on the 18th day of March, 2013 for consideration of whether the Plan should be approved, during which hearing the public and interested persons were given the opportunity to express their opinions regarding the request.

N. The Board of County Commissioners closed the public hearing on the 25th day of March, 2013 to make a final decision.

O. Based on substantial competent evidence produced at the aforementioned hearing, the Board of County Commissioners has made the following determinations:

1. That proper public notice was provided as required for the hearing before the Board of County Commissioners.

2. The hearing before the Board of County Commissioners was extensive and complete, all pertinent facts, matters and issues were submitted and all interested parties were heard at that meeting.

3. For the above stated and other reasons the Plan is in the best interest of the health, safety, and welfare of the citizens of Garfield County.

4. That the Plan is in general conformance with the 2030 Comprehensive Plan, as amended.

5. Garfield County has the explicit authority to "plan for and regulate the use of land by regulating the use of land on the basis of the impact thereof on the community or surrounding areas . . . (and) planning for and regulating the use of land so as to provide planned and orderly use of land and protection of the environment in a manner consistent with constitutional rights." (C.R.S. § 29-20-104(1)(g) and (h)).

6. The Board of County Commissioners, pursuant to 43 U.S.C. § 1712, has formally enacted Coordination (via Resolution 2012-57) with all state and federal agencies acknowledging that federal law requires the BLM to (1) make its plans consistent with this Plan and related policies; (2) include this plan as an alternative pursuant to 43 U.S.C. § 4332(e); and, (3) in the event it cannot reach consistency, state why it cannot resolve the conflicts with Garfield County. Resolution 2012-57 also acknowledges that federal law requires the Service to take into account all local efforts to conserve species prior to making a listing determination and to coordinate with the County when determining critical habitat. The resolution also acknowledges the County's primary planning authority for lands and wildlife within its boundaries, which it exercises in part by coordinating with all other state agencies to ensure the policies set forth in this plan are consistently and uniformly applied.

Reception#: 832867
03/20/2013 10:21:59 AM Jean Alberico
5 of 56 Rec Fee:$0.00 Doc Fee:0.00 GARFIELD COUNTY CO

RESOLUTION

NOW THEREFORE, BE IT RESOLVED by the Board of County Commissioners of Garfield County, Colorado, that:

A. The forgoing Recitals are incorporated by this reference as part of this resolution.

B. Garfield County adopts the Plan (attached as Exhibit A) as a refinement of the existing Parachute-Piceance-Roan Plan. The Plan serves as an update to the PPR Plan with policies specific to the County based on the most current best available science and the unique landscape found in the County as depicted in the sage-grouse Habitat Map incorporated therein.

C. Garfield County recognizes the statutory obligation of the Bureau of Land Management to make its planning, inventory and management activities consistent with the policies of Garfield County and will continue to work to resolve the conflicts with the agency.

Dated this 19th day of March, A.D. 2013.

ATTEST:

GARFIELD COUNTY SEAL COLORADO

GARFIELD COUNTY BOARD OF COMMISSIONERS, GARFIELD COUNTY, COLORADO

Jean M Alberico
Clerk of the Board

Chairman

Upon motion duly made and seconded the foregoing Resolution was adopted by the following vote:

COMMISSIONER CHAIR JOHN F. MARTIN	Aye / Nay
COMMISSIONER MIKE SAMSON	Aye / Nay
COMMISSIONER TOM JANKOVSKY	Aye / Nay

Appendix D- Updated Plan Resolution

Reception#: 856166
11/18/2014 04:19:42 PM Jean Alberico
1 of 106 Rec Fee:$0.00 Doc Fee:0.00 GARFIELD COUNTY CO

STATE OF COLORADO)
)ss
County of Garfield)

At a regular meeting of the Board of County Commissioners for Garfield County, Colorado, held in the Commissioners' Meeting Room, Garfield County Administration Building in Glenwood Springs on Monday, the 17th day of November A.D. 2014, there were present:

John Martin, Commissioner Chairman
Mike Samson, Commissioner
Tom Jankovsky, Commissioner
Andrew Gorgey, County Manager
Frank Hutfless, County Attorney
Jean Alberico, Clerk of the Board

when the following proceedings, among others were had and done, to-wit:

RESOLUTION NO. 2014 - 67

A RESOLUTION APPROVING THE FIRST AMENDMENT TO THE "GARFIELD COUNTY GREATER SAGE-GROUSE CONSERVATION PLAN"

Recitals

A. On Monday, March 18, 2013, the Garfield County Board of County Commissioners (the Board) adopted the ***Garfield County Greater Sage Grouse Conservation Plan*** (the Plan) via Resolution 2013-23 and has been implementing the principles, policies and best management practices of the Plan through land use decisions under its jurisdiction since that time.

B. Since the original adoption of the Plan in 2013, the Board recognized the need to update the habitat mapping methodology and commissioned a robust effort through the use of two model approaches to map and quantify at a finer and more accurate scale the extent of suitable Greater Sage Grouse habitat in Garfield County. Chapter 3 (Plan Area) and Chapter 4 (Habitat Mapping) have been updated based on the results of this new information. Specifically, the original Plan reflected initial habitat mapping efforts based on less sophisticated modeling techniques using characteristics more typical of national range habitats; the March 2013 Plan indicated 15,525 acres of suitable habitat within the PPR Study Area. Subsequently, more contemporary data were obtained and reviewed specific to the

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Parachute – Piceance – Roan (PPR) Study Area allowing further development of more sophisticated and statistically robust modeling methods ultimately resulting in approximately 72,896 acres of Suitable Habitat within the PPR Study Area. This effort resulted in an independent and objective peer reviewed manuscript entitled ***The Use of Modeling in a Geographic Information System to Predict Greater Sage Grouse Habitat***, now contained in full in Appendix B of the Plan.

C. The principles and policies contained within the Plan shall be used to address functional surface disturbance within Suitable Habitats in the Plan Area as depicted on a new map known as **Figure 5: Greater Sage-Grouse Management Plan Areas (MPAs).** These MPAs were developed by combining the Suitable Habitat areas resulting from both habitat models described in manuscript entitled ***The Use of Modeling in a Geographic Information System to Predict Greater Sage Grouse Habitat***. In total, the MPAs encompass 93,895 acres (or 43%) of the Plan Area. More specifically, 74,819 acres (80%) are managed under the Private Lands Management Area Plan while the remaining 19,076 acres (20%) are managed under the Public Lands Management Area Plan.

D. Additionally, Chapter 7, Section 5 (Predation) has been updated to reflect information with literature citations that better highlights the serious nature of the threat of predation on the Greater Sage Grouse which has also resulted in a new policy (Policy B) in that section stated here:

> *Encourage public agencies such as Colorado Parks and Wildlife, the Bureau of Land Management, and the US Fish and Wildlife Service to work with private land owners in areas of known Suitable Habitat to better understand the actual predation threat and then collaborate on the implementation of predator mitigation programs that discourage predators, reduce productivity and recruitment of predators, and reduce predator density.*

E. The Board of County Commissioners held a public hearing on the 17th day of November, 2014 for consideration of whether this first amendment to the Plan should be approved, during which hearing the public and interested persons were given the opportunity to express their opinions regarding the request.

F. The Board of County Commissioners closed the public hearing on the 17th day of November, 2014 to make a final decision.

G. Based on substantial competent evidence produced at the aforementioned hearing, the Board of County Commissioners has made the following determinations:

Reception#: 856166
11/18/2014 04:19:42 PM Jean Alberico
3 of 100 Rec Fee:$0.00 Doc Fee:0.00 GARFIELD COUNTY CO

1. That proper public notice was provided as required for the hearing before the Board of County Commissioners.

2. The hearing before the Board of County Commissioners was extensive and complete, all pertinent facts, matters and issues were submitted and all interested parties were heard at that meeting.

3. For the above stated and other reasons the first amendment to the Plan is in the best interest of the health, safety, and welfare of the citizens of Garfield County.

4. That the first amendment to the Plan is in general conformance with the 2030 Comprehensive Plan, as amended.

RESOLUTION

NOW THEREFORE, BE IT RESOLVED by the Board of County Commissioners of Garfield County, Colorado, that:

A. The forgoing Recitals are incorporated by this reference as part of this resolution.

B. Garfield County adopts the First Amendment to the Plan (attached as **Exhibit A**).

Dated this 17th day of November, A.D. 20 14.

ATTEST:

GARFIELD COUNTY SEAL COLORADO

GARFIELD COUNTY BOARD OF COMMISSIONERS, GARFIELD COUNTY, COLORADO

Clerk of the Board

Chairman

Upon motion duly made and seconded the foregoing Resolution was adopted by the following vote:

COMMISSIONER CHAIR JOHN F. MARTIN Aye / Nay
COMMISSIONER MIKE SAMSON Aye / Nay
COMMISSIONER TOM JANKOVSKY Aye / Nay

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Garfield County

December 1, 2014

Ruth Welch
Colorado State Director
Bureau of Land Management
2850 Youngfield Street
Lakewood, Colorado 80215-7093

Joe Meyers
Northwest District Manager
Bureau of Land Management
2815 H Road
Grand Junction, CO 81506

RE: First Amendment to the Garfield County Greater Sage-Grouse Conservation Plan

Dear Director Welch and District Manager Meyers,

Under cover of this letter, Garfield County Board of County Commissioners (the Board) is pleased to provide you with a copy of the First Amendment to the Garfield County Greater-Sage Grouse Conservation Plan (the Plan) adopted by the Board on Monday, November 17, 2014.

The purpose of the Plan is to "provide private and public land owners with land management principles, policies, and best management practices based on the best available science that are tailored to fit Garfield County's unique landscape and habitat characteristics for the betterment of the species." As such, this Plan continues to guide all projects, plans, policies, conservation measures and best management practices for the Greater Sage-Grouse (sage-grouse) in Garfield County.

There are three primary amendments to the Plan in this First Amendment that include the following:

1) The Plan now incorporates the results of the recently completed and scientifically peer reviewed Manuscript (the Manuscript) entitled, "***Use of Modelling in a Geographic***

Information System to Predict Greater Sage-Grouse Habitat" completed by Zach Purdue and Eric Petterson, November 4, 2014. The abstract to the Manuscript is stated here for convenience:

ABSTRACT *In Colorado (and across many western States) the Bureau of Land Management (BLM) is in the process of producing a greater sage-grouse (Centrocercus urophasianus [sage-grouse]) Resource Management Plan Amendment/ Environmental Impact Statement (RMPA/EIS) for the BLM's Northwest Colorado District, to assess impacts of potentially implementing sage-grouse habitat management conservation strategies (BLM 2013). If approved, the RMPA/EIS would amend current BLM Resource Management Plans and U.S. Forest Service Land and Resource Management Plans that would guide the management of greater sage-grouse habitat on public lands administered by the BLM and the U.S. Forest Service and on private lands with a federal nexus to the BLM planning process (e.g., projects extracting federal minerals or accessing federal lands across private lands).*

A key component of implementing sage-grouse conservation strategies is accurately predicting where sage-grouse habitat occurs; however, the current sage-grouse Preliminary Priority Habitat and Preliminary General Habitat used in the RMPA/EIS was in large part based on habitat modeling conducted at large scales (Doherty et al. 2010, Rice et al. 2013), which makes land use planning, accurate impact assessments and project implementation at the project level difficult due to the inherent inaccuracies of large scale habitat maps. We employed two different methods to map and quantify at a finer and more accurate scale the extent of suitable sage-grouse habitat found in Garfield County, Colorado. We started by mapping vegetation at a 2 m cell resolution in order to capture nuances in sage-grouse habitats given sage-grouse preference of habitat at smaller scales (Connelly et al. 2000, Hagen et al. 2007), and then employed: (1) a weighted overlay as a habitat suitability index (HSI) using a resource selection function (RSF) and (2) fuzzy modeling at 10 m cell resolution. We validated this technique against tracked (i.e., radio-collar and Global Positioning System [GPS]) sage-grouse as well as data from previous pedestrian surveys documenting where evidence of sage-grouse occupancy had occurred.

(Note, the Manuscript, in its entirety, is located in Appendix B, but is also incorporated where appropriate into revised Chapters 2: Plan Area, Chapter 3: Habitat Mapping, Modeling and Methodology, and Chapter 4: Plan Implementation. Ultimately, both model results indicated there are approximately 72,847 to 73,390 acres of suitable habitat in the Plan Area.)

2) The Plan includes updated information regarding the threat of predation resulting in adding an additional policy, Policy B which is restated here for convenience:

Encourage public agencies such as CPW, the BLM, and the USFWS to work with private land owners in areas of known Suitable Habitat to better understand the actual predation threat, then collaborate on the implementation of predator mitigation programs that discourage predators, reduce productivity and recruitment of predators, and reduce predator density.

(This updated information can be found in Section 5, Chapter 6: Policies.)

3) Chapter 4: Plan Implementation has been updated to include a new map identified as ***Figure 5: Greater Sage Grouse Management Plan Areas*** (MPAs). The purpose of this new map is to identify suitable habitat to be used for land use management purposes which was created from the combined results of the Weighted Overlay model using a Resource Selection Function and the Fuzzy model performed in the Manuscript. This map represents that there are approximately 74,819 acres of suitable habitat on private lands and approximately 19,076 acres of suitable habitat on public lands within the study area.

The Board placed considerable time and resources in developing this Plan and its subsequent First Amendment to ensure that the policies and suitable habitat mapping therein are based on the best available science and are relevant to Garfield County's unique topography. Importantly, this First Amendment continues to follow the Plan's adaptive management principles as it now incorporates the recently completed habitat modeling in the Manuscript which represents unsurpassed best available science to date for suitable habitat in Garfield County.

Having this detailed knowledge about the habitat allowed us to design specific and meaningful policies that will benefit our unique peripheral population of sage-grouse. More than that, a fundamental approach inherent in our Plan addresses the 'cause and effect' mechanisms that underlie each threat to sage-grouse, rather than relying on one-size-fits-all set of regulations and blanket setback distances that are proposed in the BLM's EIS as well as contained in other documents such as the National Technical Team (NTT) report and the Conservation Objectives Team (COT) report. By this letter, we continue to respectfully request that the BLM incorporate this Plan, as amended as you move forward in preparing the Northwest Colorado Greater Sage-Grouse Environmental Impact Statement (EIS) to a Record of Decision.

More specifically, we also continue to request that this Plan, as amended be included as the preferred alternative for the Garfield County portion of the BLM's EIS because the policies and suitable habitat within the Plan are best suited to manage the habitat and the species in Garfield County. As has been discussed before, we understand that your obligation under the National Environmental Policy Act (NEPA) is to resolve conflicts between your plans and our local policies and plans, and if you are unable to do so then our position must be included in the analysis in the form of an alternative so that the public and decision makers can properly analyze and comment on ***all*** the reasonable alternatives.

Please do not hesitate to contact us in the event you have questions about the Plan and its implementation in Garfield County.

Very truly yours,

John Martin, Chairman
Garfield County Board of County Commissioners

Cc	*Board of County Commissioners* *Frank Hutfless, Garfield County Attorney* *Andrew Gorgey, Garfield County Manager* *Fred Jarman, Director, Community Development Department*
Attachment(s)	*First Amended Garfield County Greater Sage-Grouse Conservation Plan*

Garfield County

April 09, 2015

Ms. Ruth Welch
State Director, Bureau of Land Management
2850 Youngfield Street
Lakewood, Colorado 80215-7093

Re: Supplement to Garfield County Comments concerning the BLM's Northwest Colorado Greater Sage Grouse Draft Resource Management Plan and Draft Environmental Impact Statement to include the Data Quality Act Challenge Reports

Ms. Welch,

As you will recall, the Garfield County Board of County Commissioners (the Commissioners) participated extensively as a Cooperating Agency with the Bureau of Land Management (BLM) as it prepared the Northwest Colorado Greater Sage Grouse Draft Resource Management Plan Amendment and Draft Environmental Impact Statement (DEIS). Through that process, the Commissioners provided the BLM with a substantial set of comments not only as an internal reviewer but also submitted formal comments once the draft was released for public comment. Those formal comments were received and signed for by your office on December 6, 2013 via certified return receipt.

Since that time, the Commissioners have participated in three specific Data Quality Act (DQA) challenges completed by Western Energy Alliance. As you may be aware, one of the DQA challenges was specifically filed with your agency on March 18th, 2015 regarding challenges to the BLM's use of the National Technical Team Report (NTT Report) in crafting the alternatives in the DEIS. The other two challenges were filed with the US Fish and Wildlife Service and the US Geologic Service regarding the Final Conservation Objective Team Report and the Final Monograph Report, respectively. The Commissioners remain concerned over the BLM's reliance on the NTT Report as a central driving document in the crafting of the alternatives in the DEIS for the reasons previously stated in the County's original comments as well as the DQA challenge attached to this letter.

The purpose of this letter is to provide your agency with a copy of all three DQA challenges mentioned above as a formal supplement to our original comments filed with your agency. The data and arguments contained in all three DQA challenges serve to both underscore and the buttress the various points already made by Garfield County in our original comments. While the Commissioners

fully support all of the points presented in all three of the DQA challenges, we draw your attention to specific points below that are consistent with the County's original comments.

1) As an overall fundamental flaw, the BLM's EIS relied heavily on the NTT Report which contains a great deal of opinion not backed by scientific research and hyper-inflates purported threats such as oil and gas development beyond scientific validity. Moreover, the NTT Report lacks objectivity and exhibits bias as it contains recommendations based on policy desires rather than being supported by sound and reproducible science.

2) The DEIS endorsed the so-called "4-Mile Buffer" around a Sage Grouse lek provided in NTT Report, despite the fact that the buffer is unsupported by scientific evidence. As stated in the County's original comments, the scientific justification for requiring 4-mile buffers and surface disturbance caps (whether they are 1, 3, or 5%) is entirely based on the opinions of selected authors and the erroneous assumption that a local and temporary displacement of sage grouse from an area of development means that a population decline has occurred. However, none of the cited studies actually ever documented a population decline. (Please refer to ***Exhibit M*** in the County's original comments entitled "How the National Technical Team Report Changes the Way the BLM Operates" which is a compilation of internal BLM emails obtained through a Freedom of Information Act (FOIA) request that points out the internal BLM's own concern over lack of scientific data to support claims in the NTT report which is the very basis for the action alternatives in the DEIS.)

3) Similar to the arbitrary nature and unscientific application of the four mile buffer, the DEIS also uses and advocates for a disturbance cap concept; however, disturbance caps are scientifically unsupported, arbitrary, and based solely on opinion with no demonstrable data as to its purported effect on the species. Further, it is based on the inaccurate notion that temporary displacement of Sage Grouse in a developed area equates to population decline. As stated in earlier county comments, the DEIS attempts to assert its management authority on private lands through the Disturbance Cap Management program; this directly impacts activities on 1/4 of privately held lands in Garfield County without the legal authority to do so. If the BLM believes it has the legal authority to implement this program, it should disclose its legal arguments in the DEIS.

4) Both the DEIS and the NTT Report fail to recognize local conservation efforts such as the Garfield County Greater Sage Grouse Conservation plan which includes a very refined habitat map that addresses "local ecological site variability" for the areas in Garfield County and NW Colorado that was required by the BLM Director to its field offices in the Instructional Memorandum 2012-044. Garfield County provided this Plan that specifically addressed local ecological site variability which was summarily ignored by the BLM. Because of the one-size-fits-all approach, the flawed and overly broad management provisions in the NTT Report apply to areas well beyond habitat with no ecological value and very real economic harm.

   More specifically, The PPH / PGH habitat maps contained in the DEIS map large areas of non-habitat in Garfield County despite cited literature and specific text in the DEIS that directly contradict the mapping. This results in over mapping approximately 160,000 acres of non-habitat

as "habitat." Recent mapping completed by Dr. Brett Walker of Colorado Parks and Wildlife appear to be very consistent with Garfield County's mapping which revealed large areas of non-habitat that are currently in the PPH / PGH maps.

5) Through the development of the BLM's DEIS, Garfield County and others continuously reiterated that the BLM and the NTT Report failed to acknowledge and recognize the existing science that supported the significant impact of predation on Greater Sage Grouse survivability as a leading threat. The DQA Challenge provides that science so that the BLM can better understand and reassess threats to the species. This issue is echoed in the DQA Challenge to the COT Report as well and attached to this letter for your review.

We look forward to be able to meaningfully coordinate with the BLM to resolve inconsistencies in the DEIS with Garfield County's local land use policies.

Very truly yours,

Tom Jankovsky, Commissioner

On behalf of the Garfield County Board of County Commissioners

cc: The Honorable John Hickenlooper, Governor, State of Colorado
The Honorable Cory Gardner, U.S. Senate
The Honorable Michael Bennet, U.S. Senate
The Honorable Scott Tipton, U.S. House of Representatives
The Honorable Bob Rankin, State House of Representatives
Neil Kornze, Director, Bureau of Land Management
Ruth Welch, State Director, BLM, Colorado
Mike King, Executive Director, Colorado Department of Natural Resources
Robert Broscheid, Director, Colorado Parks & Wildlife

USE OF MODELLING IN A GEOGRAPHIC INFORMATION SYSTEM TO PREDICT GREATER SAGE-GROUSE HABITAT

ZACH D. PERDUE[1], *Owner & Spatial Analyst, elev8, Inc. PO Box 635, Avon, Colorado 81602, USA*

ERIC S. PETTERSON[2], *Senior Biologist & Technical Leader, Olsson Associates, 760 Horizon Drive, Suite 102, Grand Junction, Colorado 81506, USA*

ABSTRACT In Colorado (and across many western States) the Bureau of Land Management (BLM) is in the process of producing a greater sage-grouse (*Centrocercus urophasianus* [sage-grouse]) Resource Management Plan Amendment and Environmental Impact Statement (RMPA and EIS) for the BLM's Northwest Colorado District, to assess impacts of potentially implementing sage-grouse habitat management conservation strategies (BLM 2013). If approved, the RMPA and EIS would amend current BLM Resource Management Plans and U.S. Forest Service Land and Resource Management Plans that would guide the management of greater sage-grouse habitat on public lands administered by the BLM and the U.S. Forest Service and on private lands with a federal nexus to the BLM planning process (e.g., projects extracting federal minerals or accessing federal lands across private lands). A key component of implementing sage-grouse conservation strategies is accurately predicting where sage-grouse habitat occurs; however, the current sage-grouse Preliminary Priority Habitat and Preliminary General Habitat used in the RMPA and EIS was in large part based on habitat modeling conducted at large scales (Doherty et al. 2010, Rice et al. 2013), which makes land use planning, accurate impact assessments and project implementation at the project level difficult due to the inherent inaccuracies of large scale habitat maps. We employed two different methods to map and quantify at a finer and more accurate scale the extent of suitable sage-grouse habitat found in Garfield County, Colorado. We started by mapping vegetation at a 2 m^2 cell resolution in order to capture nuances in sage-grouse habitats given sage-grouse preference of habitat at smaller scales (Connelly et al. 2000, Hagen et al. 2007), and then employed: (1) a weighted overlay as a habitat suitability index (HSI) using a resource selection function (RSF) and (2) fuzzy modeling at 10 m^2 cell resolution. We validated this technique against sage-grouse signage data from pedestrian surveys documenting where evidence of sage-grouse occupancy had occurred and lek location data.

KEY WORDS *Centrocercus urophasianus*, greater sage-grouse, fuzzy model, resource selection model, habitat suitability index, Geographic Information System (GIS).

Within the Piceance, Parachute, Roan (PPR) area, there have been a number of studies investigating greater sage-grouse (*Centrocercus urophasianus* [sage-grouse]) and the uniqueness of the habitats in this area (Braun 1995, Hagen 1999, Apa 2006, Apa et al. 2007, Colorado Parks & Wildlife [CPW] 2008, Sauls et al. 2006-2008, WestWater Engineering [WWE] 2008, Walker et al.

[1] *Email: zperdue@elev8-inc.com*
[2] *Email: epetterson@olssonassociates.com*

2010[3], and Apa et al. 2010[4]). The PPR area habitats are known for the steepness of habitats, the variety in vegetation conditions, and the limited spatial extent of "typical" sage-grouse habitats. Additionally, the number of studies in the PPR is also due to a combination of the significant mineral resources in this area; primarily natural gas and oil shale, but also the presence of sage-grouse and the atypical habitat found in this area. Instead of the large expanses of rolling sagebrush (*Artemisia tridentata*) steppe typically occupied by sage-grouse (Knick and Connelly 2011, Sage-grouse National Technical Team 2011), the PPR area has narrow ridgelines supporting sagebrush, which quickly grade into mixed mountain shrub habitats and other unsuitable habitat types on side slopes (Apa 2006). Of note, is that the rough topography and patches of non-habitat do not appear to pose a movement barrier to sage-grouse (Apa 2006, Apa et al. 2007, WWE 2008). Because of the mineral resources, energy company exploration and energy development is very common; much of the private lands within the PPR area are owned by energy companies. Energy companies have funded a number of CPW, consultant, and university studies in this area, and of these studies a number have been focused on mapping the unique habitats and discerning how sage-grouse utilize these atypical habitats (Hagen 1999, Sauls et al. 2006, 2008, WWE 2008, Apa et al. 2007, 2010 and Walker et al. 2010).

Of all the studies reviewed, they have all been relatively consistent with reporting how sage-grouse utilize habitats in the PPR area; sage-grouse are still strongly associated with sagebrush-dominated habitats, generally at the higher elevations, and favor sagebrush-dominated habitats at multiple spatial scales. In other words, sage-grouse favor larger areas of sagebrush dominated habitats, but can also be found in smaller patches of sagebrush. As these patches get smaller, or occur in landscapes more dominated by unsuitable habitats (e.g., mixed mountain shrublands), their use of sagebrush habitats can decline (Apa 2006, Apa et al. 2007, WWE 2008). Sage-grouse in the PPR area are unique in that their occupied habitats are much smaller in spatial extent and patch size when compared to other more "typical" sage-grouse habitats occupied by other populations (Connelly et al. 2000, et al. 2004). Sage-grouse also are found to utilize sagebrush habitats with a notable presence of other shrub species (e.g., snowberry [*Symphoricarpos oreophilus*], Utah serviceberry [*Amelanchier utahensis*]), but generally when these other shrub species occupy >25% of the shrub component, sage-grouse use of these areas appears to decline based on preliminary research (Sauls et al. 2006-2008, Apa et al. 2007, WWE 2008).

We have found that there have been multiple efforts to map suitable sage-grouse habitats in the area, and all are fairly accurate and relevant (given the acknowledged limitations of the data and methods employed). Some of the more accurate habitat maps have likely been "hand draw" or delineated from aerial imagery and topography (e.g., Sauls et al. 2006-2008, WWE 2008), but this technique is difficult or impossible to repeat, and is highly dependent upon the knowledge and biases of the authors conducting the habitat delineations. Nevertheless, these products appear to be very accurate when compared to on-the-ground conditions.

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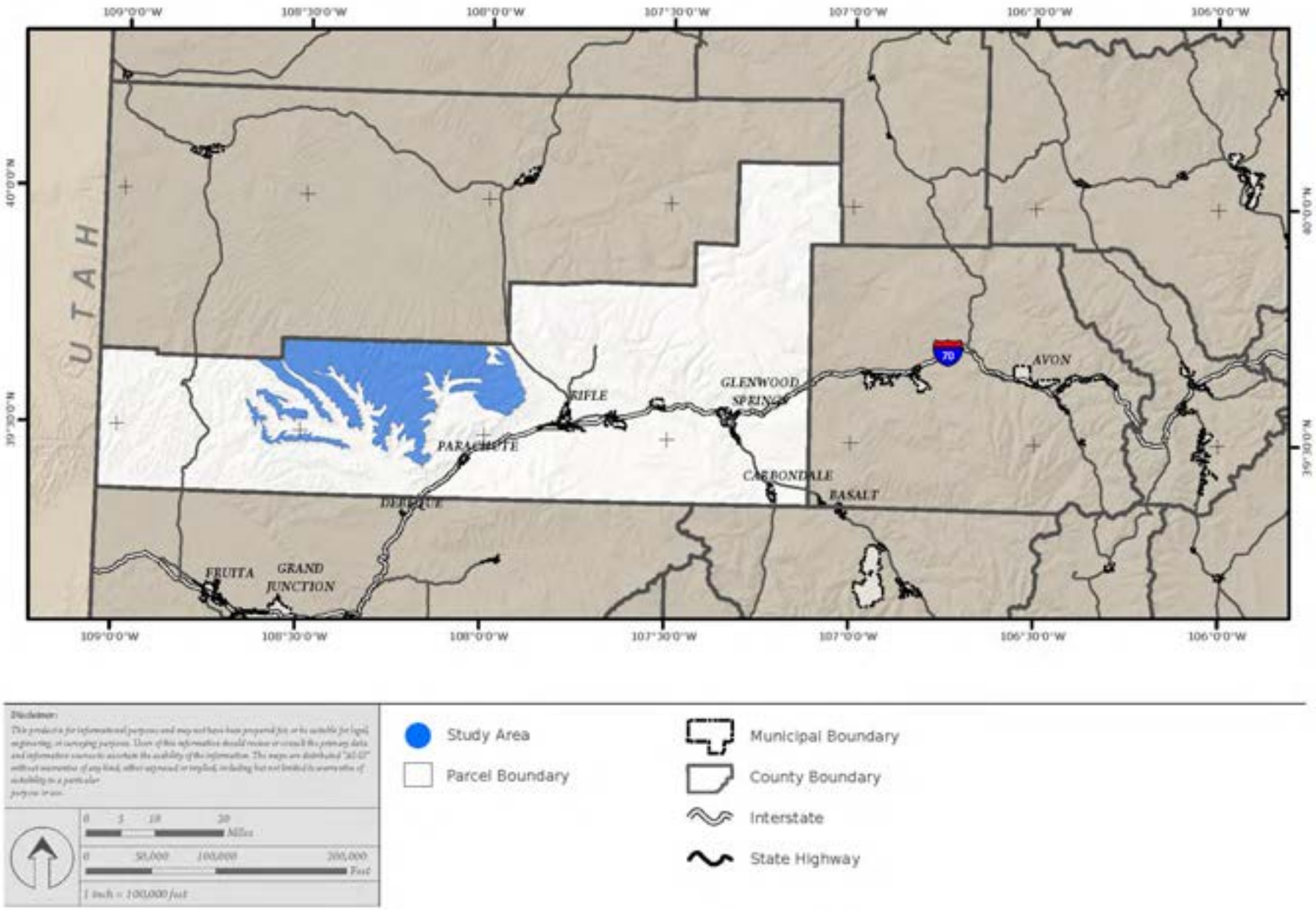
[3] The information in Walker et al. 2010 is considered preliminary and subject to further evaluation, therefore our research does not utilize or rely on this information, and our citation of this work is for general information regarding CPW's in-process investigations.

[4] The information in Apa et al. 2010 is considered preliminary and subject to further evaluation, therefore our research does not utilize or rely on this information, and our citation of this work is for general information regarding CPW's in-process investigations.

Rice et al. (2013) published their sage-grouse habitat mapping technique which was used to develop Preliminary Priority Habitat and Preliminary General Habitat (PPH and PGH) habitat maps in Colorado, including the PPR area. When compared to previous habitat mapping efforts produced by the BLM, private consultants, and interim work by CPW (Sauls et al. 2006-2008, WWE 2008, Walker et al. 2010), the PPH and PGH mapping appeared to over-predict habitat. Despite available vegetation datasets, their model was not able to discern between the sagebrush and sagebrush-mixed mountain shrubland habitats known to be used by sage-grouse, and the non-habitat areas of steeper draws, canyons, aspen (*Populus tremuloides*) stands, contiguous mixed mountain shrubland or Douglas-fir (*Pseudotsuga menziesii*) stands in the PPR area.

Because of the large change in previous characterizations of sage-grouse habitat in Garfield County to what is now shown in PPH and PGH maps, we attempted a new, repeatable habitat modelling technique in a Geographic Information System (GIS) to accurately locate and quantify the availability of suitable greater sage-grouse habitat in the PPR area within Garfield County (PPR Study Area), independent of maps already produced by the BLM, CPW, or other interested parties (including energy companies, which have performed a number of sage-grouse habitat mapping efforts). Yet we still incorporated the data that documented existing sage-grouse research, information, data and peer-reviewed and accepted habitat parameters for sage-grouse in development of our suitable habitat model. Predictive models that locate and quantify the availability of suitable habitats for a given species are predominately based on quantifying the relationships between species selection and surrounding environmental factors. This paper discusses the two different methods used to map and quantify the extent of suitable sage-grouse habitat found in the PPR area: (1) weighted overlay as a habitat suitability index (HSI) using a resource selection function (RSF) and (2) fuzzy modeling.

Figure 1: The PPR Study Area in Colorado.



In recent years, the approaches to modelling species habitat availability have advanced significantly, providing a number of statistically rigorous methods for predicting and evaluating species distribution (Rushton et al. 2004, Guisan and Thuiller 2005). Our approach to mapping and quantifying the extent of suitable sage-grouse habitat within the PPR Study Area utilized two distinctly different methods of modeling within a geospatial environment; (1) weighted overlay modeling using an RSF and (2) fuzzy modeling. The weighted overlay approach using an RSF was selected for three reasons. First, weighted overlay models, commonly known as Habitat Suitability Indexes (HSI), are widely accepted and employed by State and Federal wildlife agencies to model species distribution for resource management, planning and population viability analyses, including the U.S. Fish and Wildlife Service (USFWS) Habitat Evaluation Program (HEP) (USFWS 1980, 1981). Secondly, weighted overlay models have previously been employed, and are currently being employed in other ongoing research projects to study sage-grouse habitat availability, which provides results from our efforts as a means for direct comparison to other RSF and HSI models in Colorado (Sauls et al. 2008, Walker et al. 2010, Rice et al. 2013). Third, using an RSF allows species distribution to be modeled using known selection preferences from statistical inference of field-collected data, thereby predicting suitable habitat patches based on known behavior of the local population. By contrast, the application of fuzzy modeling to predict species distribution has been much more limited to date; however, at least one study has occurred whereby fuzzy logic was employed to map suitable sage-grouse and mule deer habitats in northwest Colorado (Hibbs 2011). This method is gaining acceptance and increased utilization based on the ability of the model to consider vagueness and imprecisions inherent in the attributes of spatial data; a limitation of other model methods. Fuzzy logic is intuitive and constructed using natural language, allowing the reasoning behind a fuzzy system to be simple and easily understood by a wide variety of audiences (Mathworks 2014a). For this reason, we also selected the fuzzy model approach to predict species habitat distribution within the PPR Study Area.

Weighted Overlay and Resource Selection Function

Weighted overlay models function by applying logical mathematical arithmetic to multiple criteria, allowing for diverse and dissimilar criteria to be inputs to an integrated analysis (Mathworks 2014a). In the instance of an HSI, the model scales, weights and integrates diverse spatial data to measure the habitat suitability of a given location on a common, relative scale. Furthermore, an HSI can employ two methods in developing the criteria as inputs to the model framework; inductive (i.e., empirical, inferred from existing data) or deductive (i.e., non-empirical, developed from expert opinion). We pursued an inductive approach to our habitat modeling for two reasons: (1) we had access to spatially-explicit field-collected data of sage-grouse sign and occupancy, and (2) deductive approaches have the possibility of introducing bias from expert-opinion.

An RSF model is a form of an HSI with statistical rigor (Boyce et al. 2002); it is a mathematical function that predicts resource or habitat use proportional to probability of use (Manley et al. 2002). While other models are developed based on expert opinion, RSF models are estimated directly from empirical data (Boyce et al. 2002). Empirical models analyze a species' habitat selection by relating known occurrences of the species (presence) with data quantifying

background environmental variables. An RSF model predicts species distribution based on the theory of habitat selection; where habitat use exceeds availability, habitat selection is inferred; and where habitat use is less than availability, habitat avoidance is inferred (Johnson and Gillingham 2005).

An RSF is generally developed from observations of either presence vs. absence or presence vs. available resource units. Both methods employ a logistic regression model utilizing a binary response (observation) that either implies presence (y=1) or absence or random location (y=0). For each observation, a set of measured habitat criteria exist, χ. For the probability of occurrence [$P(y=1|\chi)$], the dependent variable can be estimated with the following equation:

$$P(y=1|\chi)=\left(\frac{\exp(\beta_0+\beta_1\chi_1+...+\beta_p\chi_p)}{1+\exp(\beta_0+\beta_1\chi_1+...+\beta_p\chi_p)}\right)$$

where $(\beta_0...\beta_p)$ are maximum likelihood estimates of logistic regression coefficients and $(\chi_1...\chi_p)$ represent values for environmental criteria as a set of independent variables (Pearce and Boyce 2006). The equation returns values on a continuous scale of zero to one, with higher values indicating a higher level of habitat suitability.

Fuzzy Modeling

Behavioral and environmental phenomena are inherently complex, demonstrating vagueness and uncertainty that are difficult to express with crisp class boundaries. Most phenomena do not have clearly defined boundaries and are better expressed linguistically with degrees of membership to a set, rather than forcing a rigid classification to a single class (Kainz 2008). Fuzzy systems are a method that handles vagueness and uncertainty in spatial data. Fuzzy logic recognizes that most objects cannot be defined as belonging to one specific category or another (Zadeh 1965). When applied to habitat models, species presence does not imply absolute favorability or absolute un-favorability, but rather a degree of favorability.

Fuzzy inference is the process of mapping linguistic terms to an output using a fuzzy logic system. Generally speaking, fuzzy inference involves three steps: (1) identifying input terms and constructing linguistic if-then rules, (2) defining fuzzy sets and assigning fuzzy membership and (3) performing fuzzy overlay with a fuzzy operator.

The objective of fuzzy inference is to use the set of if-then statements to map results to an output space. The if-then statements, also known as fuzzy rules, refer to explanatory variables and adjectives that describe them. Fuzzy rules are constructed with both an antecedent and a consequent; the “if” portion of a statement is the antecedent, while the “then” portion of the statement is the consequent (Mathworks 2014b). Prior to developing the set of fuzzy rules, all variables must first be identified including their descriptive adjectives.

A typical rule in a fuzzy system may take the following form:

If A_1 is X_1, And A_2 is X_2,… And A_n is X_n, Then B is Y.

where *X,…Xn* and *Y* are fuzzy sets defined by *A1… A_n* fuzzy membership functions. In natural language, the form may be expressed as: "If site is flat and site is near water, then site is optimal."

Once all fuzzy rules are established for the fuzzy system, fuzzy sets are developed based on the pre-defined rules. Fuzzy logic is based on classical set theory, whereby an element must be either fully part of a set or fully excluded from a set; such a set is known as a "crisp" set. Extending this theory, fuzzy logic is based on fuzzy sets that allow for various degrees of membership to a class rather than forcing a response whereby the element is either asserted or denied.

For example, when considering proximity to an existing object, the distance of a given location may be described as near or far. In a classical set, the elicited response is binary in nature; the distance of the location to the object is either near or far. However, in a fuzzy set, the same distance can be described as both near and far.

Elements are related to a fuzzy set by fuzzy membership functions. Fuzzy membership assigns a fuzzy score for an element to a class based on a sliding scale between zero and one, where zero implies no membership and one implies full membership. The membership functions transform explanatory data in terms of suitability to a continuous scale of 0 to 1 using a variety of functions and arithmetic operators. The transformation method utilized depends on how the data are distributed and contribute to suitability. While numerous fuzzy membership functions exist, three fuzzy membership functions were utilized in this analysis; fuzzy linear membership, fuzzy small membership and fuzzy large membership. These membership functions are demonstrated in Figures 2 through 4.

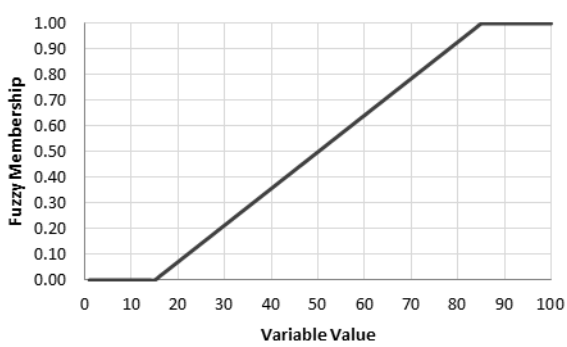
Figure 2: Fuzzy linear membership function

Fuzzy Linear Membership

Equation:

$$\mu(x) = 0 \text{ if } x < \min,$$
$$\mu(x) = 1 \text{ if } x > \max,$$
$$\mu(x) = \frac{(x - \min)}{(\max - \min)}$$

Description
A linear increasing or decreasing membership between user-specified minimum and maximum inputs.



Required Inputs
Min: *User-defined value to assign threshold for non-membership*
Max: *User-defined value to assign threshold for full membership*

Figure 3: Fuzzy small membership functions

Fuzzy Small Membership

Equation:

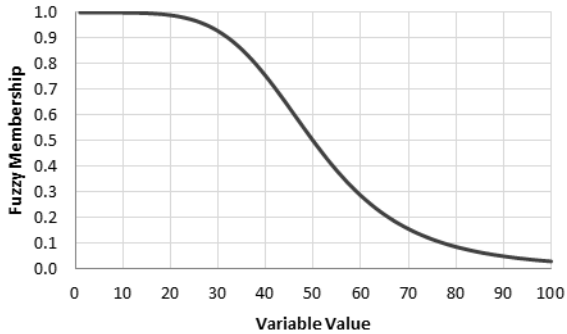
$$\mu(x) = \frac{1}{1 + \left(\frac{x}{f_2}\right)^{f_1}}$$

f_1 = spread

f_2 = midpoint

Description

Sigmoid curve function where shape is defined by a user-specified midpoint and spread. Lower variable values are assigned higher degrees of membership.



Required Inputs

Midpoint: *User-defined value to specify crossover point; assigned 0.5 membership value. Values lower than the midpoint have a higher degree of membership; values higher than the midpoint have a lower degree of membership.*

Spread: *User-defined value to prescribe the shape and character of the sigmoid curve.*

Figure 4: Fuzzy large membership function

Fuzzy Large Membership

Equation:

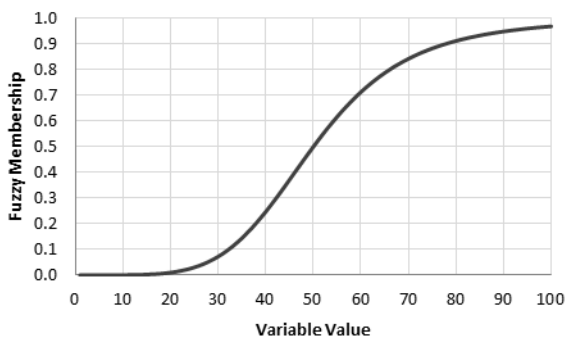
$$\mu(x) = \frac{1}{1 + \left(\frac{x}{f_2}\right)^{-f_1}}$$

f_1 = spread

f_2 = midpoint

Description

Sigmoid curve function where shape is defined by a user-specified midpoint and spread. Higher variable values are assigned higher degrees of membership.



Required Inputs

Midpoint: *User-defined value to specify crossover point; assigned 0.5 membership value. Values higher than the midpoint have a higher degree of membership; values lower than the midpoint have a lower degree of membership.*

Spread: *User-defined value to prescribe the shape and character of the sigmoid curve.*

When all explanatory data have been transformed to membership data, fuzzy overlay functions are used to combine the data to produce a single truth value that ranges in degree from 0 to 1. Once all inputs are fuzzified, the degree to which each part of the antecedent is satisfied for each rule is known (Mathworks 2014b). The overlay functions investigate the relationship between membership data and attempt to quantify the interaction between them, ultimately returning the degree of membership to the final set for all areas included in the analysis. The fuzzy overlay functions are listed and described in Figure 5. The fuzzy model returns a raster dataset with cell values ranging on a continuous scale from zero to one, with higher values indicating a higher degree of truth.

Figure 5: Fuzzy overlay functions

Overlay Function	Equation	Description
Fuzzy AND	$= Min(\chi_1, \chi_2, ...\chi_n)$	*Decreasing function. Fuzzy AND returns the minimum value of all sets at each cell location.*
Fuzzy OR	$= Max(\chi_1, \chi_2, ...\chi_n)$	*Increasing function. Fuzzy OR returns the maximum value of all sets at each cell location.*
Fuzzy PRODUCT	$= \chi_1 * \chi_2 ... \chi_n$	*Decreasing function. For each cell location, Fuzzy PRODUCT multiplies the fuzzy values of each set.*
Fuzzy SUM	$= 1 - ((1 - \chi_1) * (1 - \chi_2) ... (1 - \chi_n))$	*Increasing function. For each cell location, Fuzzy SUM adds the fuzzy values of each set.*
Fuzzy GAMMA	$= (1 - ((1 - \chi_1) * (1 - \chi_2) ... (1 - \chi_n)))^{\gamma} * (\chi_1 * \chi_2 ... \chi_n)^{1-\gamma}$	*Increasing/Decreasing function. Fuzzy GAMMA is the product of Fuzzy PRODUCT and Fuzzy SUM, both raised to the power of gamma.*

Study Area

The 894 km^2 project Study Area occurs on the Roan Plateau within Garfield County, at the southern end of the Piceance Basin in an area known as the PPR area (PPR Study Area, Figure 1). The spatial extent of the analysis area represents all areas within Garfield County currently indicated as PPH and PGH as mapped by CPW (Rice et al. 2013) and adopted by the BLM in their Resource Management Plan Amendment/ Environmental Impact Statement (RMPA and EIS) for the BLM's Northwest Colorado District. Our study area is limited to just Garfield County within the greater PPR area. Of the Study Area, 248-km^2 (28%) of surface lands are managed by the BLM, while the remaining 646-km^2 (72%) are private and State lands. Land use in the Study Area continues to be managed for summertime cattle ranching and energy development of primarily natural gas, with some limited oil shale resource exploration.

Vegetation is relatively heterogeneous, and was dependent upon slope, aspect, and elevation. Three subspecies of big sagebrush occupy the Study Area, and the location of these subspecies is dependent upon soil type. Basin big sagebrush (*Artemisia tridentata* subsp. *tridentata*) is the prevalent vegetation throughout the lower drainages at elevations of 1,800 m – 1,980 m (Cottrell and Bonham 1992). *A. t. wyomingensis* is restricted to upland ridges at elevations of 1,900 m – 1,980 m (Cottrell and Bonham 1992). *A. t. vaseyana* is confined to high mountain areas at elevations > 2,070 m. Pinyon pine (*Pinus edulis*) and juniper (*Sabina* [*Juniperus*] *osteosperma* and *S. scopulorum*) woodlands dominate the landscape until approximately 1,980 m. Big sagebrush, Utah serviceberry, oakbrush (*Quercus gambelii*), and antelope bitterbrush (*Purshia tridentata*) comprise most of the transitional ecotone vegetation type. Pinyon-juniper habitat types are relatively uncommon within the PPR Study Area in Garfield County, and were much more common to the north in Rio Blanco County where elevations are lower. Elevations of 2,380 m to 2,590 m are dominated by big sagebrush interspersed with grass and forb-dominated meadows. North aspects often host substantial groves of aspen, serviceberry, and mountain snowberry. Big sagebrush and Douglas-fir dominate south and northwest aspects at elevations > 2,500 m respectively. Free water can be scarce in dry years or late in the summer as most springs are in the bottom of steep canyons. There are scattered stock tanks and dugouts for watering cattle, which are usually associated with roadways.

METHODS

Biophysical Habitat Factors

Numerous variables were considered in our analysis that may influence sage-grouse habitat selection. The variables were broadly classified as either habitat characteristics or topographical factors. All variables describing habitat characteristics were derived from a digital vegetation map developed at a 2-m^2 cell resolution through supervised image classification of 1-m^2 color-infrared aerial photography collected in 2012 as part of the National Agricultural Imagery Program (NAIP) administered by the U.S. Department of Agriculture (USDA 2012). A detailed description of the image classification process is provided in Appendix A. Vegetation cover types derived from the image classification process are displayed in Figure 6. Topographic variables were derived from a 10-meter digital elevation model (DEM) acquired from the U.S. Geologic Survey (USGS), National Elevation Dataset. Topographic variables considered in this analysis include percent slope, topographic position index (TPI) and surface roughness, or curvature. Percent slope were derived directly from the 10-meter USGS DEM. TPI is a relative measure of a locations elevation, or slope position, as compared to surrounding elevations or positions. TPI was calculated using Jenness Enterprises DEM Surface Tools v. 2.1.375. Curvature, or surface roughness, was developed by computing the standard deviation of slope within a defined neighborhood.

Vegetation variables were developed as percent proportion of specified vegetation communities within a defined scale; likewise, all topographic variables were derived as mean values within a defined scale. All variables were analyzed and considered at three spatial scales, because while sage-grouse are known as a landscape level species, most of the contemporary research documenting sage-grouse use has been performed at the local scale. The scales of available habitats that influence sage-grouse selection and non-use are currently unknown; therefore, the contributing variables that may influence habitat selection are tested at multiple scales to determine which scales guide habitat selection. The selected scales employed in this analysis represent a local scale (e.g., 100 meters), an intermediate scale (e.g., 350 meters) and a landscape-level scale (e.g., 1 kilometer). While the distances are somewhat arbitrary (i.e., a distance of 300 or 400 meters would equally be considered an intermediate scale), they reflect distances used in other contemporary studies of sage-grouse habitat selection conducted both within the PPR Study Area and the defined national range. At each scale, statistics were generated using a moving circular window across the project Study Area, at distances of 100 m, 350 m and 1 km, respectively. A detailed summary of all variables considered in the scope of this analysis are presented in Table 1. Table 2 shows the summary of explanatory variables at 939 sites indicating sage-grouse presence in the defined analysis area.

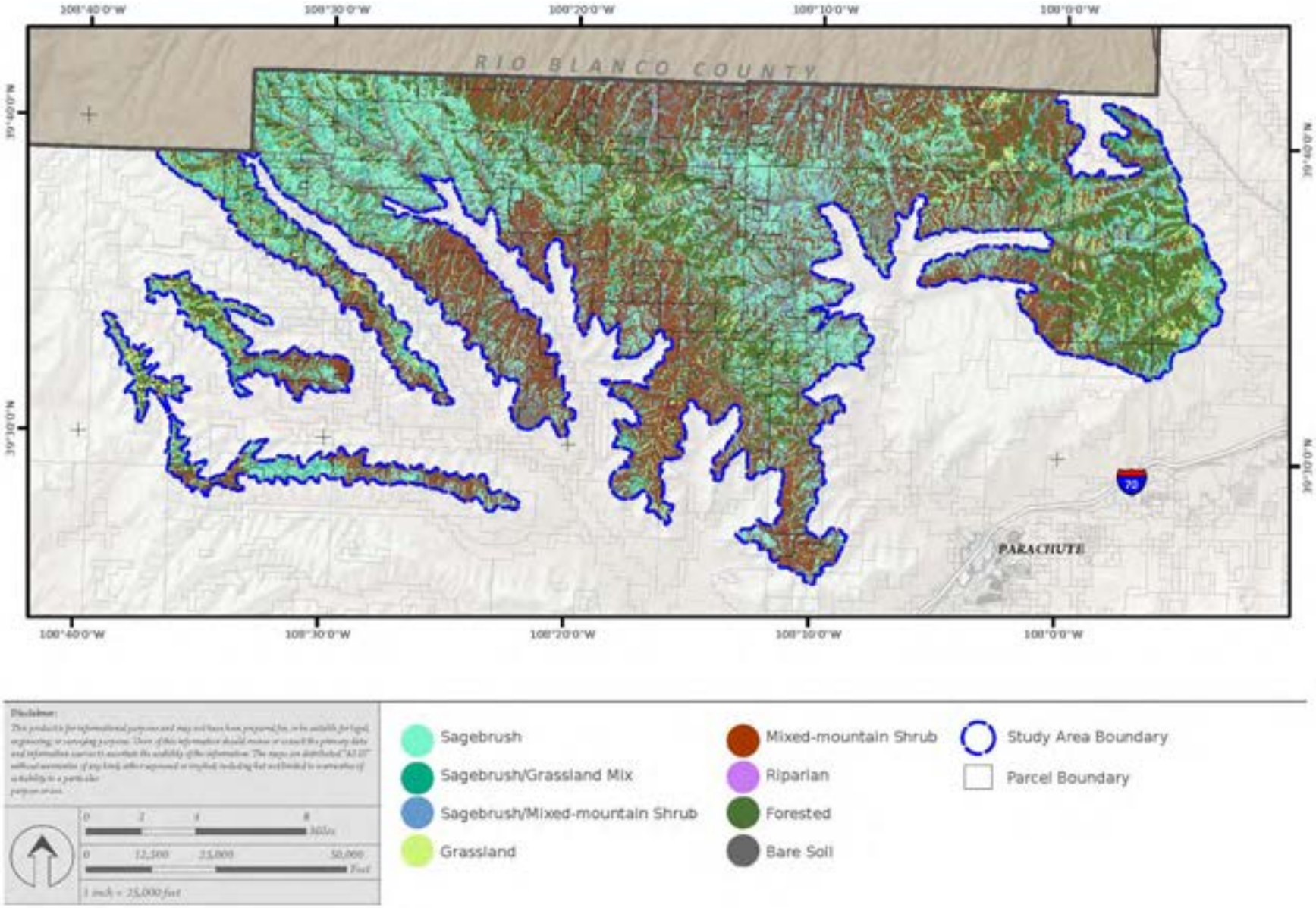
Table 1: Summary and Description of all Explanatory Variables. Summary and description of all explanatory variables used in assessing sage-grouse habitat suitability in the defined analysis area.

Variable	Name	Description
Vegetation		
sg100	Sage-dominated, 100-meters	*Percent proportion of all sage-dominated vegetation communities within a 100-meter radius.*
sg350	Sage-dominated, 350-meters	*Percent proportion of all sage-dominated vegetation communities within a 350-meter radius.*
sg1k	Sage-dominated, 1-kilometer	*Percent proportion of all sage-dominated vegetation communities within a 1-kilometer radius.*
sgmms100	Sage-dominated + mixed mountain shrubs, 100-meters	*Percent proportion of all sage-dominated and mixed mountain shrub vegetation communities within a 100-meter radius.*
sgmms350	Sage-dominated + mixed mountain shrubs, 350-meters	*Percent proportion of all sage-dominated and mixed mountain shrub vegetation communities within a 350-meter radius.*
sgmms1k	Sage-dominated + mixed mountain shrubs, 1-kilometer	*Percent proportion of all sage-dominated and mixed mountain shrub vegetation communities within a 1-kilometer radius.*
mms100	Mixed mountain shrubs, 100-meters	*Percent proportion of all mixed mountain shrub vegetation communities within a 100-meter radius.*
mms350	Mixed mountain shrubs, 350-meters	*Percent proportion of all mixed mountain shrub vegetation communities within a 350-meter radius.*
mms1k	Mixed mountain shrubs, 1-kilometer	*Percent proportion of all mixed mountain shrub vegetation communities within a 1-kilometer radius.*
sggr100	Sage-dominated + grasslands, 100-meters	*Percent proportion of all sage-dominated and grassland vegetation communities within a 100-meter radius.*
sggr350	Sage-dominated + grasslands, 350-meters	*Percent proportion of all sage-dominated and grassland vegetation communities within a 350-meter radius.*
sggr1k	Sage-dominated + grasslands, 1-kilometer	*Percent proportion of all sage-dominated and grassland vegetation communities within a 1-kilometer radius.*
gr100	Grasslands, 100-meters	*Percent proportion of all grassland vegetation communities within a 100-meter radius.*
gr350	Grasslands, 350-meters	*Percent proportion of all grassland vegetation communities within a 350-meter radius.*
gr1k	Grasslands, 1-kilometer	*Percent proportion of all grassland vegetation communities within a 1-kilometer radius.*
bare100	Barren surface, 100-meters	*Percent proportion of all bare surface within a 100-meter radius.*
bare350	Barren surface, 350-meters	*Percent proportion of all bare surface within a 350-meter radius.*
bare1k	Barren surface, 1-kilometer	*Percent proportion of all bare surface within a 1-kilometer radius.*
for100	Forested areas, 100-meters	*Percent proportion of all forested vegetation communities within a 100-meter radius.*
for350	Forested areas, 350-meters	*Percent proportion of all forested vegetation communities within a 350-meter radius.*
for1k	Forested areas, 1-kilometer	*Percent proportion of all forested vegetation communities within a 1-kilometer radius.*
for_dist	Distance to forest	*Distance to forested areas.*
Topographic		
slope100	Percent slope, 100-meters	*Mean percent slope within a 100-meter radius.*
slope350	Percent slope, 350-meters	*Mean percent slope within a 350-meter radius.*
slope1k	Percent slope, 1-kilometer	*Mean percent slope within a 1-kilometer radius.*
tpi100	Topographic position index, 100-meters	*Mean topographic position index within a 100-meter radius.*
tpi350	Topographic position index, 350-meters	*Mean topographic position index within a 350-meter radius.*
tpi1k	Topographic position index, 1-kilometer	*Mean topographic position index within a 1-kilometer radius.*
curve100	Curvature, 100-meters	*Mean curvature within a 100-meter radius.*
curve350	Curvature, 350-meters	*Mean curvature within a 350-meter radius.*
curve1k	Curvature, 1-kilometer	*Mean curvature within a 1-kilometer radius.*

Table 2: Summary of Explanatory Variable. Summary of explanatory variables at 939 sites indicating Greater Sage-grouse presence in the defined analysis area.

Variable	Mean ± Std. Dev.	Median	25% - 75% Quartiles	Min.	Max.
Vegetation					
sg100	0.7348 ± 0.2549	0.7981	0.5757 – 0.9606	0.0	1.0
sg350	0.6339 + 0.2278	0.6819	0.4792 – 0.8229	0.0183	0.9725
sg1k	0.5441 + 0.1935	0.5662	0.3852 – 0.712	0.0794	0.8579
sgmms100	0.8117 + 0.2206	0.8886	0.6963 – 0.9973	0.0	1.0
sgmms350	0.8046 + 0.1219	0.8229	0.7355 – 0.9098	0.2744	0.9725
sgmms1k	0.7472 + 0.0896	0.7674	0.6804 – 0.8166	0.406	0.9367
mms100	0.0792 + 0.1363	0.0	0.0 – 0.112	0.0	1.0
mms350	0.1707 + 0.1647	0.1226	0.0177 – 0.2908	0.0	0.7918
mms1k	0.203 + 0.1546	0.1936	0.0571 – 0.3236	0.0046	0.7236
sggr100	0.6589 + 0.2944	0.7056	0.4456 – 0.9324	0.0	1.0
sggr350	0.5556 + 0.2523	0.5729	0.3455 – 0.7901	0.0032	0.9777
sggr1k	0.4736 + 0.1993	0.4687	0.3265 – 0.6536	0.0719	0.8721
gr100	0.0127 + 0.0407	0.0	0.0 – 0.0	0.0	0.5066
gr350	0.0236 + 0.0305	0.0119	0.0018 – 0.0329	0.0	0.2354
gr1k	0.0267 + 0.0203	0.0227	0.0123 – 0.0364	0.0	0.1782
bare100	0.1642 + 0.2082	0.0883	0.0 – 0.2429	0.0	1.0
bare350	0.134 + 0.1119	0.0897	0.0496 – 0.1968	0.0	0.7104
bare1k	0.1596 + 0.0891	0.1472	0.087 – 0.2032	0.0205	0.4628
for100	0.0088 + 0.0463	0.0	0.0 – 0.0	0.0	0.511
for350	0.0378 + 0.0646	0.0048	0.0 – 0.0514	0.0	0.439
for1k	0.0663 + 0.0621	0.049	0.018 – 0.1042	0.0	0.3586
for_dist	452.19 + 396.17	320.16	190.26 – 551.73	0.0	2,568.6
Topographic					
slope100	17.08 + 6.93	15.98	11.6 – 21.65	4.6167	45.1652
slope350	25.43 + 5.39	25.3	21.26 – 28.84	13.8007	44.647
slope1k	29.28 + 3.72	28.78	26.5 – 31.55	23.0494	40.4389
tpi100	483.93 + 22.0	482.42	468.24 – 501.61	384.584	551.082
tpi350	463.76 + 18.29	464.6	452.22 – 478.16	405.514	520.361
tpi1k	442.38 + 11.77	444.83	435.05 – 451.61	405.554	465.649
curve100	7.9699 + 2.7441	7.604	5.838 – 9.8535	2.7412	19.3061
curve350	11.1652 + 2.4527	11.134	9.2925 – 12.6971	6.0214	20.107
curve1k	12.738 + 1.725	12.4362	11.4627 – 13.9053	10.0158	17.5551

Figure 6: Vegetation Types. Vegetation types within the PPR Study Area derived from image classification of color-infrared National Agricultural Imagery Program (NAIP) aerial photography collected in 2012.



Spatial Data Collection

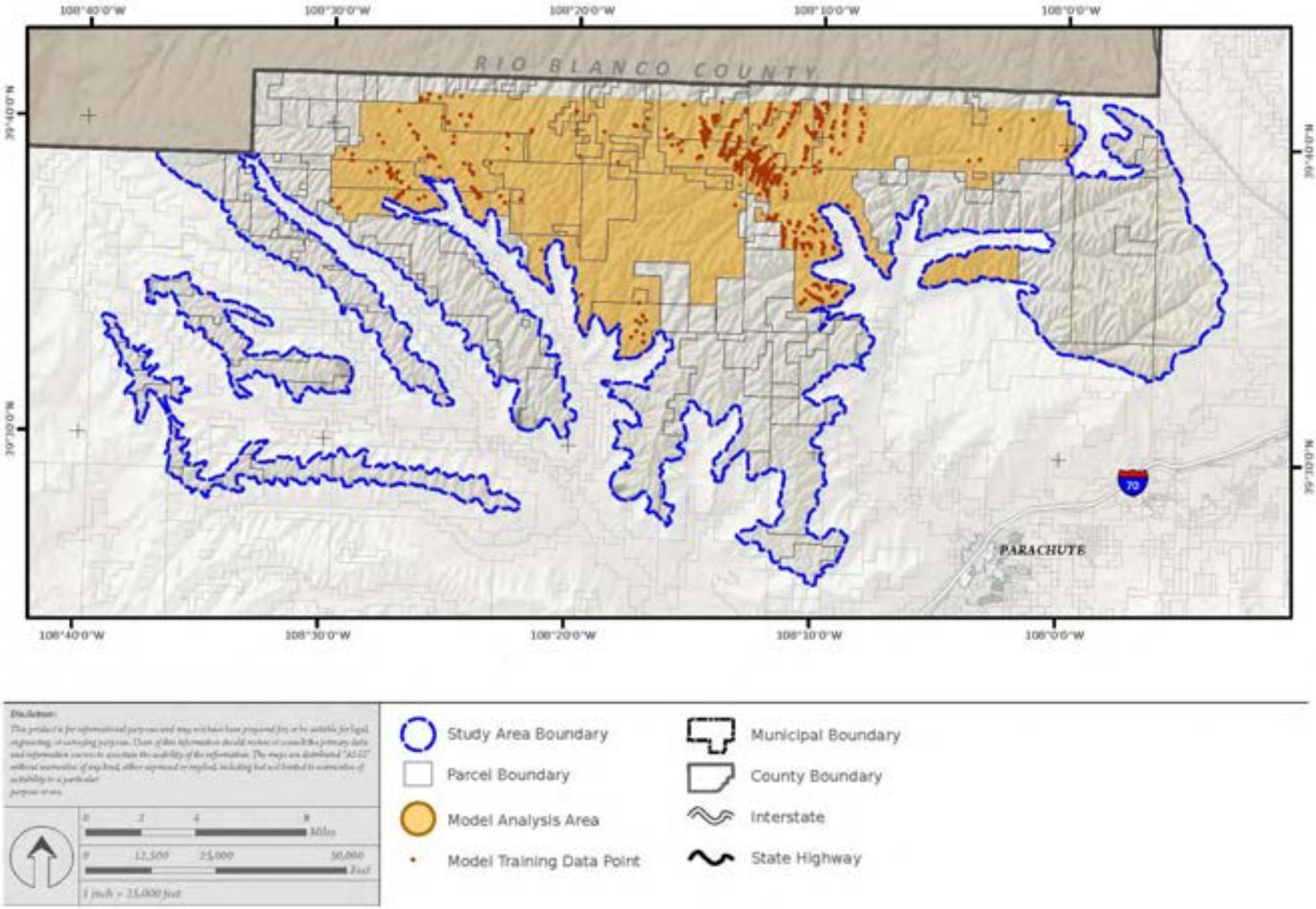
Field-collected data of point locations of sage-grouse signage were collected and compiled from three individual private landowners within the PPR Study Area (WWE 2008). In total, the compiled dataset contained 1,174 unique signage points collected from 2005 to 2012 across a contiguous area totaling 375 km^2 completely contained within the broader PPR Study Area (WWE 2008). The private lands where the field surveys were conducted occur in the central portion of the broader PPR Study Area and are considered to be representative of the diverse habitat types that naturally occur in the region; the surveyed area is displayed on Figure 7. The signage point data consisted of locations indicating presence of sage-grouse, including feather and pellet presence, lek locations and physical bird sightings collected during the summer season when the PPR Study Area is snow-free and easily accessible. All signage data were collected using resource-grade Global Positioning Systems (GPS) with an assumed 2-m horizontal precision. No telemetry data (i.e., sage-grouse outfitted with a GPS or radio-collar) were available for use in this analysis. Prior to, and after the acquisition of the sage-grouse point data, there has been a number of natural gas exploration and development activities in the analysis area, including road construction, natural gas pad development, compressor station construction, and other natural gas related support facilities. Because of these activities and the changing landscape, we did not attempt to capture these habitat impacts in our analysis, as it would have been very difficult to draw a point-in-time by which to incorporate these anthropogenic impacts. An incorporation of these habitat impacts could be incorporated into subsequent modelling analysis investigating direct and indirect impacts to sage-grouse habitats, but such an analysis was beyond the scope of our efforts.

While this data can show presence and seasonality of use, interpretation of how sage-grouse were using the area (e.g., summer foraging, winter foraging and nesting) is somewhat subjective and difficult to accurately predict. Some sage-grouse sign (such as roost piles) can reliably be used to predict winter time use, but single pellets, feathers, or tracks were assumed to not provide enough data to accurately describe use, therefore our models do not attempt to discern how habitats are being utilized by sage-grouse.

Analysis Area

While the model analysis area covered the entire extent of the 894-km^2 PPR Study Area, the model was trained on available point locations collected within the 375-km^2 acres of private lands. The training area, displayed in Figure 7, occurs in the central portion of the broader PPR Study Area, containing a variety of habitat types and topographical features that are assumed to represent the diverse topography and vegetation communities of the broader PPR Study Area.

Figure 7: *Model training area. Defined area used for habitat model training and locations of signage points collected from 2005-2012 within the broader PPR Study Area.*



Resource Selection Function

We first assessed suitability of sage-grouse habitat using a weighted overlay approach utilizing a RSF. The RSF was constructed on a presence vs. available habitat design because our data contained presence-only records, with no attempt to track absence locations. The presence vs. available habitat design characterizes a sample of sites where species' presence is recorded from a sample of resources available in the surrounding environment (Boyce et al. 2002). By contrast, a presence vs. absence design characterizes a sample of sites where species' presence is recorded by contrasting a sample of resources in sites the species are known to be absent. A concern with the presence vs. absence approach is the potential for a false negative error for presence thereby introducing potential bias to the model. While we can ensure that presence records indicate species use, we cannot say with certainty that unused sites (or absence records) are not actually utilized (Boyce et al. 2002). By contrast, a presence vs. available habitat design allows for contamination, defined as having a mixture of both used and unused resources present in the random sample of available resource units. This approach estimates habitat selection using a logistic function that transforms available resource distribution into the used distribution (Johnson et. al. 2006)

The field-collected sage-grouse data contained 1,174 unique point features (WWE 2008). For model analysis, we implemented a 5 to 1 training-to-validation ratio which is commonly recommended in k–fold partitioning designs to reduce cross-validation variance and bias (Breiman and Spector 1992). As such, 939 point features (80%) were randomly selected to represent presence locations; the remaining 235 point features (20%) were withheld for model validation. An additional 939 point features were randomly generated within the analysis area to quantify resource availability. In total, the compiled training dataset contained a total of 1,878 point features, with half of the features identifying known presence locations and the remaining half used for sampling available resources within the defined analysis area.

We first assessed linear correlation among the potential set predictor variables using Pearson correlation coefficients. When two parameters were correlated ($R > 0.65$), the variables were allowed to compete to determine which independent parameter better explained variance in the dependent variable. The remaining variables were tested for significance ($\rho < 0.1$) using both forward and backward stepwise selection to test all possible explanatory variable combinations and construct a model that best fit the training data; models were evaluated on the basis of samples size corrected Akaike Information Criterion (AIC) scores. AIC scores attempt to minimize model bias while maximizing model precision (Gunn et al. 2004). Models with the lowest AIC scores are considered the most parsimonious and have maximum support for the model (Goodenough et al. 2012). The selected model was further evaluated using bootstrap methods; the data was randomly re-sampled 10,000 times to generate 95% confidence intervals for regression coefficients and estimate standard errors of regression parameters. The full set of explanatory variables retained for model analyses with estimated coefficients, standard errors, upper and lower confidence intervals and significance values are summarized in Table 3. All statistical analyses were performed in the R Project for Statistical Computing using the stats (R Core Team 2013), aod (Lesnoff and Lancelot 2012), Hmisc (Harrell and Dupont 2014) and boot packages (Cantey and Ripley 2013).

After determining the best fit model, the regression coefficients obtained from the analysis were applied to the respective spatial data layers for each explanatory variable as a weighted linear combination in a GIS to produce a predictive surface.

The regression equation for the final model is expressed in the following form:

Y= -16.037746

- 1.841643 * for350

- 18.10309 * gr1k

- 1.829971 * mms100

- 2.321588 * mms1k

+ 14.394478 * sg1k

- 14.473146 * sggr1k

- 0.10506 * slope_100

- 0.122239 * slope_1k

+ 0.044144 * tpi_100

where Y is the probability of occurrence of sage-grouse.

The probability of occurrence was logit transformed using the equation:

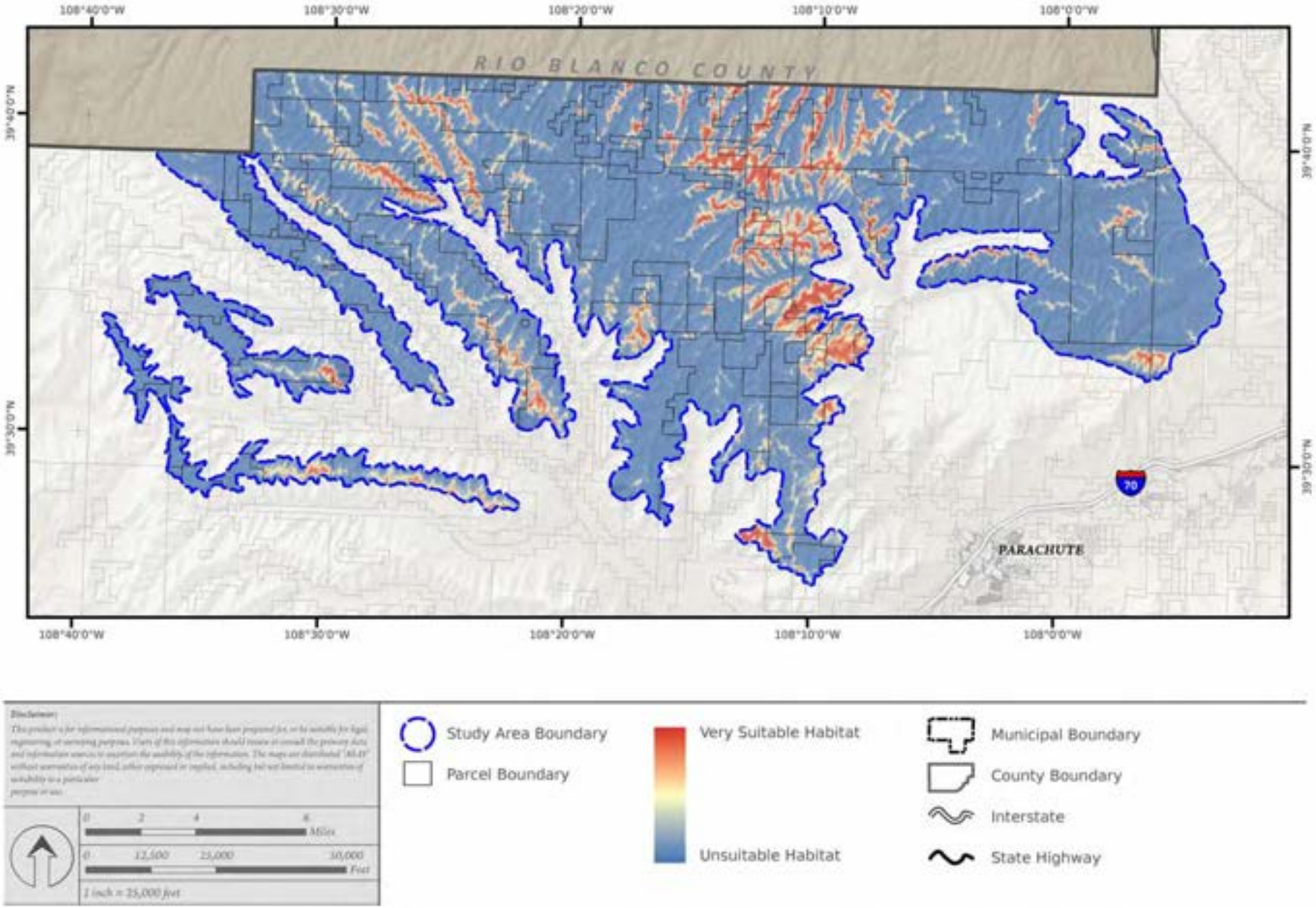
$$P = e^{Y} / (1 + e^{Y})$$

The resulting output (Figure 8) predicts probability of occurrence for sage-grouse on a continuous index of 0 to 1; 0 represents 0% probability of suitable sage-grouse habitat while a value of 1 represents 100% probability of suitable habitat for the species.

Table 3: RSF model variable coefficients. Summary of Coefficients of Explanatory Variables used to Predict Suitable Sage-Grouse Habitat

Variable	Coefficient	Std. Error	95% Confidence Interval		ρ Value
			Lower	***Upper***	
Intercept	-16.037746	3.0156	-22.811554	-10.918313	< 0.0001
sg1k	14.394478	2.229340	10.536357	19.309086	< 0.0001
mms100	-1.829971	0.698993	-3.279840	-0.542836	0.0037
mms1k	-2.321588	1.559011	-5.482815	0.583278	0.0841
sggr1k	-14.473146	2.161593	-19.251208	-10.785774	< 0.0001
gr1k	-18.103090	4.942620	-29.617783	-10.155660	< 0.0001
for350	-1.841643	1.155621	-4.152190	0.376809	0.0964
slope100	-0.105060	0.015353	-0.139571	-0.079109	< 0.0001
slope1k	-0.122239	0.047573	-0.216595	-0.031149	0.003
tpi100	0.050775	0.004596	0.044144	0.062215	< 0.0001

Figure 8: RSF model results. Raw RSF model results for PPR sage-grouse habitat.



Fuzzy Model

Following development and analysis of the RSF model, a fuzzy model was developed to model suitable sage-grouse habitat within the PPR Study Area. We utilized all explanatory variable combinations to form our fuzzy model, excluding mixed sagebrush vegetation communities (e.g., sagebrush-grassland mix and sagebrush-mixed mountain shrub mix). Unlike RSF models that determine the most significant contributing explanatory variables and assign weighted coefficients, fuzzy models utilize all sets of explanatory variables without weighting assigned. Because fuzzy logic examines the degree to which a specific location belongs to multiple sets, assigning weights to explanatory variables is illogical as increasing the weight of one factor over another does not increase the potential of belonging to one or more sets; the location is either a member of the set or not (ESRI 2014).

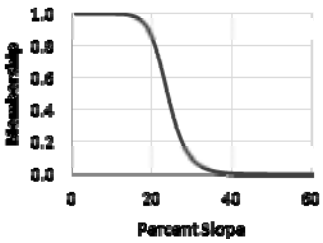
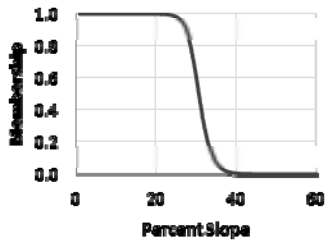
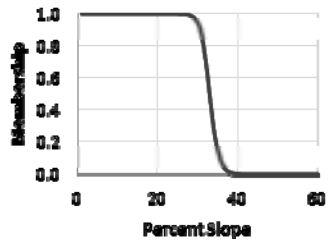
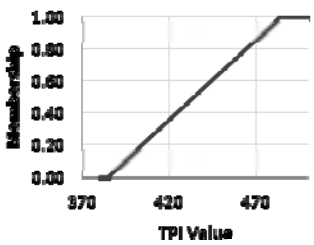
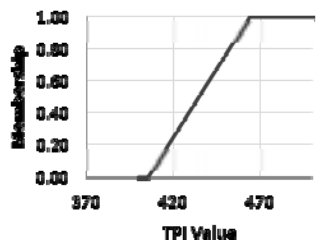
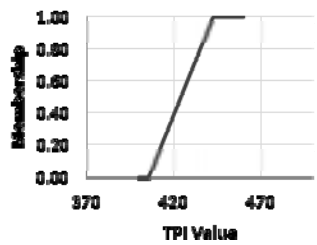
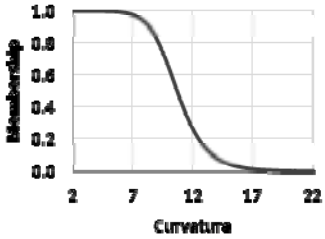
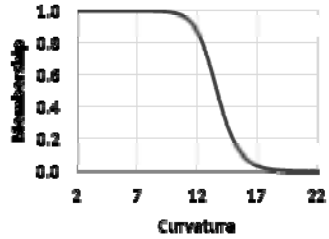
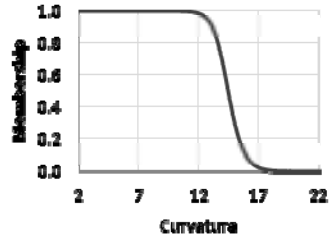
The fuzzy model was constructed to distinguish between suitable and unsuitable habitats for sage-grouse in the PPR Study Area. No attempt was made to model seasonal habitats or model effectiveness and quality of habitats. As such, the fuzzy model equation was constructed using linguistic descriptions involving all explanatory variables; the linguistic descriptions were qualified using the statistics derived for all explanatory variables listed in Table 4. The fuzzy rule for the model was developed using 25 explanatory variables.

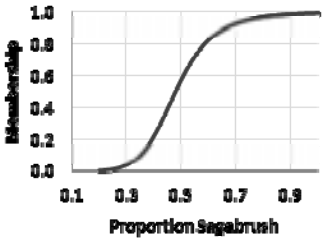
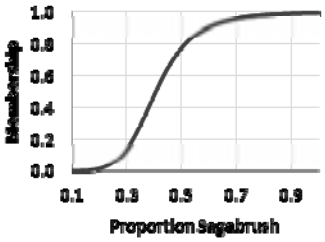
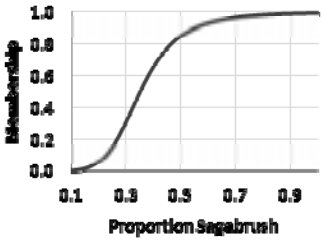
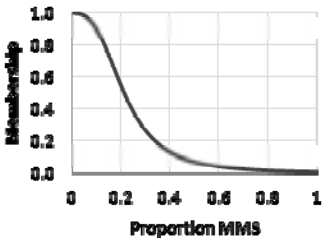
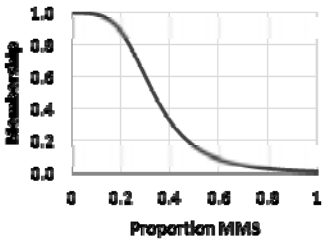
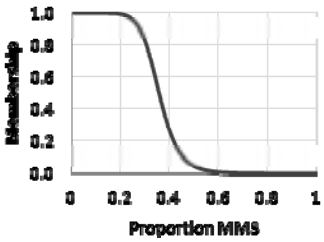
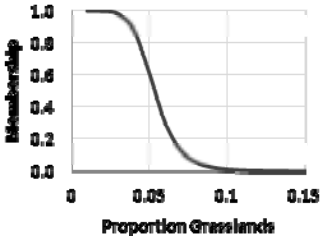
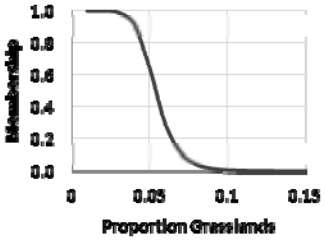
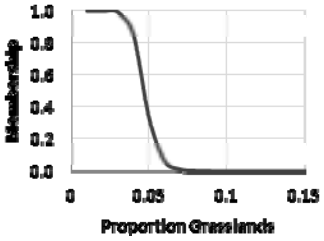
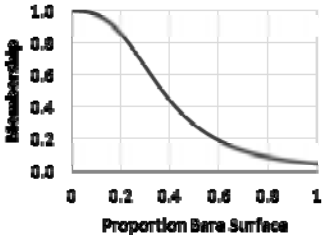
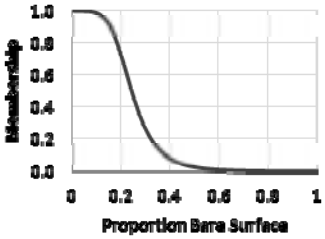
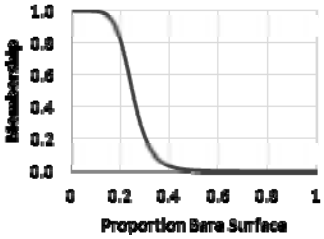
The fuzzy memberships were fitted from the statistics gathered for each variable in Table 4. Sinusoidal memberships were formed using the variable's mean plus or minus one standard deviation for the midpoint value with a spread value that assigned near full membership at the variable's mean. Linear memberships were formed using the minimum value of the variable as the minimum point and the mean specified as the maximum point allowing full membership. The fuzzy membership equations and graphs defining probability of membership for each explanatory variable are listed in Table 5.

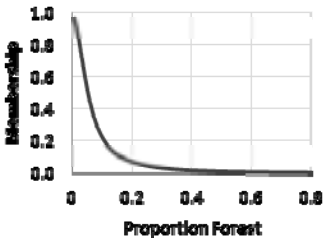
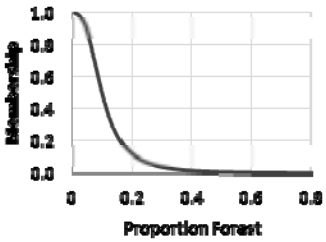
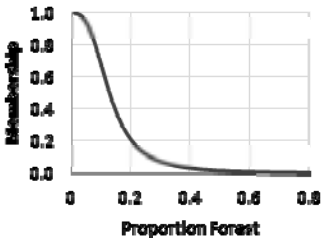
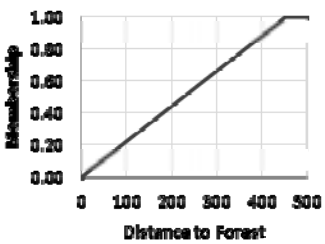
Table 4: Fuzzy Model Rule

A site is considered suitable for Greater Sage-grouse habitat if it meets the following criteria:		
Criteria	**Scale**	**Definition**
Slope is not steep	100 m	'not steep' defined as < 24%
	350 m	'not steep' defined as < 31%
	1 km	'not steep' defined as < 33%
Location is on or near a ridge	100 m	Defined as TPI value > 435
	350 m	Defined as TPI value > 435
	1 km	Defined as TPI value > 424
Surface curvature is more flat	100 m	'more flat' defined as < 10.71
	350 m	'more flat' defined as <13.62
	1 km	'more flat' defined as <14.46
Surrounding vegetation is dominated by sagebrush	100 m	'dominated' defined as > 48% presence
	350 m	'dominated' defined as > 41% presence
	1 km	'dominated' defined as > 35% presence
Proportion of mixed mountain shrubs are moderately low	100 m	'low' defined as < 22% presence
	350 m	'low' defined as <34% presence
	1 km	'low' defined as < 36% presence
Proportion of grasslands are low	100 m	'low' defined as < 5%
	350 m	'low' defined as < 5%
	1 km	'low' defined as < 5%
Presence of bare surfaces are moderately low	100 m	'low' defined as < 37%
	350 m	'low' defined as < 25%
	1 km	'low' defined as < 25%
Proportion forest is low	100 m	'low' defined as < 6%
	350 m	'low' defined as < 10%
	1 km	'low' defined as < 13%
Distance to forest is far		'far' defined as > 226 ft.

Table 5: Fuzzy Set Membership Functions

Percent Slope		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{24.01}\right)^{10}}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{30.82}\right)^{20}}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{33.0}\right)^{30}}$
		
Topographical Position Index (TPI)		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = 0$ if $x < 385$, $\mu(x) = 1$ if $x > 484$, $\mu(x) = \dfrac{(x-385)}{(484-385)}$	$\mu(x) = 0$ if $x < 406$, $\mu(x) = 1$ if $x > 464$, $\mu(x) = \dfrac{(x-406)}{(464-406)}$	$\mu(x) = 0$ if $x < 406$, $\mu(x) = 1$ if $x > 442$, $\mu(x) = \dfrac{(x-406)}{(442-406)}$
		
Surface Curvature		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{10.71}\right)^{9}}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{13.62}\right)^{15}}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{14.46}\right)^{23}}$
		
Proportion Sagebrush		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{0.48}\right)^{-7}}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{0.41}\right)^{-6}}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{0.35}\right)^{-5}}$

		
Proportion Mixed Mountain Shrubs		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = \frac{1}{1+\left(\frac{x}{0.22}\right)^3}$	$\mu(x) = \frac{1}{1+\left(\frac{x}{0.34}\right)^4}$	$\mu(x) = \frac{1}{1+\left(\frac{x}{0.36}\right)^9}$
		
Proportion Grasslands		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = \frac{1}{1+\left(\frac{x}{0.05}\right)^7}$	$\mu(x) = \frac{1}{1+\left(\frac{x}{0.05}\right)^8}$	$\mu(x) = \frac{1}{1+\left(\frac{x}{0.05}\right)^{11}}$
		
Proportion Bare Surface		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***
$\mu(x) = \frac{1}{1+\left(\frac{x}{0.37}\right)^3}$	$\mu(x) = \frac{1}{1+\left(\frac{x}{0.25}\right)^5}$	$\mu(x) = \frac{1}{1+\left(\frac{x}{0.25}\right)^7}$
		
Proportion Forest		
100 m (Local Scale)	***350 m (Intermediate Scale)***	***1 km (Landscape Scale)***

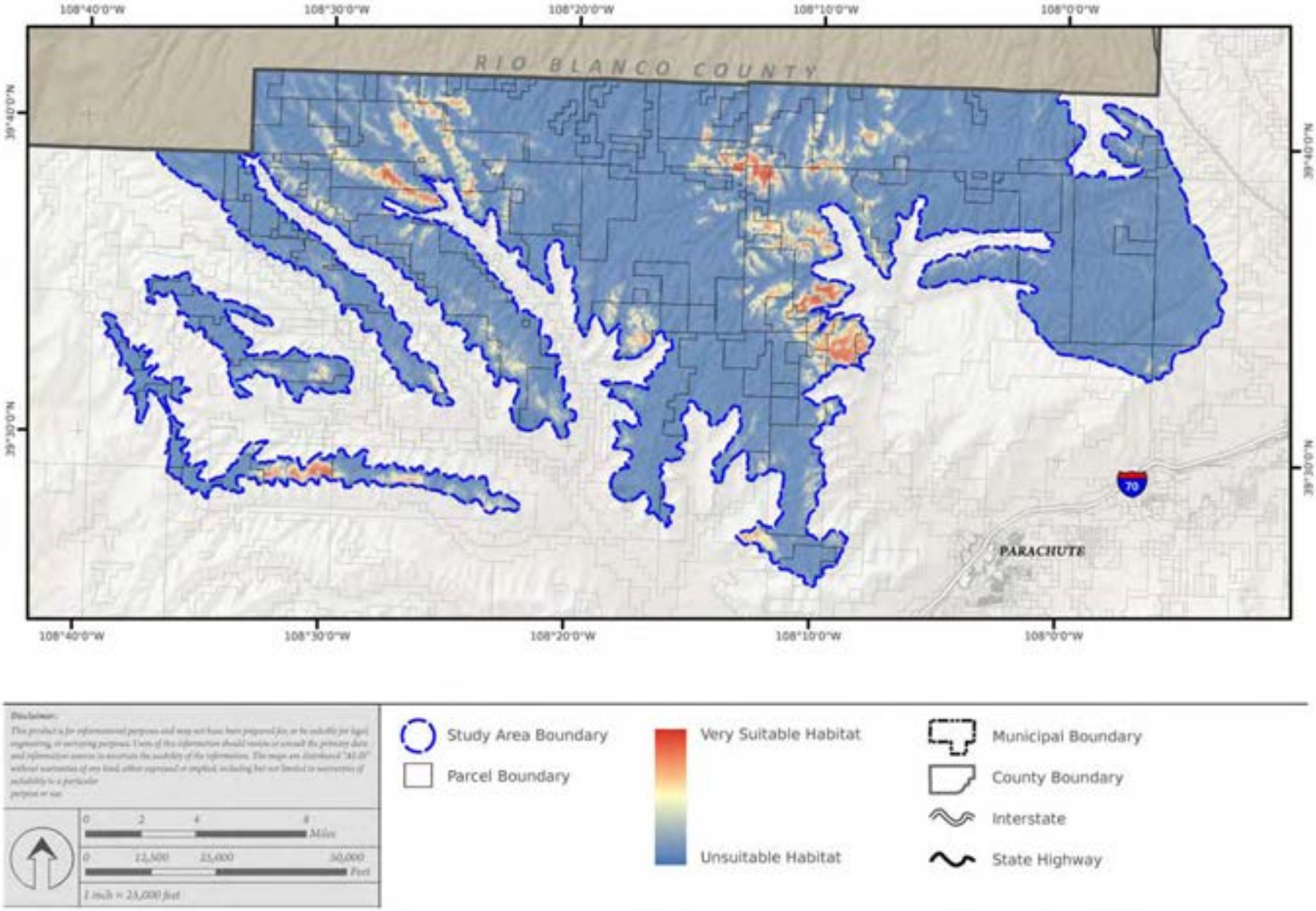
$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{0.06}\right)^2}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{0.10}\right)^3}$	$\mu(x) = \dfrac{1}{1+\left(\dfrac{x}{0.13}\right)^3}$
		
Distance to Forest		
$\mu(x) = 0$ if $x < 0$, $\mu(x) = 1$ if $x > 452$, $\mu(x) = \dfrac{(x-0)}{(452-0)}$		
		

After fitting memberships to all model sets, the sets were combined and analyzed using the Gamma overlay operator using a gamma power of 0.9. The Gamma overlay technique is a combination of the Fuzzy Sum and Fuzzy Product overlay techniques. Fuzzy sum, an increasive function, is employed when the combination of evidence from all sets is more important than any single piece of evidence; by contrast, the Fuzzy Product technique, a decreasive function, is employed when the combination of evidence from all sets is less important than any single piece of evidence. When the Gamma value is applied as 1.0, the results are precisely the same as the Fuzzy Sum technique; when the Gamma value is 0, the results are precisely the same as the Fuzzy Product technique. Initially the Fuzzy Sum technique was employed as no single piece of evidence influenced sage-grouse habitat selection, but rather selection was determined by variety of combined factors. However, the results of the Fuzzy Sum technique ranged from 0.999 – 1.0; far too similar to accurately distinguish between habitat types and probable selection. As such, the Gamma overlay technique was employed to decrease the results, increasing the range of values returned and provide greater contrast in suitable habitats across the Study Area landscape. Initially, we knew the gamma operator would be higher to maintain the increasing function of the combined evidence. As such, we explored various results using a gamma value of 0.8, 0.85, 0.9 and 0.95. Results using a gamma operator of 0.8 and 0.85 did not adequately delineate utilized habitats, a conclusion based on observing known signage points that were not captured by the model results. By contrast, using the gamma operator of 0.95 greatly over-predicted habitat utilization, a conclusion gained by observing broad forested areas on gentler slopes delineated as suitable habitats. As such, the selected model employed a gamma value of 0.9 which maintains

the increasive function of the combined evidence, yet provides adequate distinction between areas of non-utilization.

The resulting output (Figure 9) predicts probability of occurrence for sage-grouse on a continuous index of 0 to 1 using fuzzy logic; 0 represents 0% probability of suitable sage-grouse habitat while a value of 1 represents 100% probability of suitable habitat for the species.

Figure 9: Fuzzy model results. Raw fuzzy model results for PPR sage-grouse habitat.



RESULTS

RSF Model Validation

The RSF model results were validated using a k-fold cross-validation method used to correlate ranked bins with area-adjusted frequencies of predicted values (Johnson et al. 2006). The validation technique involves five steps:

Divide the resulting prediction surface into a specified number of progressively ranked equal-area bins.

Determine the midpoint value of the RSF score for each bin area.

Calculate the utilization rate for each bin using the following formula:

$$U(x_i) = w(x_i)A(x_i) / \sum_j w(x_j)A(x_j)$$

where $w(x_i)$ is the midpoint RSF value of bin i and $A(x_i)$ is the area of bin i (Boyce and McDonald 1999).

Estimate the expected number of validation records within each bin using the following formula:

$$N_i = N * U(x_i)$$

where N is the total number of validation observations used and $U(x_i)$ is the utilization function from step 3.

Calculate the observed number of validation records within each bin and regress against the predicted number of locations for each bin.

A well-fit model, one proportional to probability of use, would have a slope equal to 1, an intercept of 0, with a high R^2 value and an insignificant X^2 goodness-of-fit value (Johnson et al. 2006).

RSF Model Results

The RSF model results were split into 6 equal-area ordinal bins. The 235 field-collected presence locations withheld for model validation were cross-referenced with the ordinal bins to count the number of known observations that fell within each bin. We then determined all midpoint values to calculate the expected utilization rate $U(x_i)$ for each bin. The observed and predicted location numbers were converted to percentages to assess model performance and fit using linear regression. In addition, chi-square tests were used to assess model fit, while Spearman correlation coefficients were calculated to assess significance between predicted and observed frequencies.

The RSF model validated well, having a slope of 0.779 (95% CI: 0.626 – 0.932), an intercept of 0.037 (95% CI: -0.024 – 0.097) and an R^2 value of 0.9615. The chi-square goodness-of-fit test supported a good fit between observed and predicted frequencies (χ^2 = 18, ρ = 0.263). The top two bins predicted 97% occupancy while observed occupancy totaled 99% in bins 5 and 6, totaling 297 km^2 within the PPR Study Area (Figure 9). Bins 1-4 did not meet significance criteria,

whereby occupancy would not likely occur >3% of the time (results for bins 1-4 were therefore not displayed on Figure 9).

In addition, the RSF model was validated against an independent dataset of known lek locations collected by CPW within the PPR Study Area from 1997 – 2012, containing a total of 85 unique point locations (CPW 2013). The model produced a slope of 0.926 (95% CI: 0.814 – 1.034), an intercept of 0.012 (95% CI: -0.027 – 0.051) and an R^2 value of 0.985. The chi-square goodness-of-fit test supported a good fit between observed and predicted frequencies (χ^2 = 24, ρ = 0.242).

The validation results indicate the RSF model is a good predictor for sage-grouse habitat suitability within the PPR Study Area. Model validation results are summarized in Figure 10, which shows expected versus observed proportion of presence observations for withheld validation sample (n = 235) and independent CPW lek samples (n = 85). The dashed line represents perfect fit, having a slope of 1 with intercept of 0. Solid line depicts the fitted regression with point markers displayed as black diamonds.

Figure 10: RSF model bins. RSF model habitat map for PPR sage-grouse habitat.

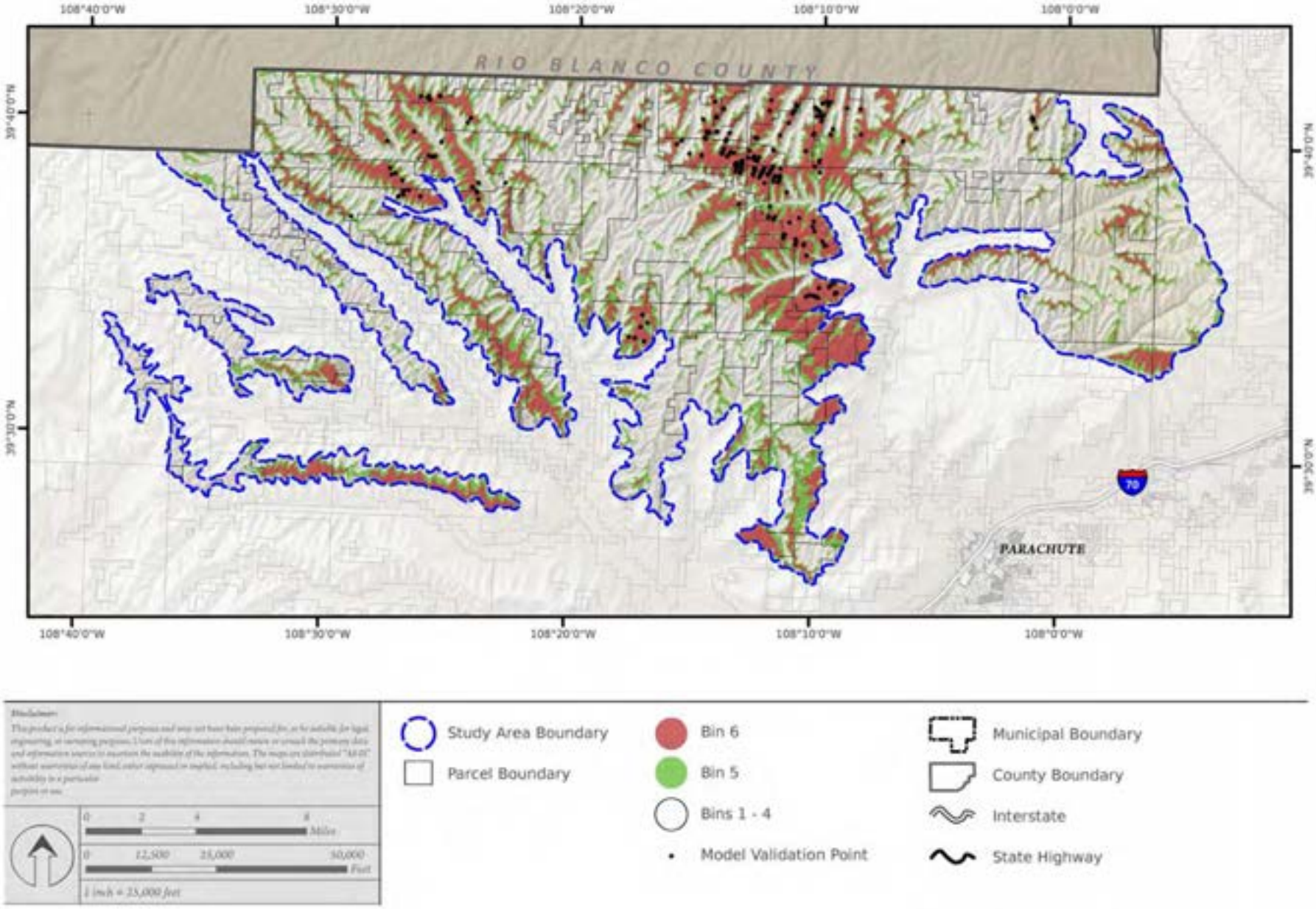
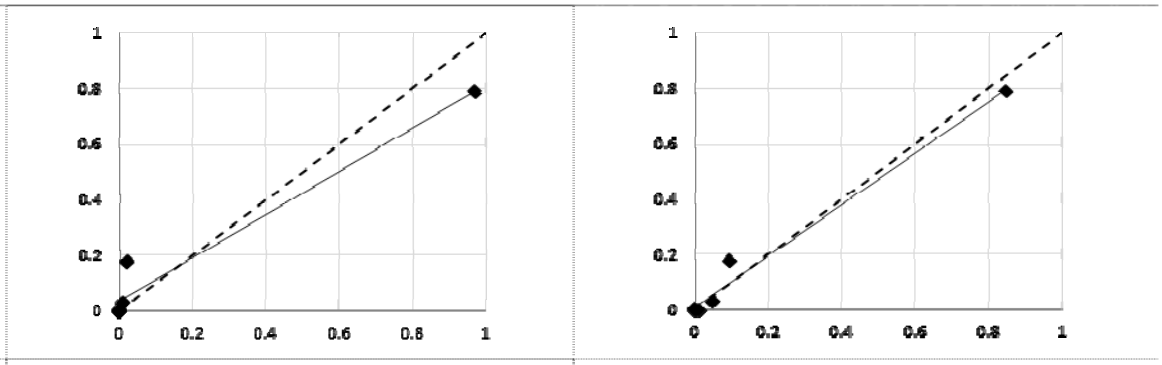


Figure 11: RSF Validation Results: Expected vs. Observed Proportion of Presence Observations.



	Withheld Validation Set			CPW Lek Validation Set		
Regression	$y = 0.779x + 0.037$, Adj.. r^2 **= 0.9519**			$y=0.926x+0.012$, Adj. r^2 **= 0.9814**		
Chi-square	χ^2	**Deg. Of Freedom**	ρ	χ^2	**Deg. Of Freedom**	ρ
	18	15	0.2627	24	20	0.2424
Spearman correlation	r^2	ρ		r^2	ρ	ρ
	0.9411	0.005		0.8986	0.015	0.015

Fuzzy Model Validation

Validation of the fuzzy model habitat results followed the same k-fold cross-validation procedure applied to the RSF habitat model as outlined above.

Fuzzy Model Results

Similar to the RSF model, we attempted to split the fuzzy model results into six (6) equal-area ordinal bins. However, due to the homogeneous nature of the lower values returned in the predicted surface, only four distinct bins could be produced; the lowest ranked bin (bin 1) captured approximately one-half of the study area, but due to the homogeneity of the results it could not be further subdivided. Therefore a total of four bins for the fuzzy model results are shown in Figure 12, with bin 1 being non-suitable habitat.

The 235 field-collected presence locations withheld for model validation were cross-referenced with the ordinal bins to count the number of known observations that fell within each bin. We then determined all midpoint values to calculate the expected utilization rate $U(x_i)$ for each bin.

The observed and predicted location numbers were converted to percentages to assess model performance and fit using linear regression. In addition, chi-square tests were used to assess model fit, while Spearman correlation coefficients were calculated to assess significance between predicted and observed frequencies.

The fuzzy model validated very well, having a slope of 1.031 (95% CI: 0.998 – 1.064), an intercept of 0.005 (95% CI: -0.017 – 0.007) and an R^2 value of 0.999. The chi-square goodness-of-fit test supported a good fit between observed and predicted frequencies (χ^2 = 18, ρ **=** 0.1157). The top two bins (bins 3 and 4) predicted 98% occupancy and observed occupancy totaled 98% totaling 294.8 km^2 within the PPR Study Area. Bins 1-2 did not meet significance criteria, whereby

occupancy would not likely occur ≥2% of the time (results for bins 1-2 were therefore not displayed on Figure 12).

In addition, the fuzzy model was validated against the independent dataset of known lek locations collected by CPW within the PPR Study Area from 1997 – 2012, containing a total of 85 unique point locations (CPW 2013). The model produced a slope of 1.22 (95% CI: 1.069 – 1.37), an intercept of -0.037 (95% CI: -0.083 – 0.01) and an R^2 value of 0.984. The chi-square goodness-of-fit test supported a good fit between observed and predicted frequencies (χ^2 = 24, ρ = 0.0895).

The validation results indicate the fuzzy model is a good predictor for sage-grouse habitat suitability within the PPR Study Area. Model validation results are summarized in Figure 13.

Figure 12: Fuzzy model bins. Fuzzy model habitat map for PPR sage-grouse habitat.

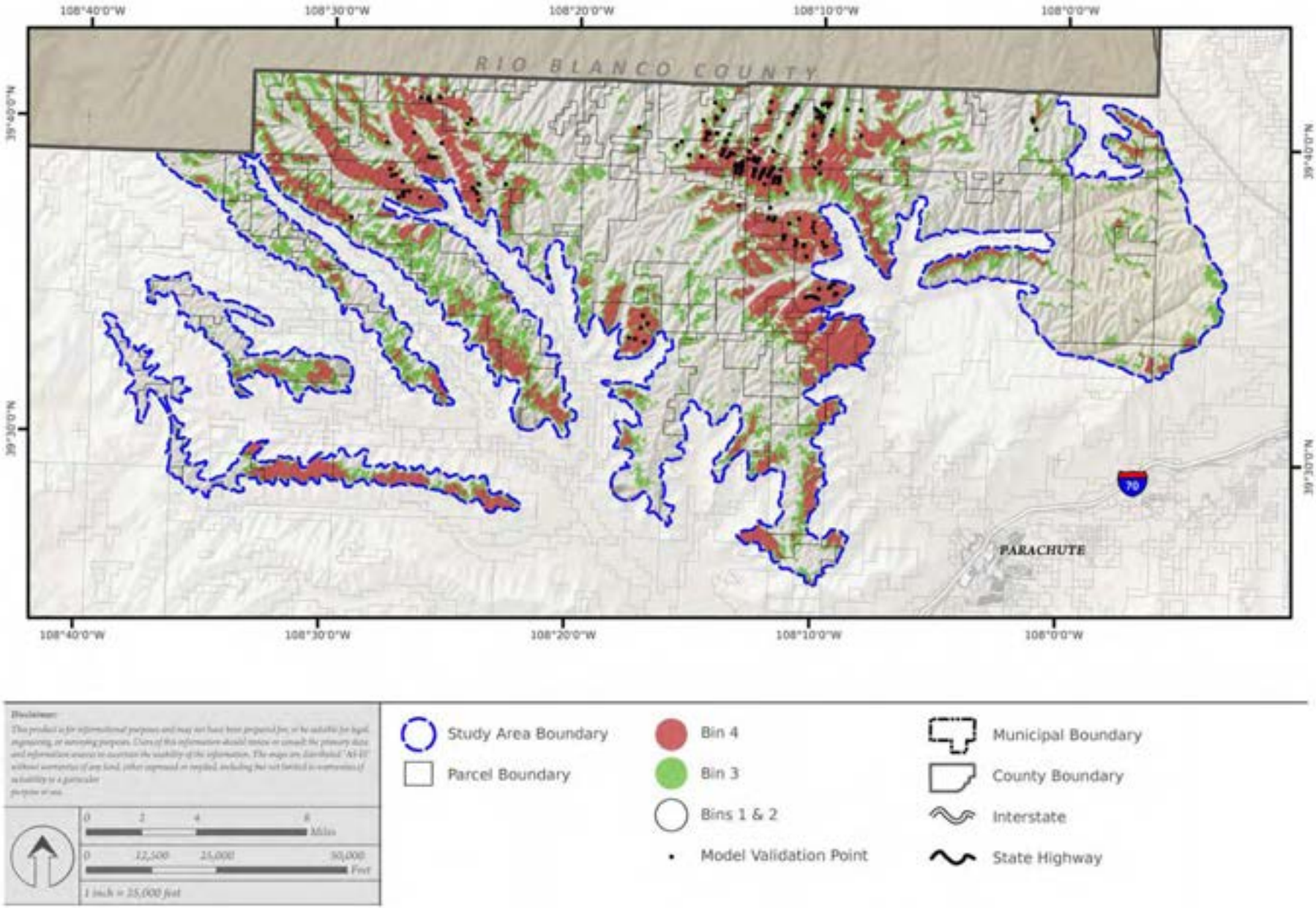
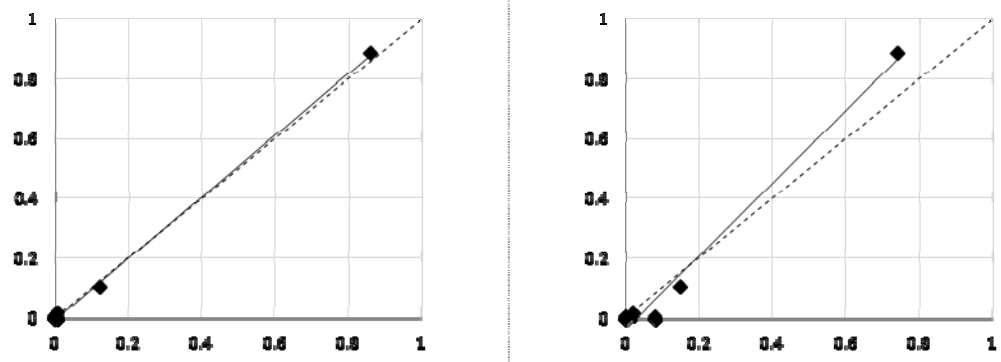


Figure 13: Fuzzy Validation Results: Expected vs. Observed Proportion of Presence Observations.



	Withheld Validation Set			CPW Lek Validation Set		
Regression	$y = 1.031x + 0.017$, Adj. r^2 **= 0.9987**			$y = 1.22x - 0.037$, Adj. r^2 **= 0.9805**		
Chi-square	χ^2	**Deg. Of Freedom**	ρ	χ^2	**Deg. Of Freedom**	ρ
	18	12	0.1157	24	16	0.0895
Spearman correlation	r^2	ρ		r^2	ρ	
	0.9852	0.0003		0.9412	0.005	

Model Assumptions and Limitations

Two primary subjects limit the predictive accuracy of the habitat models developed in this exercise; explanatory variables and uncertainties inherent to the sage-grouse signage points. Concerning explanatory variables, issues that may influence habitat selection beyond the scope of this analysis include 1) accuracy of the classified vegetation dataset, 2) omission of other potentially influential explanatory variables and 3) temporal discrepancies that exist between the signage points and explanatory variables. Regarding signage points, uncertainty exists in terms of understanding the full context of sage-grouse use and behavior at each signage location, as well as the limitation of not being able to discern seasonal use and occupation of an area.

As sage-grouse are a sagebrush obligate species, utilization of a vegetation dataset that accurately depicts vegetation communities and distribution of sagebrush is paramount to understanding habitat selection. Our decision to develop and utilize a vegetation dataset derived from classification of 1-m four-band aerial photography was motivated by the both the attribute and spatial inaccuracies inherent to both the CVCP (Colorado Vegetation Classification Project [CPW 2003]), and LANDFIRE (2010) vegetation datasets. Furthermore, the cell resolutions of each dataset, 25 m and 3 m respectively, are more applicable to development of a regional scale model, as opposed to the local scale model produced for this analysis.

While the results of the vegetation validation indicate an acceptable level of accuracy, only 45 of the 98 field validation locations were able to be field validated due to timing restrictions that prevented access to some private lands. For that reason, additional ocular assessments were

performed by visually comparing the classified vegetation communities to underlying high-resolution photography (i.e., 30-cm cell resolution), as well as comparing the classified vegetation dataset results to other areas were data was verified in the field, including field-collected photographs and vegetation plot data. Following these secondary assessments, we were satisfied with the vegetation dataset produced from the image classification process and firmly believe it is the best available data to employ for habitat modeling for this location and scale of analysis. Nevertheless, a limited level of inaccuracy still exists in the data thereby influencing the predictive ability of the habitat models.

A second model limitation is the omission of other potentially influential explanatory variables, including anthropogenic factors and other resource-related criteria including canopy heights and densities, understory vegetation composition, soil types, wildfire risks and others. Anthropogenic variables (e.g., roads, well pads, compressors, pipeline corridors, water facilities, etc.) were excluded due to the lack of available data depicting these features and the inability to accurately produce data that adequately represented anthropogenic factors in a timely manner. Furthermore, recent literature reveals conflicting results on what types of anthropogenic factors and to what degree these features may impact habitat selection for the greater sage-grouse (Ramey, Brown and Blackgoat 2011). For example, a number of currently active and historical natural gas well pad sites exist across the PPR Study Area; based on photo interpretation, it is not evident in every case to determine which sites are active versus inactive. While an inactive pad site is still considered an anthropogenic impact, we know that some of historical pad sites in the PPR Study Area are used as lek locations (based on CPW lek count data). Due to the uncertainty in identifying anthropogenic factors in a timely manner, as well as the uncertainty in how they influence habitat selection, anthropogenic factors were excluded as an explanatory variable in this analysis.

Several other resource-related explanatory variables were omitted from this analysis as well, primarily due to the fact that literature and expert opinion do not indicate them to be primary indicators of habitat selection for sage-grouse, but also due to inadequate or inaccurate data sources. Data depicting canopy heights and densities are available for the project area from the LANDFIRE (2011) suite of data products, but review of the data revealed broad areas where the data did not accurately reflect on-the-ground conditions. Other omitted resource explanatory variables (e.g., soil types, livestock grazing pressure, climatic change) were excluded due to either their marginal influence in determining habitat selection or lack of data at the project level scale. While these variables are not considered to be key predictors of sage-grouse use and occupation, inclusion of these variables in the models would marginally strengthen the predictive ability of the habitat models.

The temporal discrepancies between the sage-grouse signage points and explanatory variables are an additional limitation of the habitat models. While we know the precise locations of when the signage points were collected, we do not know with certainty what the ground conditions were during the period that the bird was present at the location. The vegetation dataset we developed was produced from NAIP photography collected in 2012, therefore reflecting recent ground conditions. However, the collection of the signage points occurred from across a seven

year period from 2005 – 2012. For that reason, uncertainty exists in accurately defining the conditions that existed at the precise point in time that the sage-grouse was present at the signage location.

Lastly, due to the inability to discern the duration of sage-grouse presence in a defined area, as well as the type of habitat use and behavior at each signage locations, the models are unable to classify seasonal habitats. In fact, the sage-grouse signage points are a collection of a data that most likely include indications of use across all seasons. Without knowing the precise time that the grouse were at the signage locations, it is not possible to predict seasonal use with these models.

Recognizing the limitations and uncertainties in the habitat models, we are satisfied with the predictive ability of the models as confirmed through significance in our model validation results, as well as concurrence with other similar models performed at similar scales within the PPR Study Area (Sauls et al. 2006, Walker et al. 2010). Future modeling efforts could be strengthened through inclusion of some of the omitted variables, as well as utilization of telemetry datasets that depicts marked bird locations at precise dates and times to generate a larger dataset of points for model training, including the ability to model and predict seasonal habitats.

DISCUSSION

RSF and fuzzy models utilizing field-collected sage-grouse data both accurately predicted use of habitats at local (100 m), intermediate (350 m) and landscape scales (1 km). These models were validated using randomly selected unique point features, which resulted in ranked bins accurately predicting frequencies of use. The RSF model validated with an R^2 value of 0.962. The top two bins predicted 97% occupancy while observed occupancy totaled 99% in bins 5 and 6, totaling 297 km^2 within the PPR Study Area. The RSF model was also validated against known lek locations, which also produced an R^2 value >0.98.

The fuzzy model utilized all sets of explanatory variables, without weighting, allowing a variable to exist in multiple bins at various degrees of membership. The results clearly showed that the fuzzy habitat model accurately validated against randomly selected sage-grouse location data and lek sites. The fuzzy model validated with an R^2 value of 0.999. The top two bins predicted 98% occupancy and observed occupancy totaled 98% in bins 3 and 4, totaling 295 km^2 within the PPR Study Area. In addition, the fuzzy model was validated against the independent dataset of known lek locations, with the model producing an R^2 value of 0.984 against lek locations.

MANAGEMENT IMPLICATIONS

We constructed two predictive models using distinctly different methods to assess sage-grouse habitat suitability within the PPR Study Area. The models demonstrate that of the 894-km^2 Study Area mapped as PPH and PGH by Rice et al. (2013), only 295-km^2 (34%) of the Study Area actually supported suitable sage-grouse habitats. Results suggest that a combination of both vegetation and topographic variables at multiple scales best explain habitat selection by sage-grouse in the PPR Study Area. The RSF model indicates a strong preference for sagebrush-dominated

vegetation communities, while demonstrating negative associations with grassland, mixed mountain shrub and forested vegetation communities.

This is further supported by the vegetation selection index (Table 6), a generalized method of quantifying resource selection whereby the amount of a resource utilized is compared to resource availability; ratios producing a value greater than one indicate selection while ratios less than one indicate avoidance (Manly et al. 1992). The vegetation selection index indicates a selection rate of 54% for sagebrush-only and dominated landscapes, and 19% for sagebrush communities containing a marginal mixed mountain shrub component. Topographic variables indicate a negative association with slope and a positive association with a higher topographical position index (TPI), implying that local sage-grouse population prefer flatter areas on the top of ridgelines. These results are consistent with other previous and ongoing fine-scale modeling efforts conducted in the Study Area (Sauls et al. 2008; Walker et al. 2010) which indicate the PPR sage-grouse population select for sage-dominated vegetation communities that occur along ridge tops with shallow slopes. Sage-grouse preference of flatter terrain is also observed in other populations (Hupp and Braun 1989, Doherty et al. 2008) and can be an important habitat factor (Knick and Connelly 2011).

Table 6: Vegetation Selection Index

	Available		**Utilized**			
Vegetation Type	**Acres**	**%**	**Points**	**%**	**Selection Rate**	**Calibrated Selection Rate**
Bare	28,302.8	13%	287	24%	1.91	26%
Forest	33,992.1	15%	2	< 1%	0.01	< 1%
Grassland	19,611.1	9%	7	1%	0.07	1%
Mixed mountain shrub	69,614.7	31%	22	2%	0.06	1%
Riparian	70.9	< 1%	0	< 1%	0.00	< 1%
Sage dominant	59,995.1	27%	786	67%	4.01	54%
Sage/Mixed Mountain Shrub	9,496.0	4%	70	6%	1.39	19%

By contrast, the results of our two fine-scale predictive models differed dramatically from the Rice et al. (2013) sage-grouse mapping that delineates PPH and PGH habitats for the species within the PPR Study Area. The disparate results are likely explained by differences in 1) spatial resolution of the data employed in the model analyses and 2) explanatory variables employed in the models. Regarding spatial resolution, our models used raster data with 10 m cell resolution, similar to the Sauls et al. (2008) and Walker et al. (2010) models, as compared to the Rice et al. (2013) model that utilized raster data with a 1-kilometer cell resolution. The difference in cell resolution equates to a loss of information in the model results that are invaluable for local

management policies and practices; for every possible single response in the Rice et al. (2013) model analyses, there were 10,000 possible responses in our model results.

Secondly, the Rice et al. (2013) model, once an area was known to be occupied sage-grouse, only considered vegetative explanatory variables, omitting significant topographical variables including slope, surface roughness and topographic or slope position. Particularly to the PPR Study Area, topographical variables are significant predictors of sage-grouse utilization; omission of these critical explanatory variables in assessing habitat suitability fails to recognize the diverse environment of the PPR Study Area, the limited areas of gentler terrain, and how the naturally fragmented landscape is selectively utilized by the local sage-grouse population.

While Rice et al. (2013) omitted the use of topographic variables in their models due to model scale, they recognized that localized studies indicate these factors strongly contribute to actual sage-grouse habitat utilization. Furthermore, Rice et al. (2013:8) did emphasize that "finer-scale and site-specific information…." should be used to identify priority areas for sage-grouse conservation. Our results support and quantify the conclusions of Rice et al. (2013) that finer-scale analysis is needed to adequately assess sage-grouse habitat suitability.

While the Rice et al. (2013) model analysis is not technically flawed, the dramatically broader spatial resolution of the data employed, combined with the omission of critical explanatory topographic variables, has the unintended consequence of over-predicting habitat by a three-fold factor in the PPR Study Area; the Rice et al. (2013) model results indicate the entirety of the Study Area is suitable sage-grouse habitat to some degree.

Gross over-prediction of habitats may not help support habitat management or species conservation, but rather may unnecessarily dilute conservation activities and priorities resulting in ineffective allocation of habitat improvement strategies. Preliminary Priority Habitat (PPH) is defined by the Sage-Grouse National Technical Team (NTT 2011:36) as "Areas that have been identified as having the highest conservation value to maintaining sustainable sage-grouse populations. These areas would include breeding, late brood-rearing, and winter concentration areas. These areas have been identified by state fish and wildlife agencies in coordination with respective BLM offices." Designated PPH and PGH habitats within the BLM's Draft RMPA and EIS have certain goals, objectives and management guidance associated for PPH and PGH areas. For example, the RMPA and EIS has: habitat restoration objectives to improve sagebrush habitats, wildfire management priorities, seasonal restrictions for fuels management activities, access restrictions, grazing restrictions, and other actions which may not actually benefit sage-grouse if PPH and PGH designations were erroneously applied to non-habitat. Goals and objectives tied to erroneously designated PPH and PGH areas could burden land management agencies with unnecessary management targets and "habitat improvement" targets in areas that were never, and will never actually be occupied by sage-grouse.

Additionally, applying erroneously mapped PPH and PGH designations on areas which do not support sage-grouse habitat may burden or restrict other land use activities; for example, the RMPA and EIS would impose a 3% surface disturbance cap on PPH and PGH areas, and even if the area is field-validated as being non-habitat, the validation process could be time consuming and

burdensome for both land owners, land managers and regulatory agencies. When PPH and PGH areas may be over predicting habitat by approximately 60% in the PPR Study Area alone, this could impose significant burdens on landowners and land managers across very large areas.

With potential listing of the species under the Endangered Species Act, truly understanding and spatially depicting sage-grouse habitat could further inform policy and management of the species. Omission of critical explanatory data, or utilizing over-predicting habitat models could also lead managers to the conclusion that there is more available habitat than there truly is. The use of coarse models to map PPH and PGH attempts to predict important ("priority") habitats for sage-grouse conservation, yet as Rice et al. (2013:9) indicates "At the broad scale of these models, detecting specifics for individual birds or individual locations is not possible." We believe that even our models are still not accurate enough to detect specifics for "individual birds or individual locations", but the results presented by utilizing higher resolution vegetation data and more accurate modelling techniques still paints a much different picture of sage-grouse habitat suitability. While our model is not intended to drive regional policy, it presents additional information to help land use managers make more informed and hopefully more accurate and relevant decisions regarding management of sage-grouse habitats, and to help conservation efforts become more effective and meaningful at a scale and in locations that are more relevant to sage-grouse.

ACKNOWLEDGMENTS

This report was reviewed by three anonymous reviewers, considered experts in the fields of biological statistics, GIS and sage-grouse ecology; their comments greatly improved this manuscript. We thank landowners in the PPR Study Area that granted access to private lands, including the Oldland Ranch, Oxy (USA) Inc., Chevron North America Exploration and Production, and Encana Oil & Gas (USA), Inc. We thank C. Rey and M. Paulek (with URS Corporation) for their outstanding efforts in the field. Funding for this project came from Garfield County Department of Community Development. We thank Colorado Parks and Wildlife for reviewing and validating initial model efforts, and we thank WestWater Engineering (M. Klish and J. P. Grey) for their assistance and comments on sage-grouse studies in the PPR area.

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APPENDIX A:

USING IMAGE CLASSIFICATION TO DEVELOP VEGETATION COVER TYPES

Introduction

Publicly available datasets depicting vegetation cover types across the project area were initially employed in the spatial models; the datasets include LANDFIRE vegetation cover (LANDFIRE 2011) and the Colorado Vegetation Classification Project (CVCP) (CPW 2003). However, review of the data revealed widespread inaccuracies in correctly identifying and classifying the vegetative cover types when compared to high-resolution aerial photography. In addition, the cell resolution of both the LANDFIRE and CVCP datasets, measured at 30 m^2 and 25 m^2 respectively, were too coarse to accurately delineate vegetation communities at the local scale. As a result, the spatial inaccuracies combined with the mistyped vegetative in both datasets led to our conclusion that the datasets were inadequate in appropriately identifying suitable vegetative cover types at the local scale.

In an effort to increase the accuracy of the spatial data depicting existing vegetative cover types within the Study Area, an image classification process involving color-infrared aerial photography was performed to better represent vegetation communities. Image classification is achieved by combining multiple bands from the same image to detect relative color, color intensity and texture to form clusters based on similar return values. Two major categories of image classification include supervised and unsupervised classification. Supervised classification is a method whereby the user defines training sites of known vegetation types within the analysis area; the training sites are subsequently used to as reference for classifying all other remaining pixels in the image into respective vegetation groups (Busch n.d.). By contrast, an unsupervised classification process relies on software analysis to identify and define similar pixel groups without user-defined training sites; the software uses a variety of statistical algorithms and techniques to identify related pixels and group them into similar classes (Busch, n.d.). Subsequently, the user assigns vegetation communities to the resulting classes using a combination of photo-interpretation and field-collected data.

Color-infrared photography provides four bands that detect specific wavelength ranges of reflected solar radiation; three bands within the visible light spectrum (e.g., red, green and blue), and a fourth near infrared band that measures reflected radiation beyond the visible light spectrum. The band combinations can yield a variety of properties and characteristics of the objects and vegetation interpreted in the aerial photography, including vegetation health, vegetation moisture and species identification (USDA 2008). For example, using the near infrared, red and green spectral bands to produce a 'false color' image (e.g., mapping the near infrared, red and green bands to RGB) provides high contrast between heavily vegetated areas (i.e., aspen, mixed conifer, and mixed mountain shrubs), less vegetated areas (grasslands, shrublands, etc.) and barren areas. Furthermore, within forested areas, image combinations utilizing the near

infrared band help to distinguish between deciduous and coniferous tree species. Deciduous trees contain more chlorophyll and therefor reflect an intense bright red, while coniferous trees contain less chlorophyll and reflect lighter tones of red, magenta or pink. Within grassland and shrub communities, delineations were detected in a similar manner; the higher chlorophyll content in grasses and forbs caused these communities to reflect much brighter as compared to adjacent sagebrush communities.

Materials and Methods

The image classification for this project was performed on four-band 1-m^2 resolution photography acquired in 2011 from the USDA as part of the NAIP (USDA 2012) within the defined PPR Study Area. The NAIP imagery was re-sampled from 1-m^2, to 2-m^2 cell resolution to facilitate accurate grouping of similar vegetation classes by minimizing noise that results from mixed vegetation stands. The four-bands were subsequently combined using a number of techniques to yield band derivatives that distinguished and delineated presence of vegetation, amount of chlorophyll, band reflectance values and relative textures. The band derivatives were finally employed in an unsupervised image classification exercise to identify and delineate distinct vegetation communities within the PPR Study Area. Initially, the classification effort sought to identify the following vegetation cover types described in Table 1.

Table 1: Cover type classifications.

Cover Type	
Sagebrush	Gambel Oak
Sagebrush-dominated/grassland mix	Pinyon-Juniper
Sagebrush-dominated/mixed mountain shrub mix	Aspen
Grassland	Mixed conifer
Grass-dominated/mixed mountain shrub mix	Riparian
Mixed mountain shrubs	Bare surface

The primary intent of the classification exercise was to delineate both cohesive and mixed communities at a fine scale to study how they might influence habitat selection at the local scale. Secondarily, we hoped to distinguish oakbrush and pinyon-juniper dominated stands from mixed mountain shrubs, consisting primarily of snowberry, service berry and bitterbrush, to examine if one cover type exerted greater influence in habitat selection within the PPR Study Area.

Results and Discussion

The cover type map units were broadly defined and included several vegetation communities. The forested cover type included woodland areas dominated by aspen or conifers with mixed understories. The mixed mountain shrublands consisted of Utah serviceberry, mountain snowberry, bitterbrush and Gambel oak interspersed with grassland and herbaceous understories. The grasslands included bunchgrass meadows, allowing for encroachment of mixed

mountain shrubs up to 25%. Sagebrush communities were dominated by a variety of sagebrush species, interspersed with bunchgrass and herbaceous understories. Both sagebrush-dominated/mixed mountain shrub and sagebrush-dominated/grassland mixed cover types contained a variety of sagebrush species intermixed with mixed mountain shrublands and bunchgrass meadows, with sagebrush cover ranging from 50% to 75%, respectively within these two cover types.

98 random points were generated across the project area for the purposes of field validation. Excluding bare surface and riparian cover types, each community was assigned 10 randomly generated points to inspect and confirm via field verification, with mixed conifer stands being assigned 8 randomly generated points for verification. Of the 98 potential points, only 45 were able to be field verified due to timing restrictions/limitations and limited access to some private lands.

The initial image classification exercise attempted to distinguish Gambel oak and pinyon-juniper from the broader mixed mountain shrublands cover type. In addition, aspen stands were classified separately from mixed conifer stands. The initial classification effort correctly identified 31 of the 45 of the randomly sampled field plots. Results of the initial classification effort are provided in Table 2.

Table 2: Accuracy assessment of initial image classification.

Cover Type	# Correct	Total Plots	% Correct
Aspen	7	7	100%
Gamble Oak	2	3	67%
Grasslands	1	3	33%
Grassland/mixed mountain shrubs	0	6	0%
Mixed Conifer	7	7	100%
Mixed mountain shrubs	4	5	80%
Pinyon-juniper	0	4	0%
Sagebrush	3	3	100%
Sagebrush-dominated/grass	3	3	100%
Sagebrush-dominated/mixed mountain shrubs	4	4	100%
Total	**31**	**45**	**68%**

The validation of the initial classification effort resulted in a total of 68% of the field plots being correctly identified which falls below the acceptable interpretation accuracy of 85% (Anderson et al. 1976). While several communities validated with 100% accuracy, the low predictive accuracy for Gambel oak, pinyon-juniper, grasslands and grassland/mixed mountain shrubs cover types hampered the accuracy of the overall classified dataset.

Field validation revealed that map units typed as pinyon-juniper cover type were, in fact, mixed mountain shrubland communities. Consequently, the pinyon-juniper mapped units were converted to mixed mountain shrubland communities. Likewise, while two of the three Gambel oak sample plots were correctly verified, they nevertheless contained a high percentage of mixed

mountain shrublands; the third sample plot was field verified as mixed mountain shrublands. As such, the Gambel oak map units were also converted to mixed mountain shrublands, based on limitations in the model accurately distinguishing between Gambel oak and other mixed mountain shrub species.

In addition, the poor predictive accuracy of grassland and grassland/mixed mountain shrub communities warranted a second review of the data. Of the six field plots for grass/mixed mountain shrub cover types, none were accurately verified. Rather five of the six sample plots revealed a much higher percentage of shrubs, while the sixth plot was verified as sagebrush. Furthermore, only one of the three grassland field sample plots was correctly verified; the remaining two plots were identified as sagebrush communities. Subsequently, the units originally mapped as either grasslands or grass/mixed mountain shrub cover types were re-analyzed and re-typed as either grassland, mixed mountain shrublands or sagebrush. Lastly, both aspen and mixed conifer cover types were combined to form a single forested cover type.

The revised classified dataset was re-validated using the original 45 field verified sample plots. The secondary validation effort against the revised dataset correctly identified 41 of the 45 randomly sampled field plots. Results of the revised vegetation classification accuracy assessment are presented in Table 3.

Table 3: Accuracy assessment of final image classification.

Cover Type	# Correct	Total Plots	% Correct
Grassland	1	3	33%
Forested	14	14	100%
Mixed mountain shrubs	16	18	89%
Sagebrush	3	3	100%
Sagebrush-dominated/grass	3	3	100%
Sagebrush-dominated/mixed mountain shrubs	4	4	100%
Total	**31**	**45**	**87%**

The second validation of the revised classification effort resulted in a total of 87% of the field plots being correctly identified, indicating the dataset meets acceptable interpretation accuracy. Overall, most mapped communities validated exceptionally well, excluding grassland communities which still had a low predictive accuracy of 33%, and to a lesser degree, mixed mountain shrubland cover types. An error matrix for the mapped cover types are presented in the Table 4.

Table 4: Error matrix for final mapped cover types.

Mapped Cover Type	**Actual Cover Type**					
	Grassland	Forested	Mixed mountain shrubs	Sagebrush	Sage-dominated/grass	Sage-dominated/mixed mountain shrubs
Grassland	1			2		
Forested		14				
Mixed mountain shrubs		1	16	1		
Sagebrush				3		
Sagebrush-dominated/grass					3	
Sagebrush-dominated/mixed mountain shrubs						4
Total	**1**	**15**	**16**	**6**	**3**	**4**

Overall, the final classified cover type dataset resulted in seven distinct cover types within the PPR Study Area. The results of the classification are quantified in Table 5.

Table 5: Final image classification cover types quantified.

Cover Type	**Acres**	**% of Study Area**
Bare	28,303	13%
Grassland	19,611	9%
Forested	33,992	15%
Mixed mountain shrubs	69,615	31%
Riparian	71	< 1%
Sagebrush	38,240	17%
Sagebrush-dominated/grass	21,756	10%
Sagebrush-dominated/mixed mountain shrubs	9,496	4%
Total	**221,084**	**100%**

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Appendix B
Vegetation Classification Model Validation Point Data

The following section presents the vegetation data points initially installed to help refine the initial vegetation classification model. Based on the results of these data plots, the model was revised and re-run to more accurately document vegetation conditions in the PPR.

Access was generously provided Oldland Ranch, Oxy (USA) Inc., Chevron North America Exploration and Production, and Encana Oil & Gas (USA), Inc. BLM lands were also utilized as part of this effort.

Aspen Points

AS_01

North View: Photo file: AS_01.jpg

East View: Photo file: AS_01e.jpg

South View: Photo file: AS_01s.jpg

West View: Photo file: AS_01w.jpg

Plot ID: AS-01 **Survey Date:** September 26, 2013
Cover Type: Aspen **Sage Cover:** 0%
Other Shrub Cover: *Populus tremuloides* 85%, *Symphoicarpos oreophilus* 45%, *Amelanchier alnifolia* 15%, *Prunus virginiana* 7%
Total Shrub Cover: 65% **Grass Cover:** 70%
Forb Cover: 20% **Aspect:** northeast
Slope: 17° **Insect/Disease:** some *Populus tremuloides* decline.
Dominant Plant Species: *Bromus anomalus*, *Elymus spp.*, *Rosa woodsii*, *Carex geyeri*, *Aquilegia caerulea*, *Ozmorhizza spp.*

Notes: Overstory is mostly dead, but good understory regen.

AS_03

Photo file: AS_03n.jpg

Photo file: AS_03e.jpg

Photo file: AS_03s.jpg

Photo file: AS_03w.jpg

Plot ID: AS-03
Survey Date: August 30, 2013
Cover Type: Aspen
Sage Cover: 0%
Other Shrub Cover: *Symphoricarpos oreophilus* 55%, *Populus tremuloides* 15%, *Rosa woodsii* 7%
Total Shrub Cover: 65%
Grass Cover: 50%
Forb Cover: 15%
Aspect: north
Slope: 13°
Insect/Disease: some aspen decline

Dominant Plant Species: *Populus tremuloides*, *Symphoricarpos oreophilus*, *Pedicularis bracteosa*, *Viscia americana*, *Mentha arvensis*

Notes:

AS_06

Photo file: AS_06n.jpg

Photo file: AS_06e.jpg

Photo file: AS_06s.jpg

Photo file: AS_06w.jpg

Plot ID: AS-06
Survey Date: September 15, 2013
Cover Type: Aspen
Sage Cover: 0%
Other Shrub Cover: *Symphoricarpos oreophilus* 45%, *Populus tremuloides* 40%, *Rosa woodsii* 2%, *Ribes cereum* 1%, *Acer glabrum* 2%, *Prunus virginiana* 2%, *Amelanchier alnifolia* 8%
Total Shrub Cover: 60%
Grass Cover: 20%
Forb Cover: 18%
Aspect: southwest
Slope: 30°
Insect/Disease: Approximately 50% of *Populus tremuloides* are standing dead

Dominant Plant Species: *Populus tremuloides*, *Symphoricarpos oreophilus*, *Thalictrum fendleri*, *Geranium viscosissimum*, *Viscia americana*, *Cynoglossum officinalis*

Notes:

AS_07

Photo file: AS_07n.jpg

Photo file: AS_07e.jpg

Photo file: AS_07s.jpg

Photo file: AS_07w.jpg

Plot ID: AS-07
Survey Date: August 30, 2013
Cover Type: Aspen
Sage Cover: 0%
Other Shrub Cover: *Symphoricarpos oreophilus* 20%, *Populus tremuloides* 30%
Total Shrub Cover: 20%
Grass Cover: 30%
Forb Cover: 50%
Aspect: east
Slope: 20°
Insect/Disease:

Dominant Plant Species: *Populus tremuloides*, *Symphoricarpos oreophilus*, *Thalictrum fendleri*, *Mentha arvensis*, elytra, *Poa pratensis*, *Senecio serra*, *Viscia americana*, *Carex geyeri*, *Lupinus spp.*

Notes:

AS_08

Photo file: AS_08n.jpg

Photo file: AS_08e.jpg

Photo file: AS_08s.jpg

Photo file: AS_08w.jpg

Plot ID: AS_08
Survey Date: September 25, 2013
Cover Type: Aspen
Sage Cover: 0%
Other Shrub Cover: *Populus tremuloides* 17%, *Symphoicarpos oreophilus* 58%, *Quercus gambelii* 2%, *Amelanchier utahensis* 2%, *Prunus virginiana* 3%
Total Shrub Cover: 65%
Grass Cover: 70%
Forb Cover: 10%
Aspect: east
Slope: 22°
Insect/Disease: *Populus tremuloides* is pretty decadent

Dominant Plant Species: *Populus tremuloides*, *Carex geyeri*, *Poa pratensis*, *Conioselinum scopulorum*, *Gallium spp.*, *Viscia americana*, *Mentha arvensis*

Notes:

AS_09

Photo file: AS_09n.jpg

Photo file: AS_09e.jpg

Photo file: AS_09s.jpg

Photo file: AS_09w.jpg

Plot ID: AS-09
Survey Date: August 30, 2013
Cover Type: Aspen
Sage Cover: 0%
Other Shrub Cover: *Amelanchier alnifolia* 15%, *Prunus virginiana* 30%, *Symphoricarpos oreophilus* 18%
Total Shrub Cover: 65%
Grass Cover: 45%
Forb Cover: 16%
Aspect: north
Slope: 15°
Insect/Disease: larger *Populus tremuloides* are mostly dead, some regeneration

Dominant Plant Species: *Populus tremuloides*, *Amelanchier alnifolia*, *Prunus virginiana*, *Symphoricarpos oreophilus*, *Carex geyeri*, *Bromus anomalus*, *Gallium spp.*, *Mentha arvensis*, *Viscia americana*, *Ozmorhizza spp.i*, *Potentilla pulcherrima*, *Rosa woodsii*, *Poa pratensis*.

Notes: quite a bit of bear sign

AS_10

Photo file: AS_10n.jpg

Photo file: AS_10e.jpg

Photo file: AS_10s.jpg

Photo file: AS_10w.jpg

Plot ID: AS_10
Survey Date: September 26, 2013
Cover Type: Aspen
Sage Cover: 0%
Other Shrub Cover: *Populus tremuloides* 78%, *Symphoricarpos oreophilus* 45%, *Amelanchier alnifolia* 14%, *Rosa woodsii* 4%
Total Shrub Cover: 50%
Grass Cover: 65%
Forb Cover: 19%
Aspect: north
Slope: 27°
Insect/Disease: low levels of *Populus tremuloides* decline

Dominant Plant Species: *Geranium viscossissimum*, *Bromus anomalus*, *Elymus spp.*, *Pedicularis bracteosa*, *Ozmorhizza spp.*

Notes:

Gambel Oak Points

GO_07

Photo file: GO_07n.jpg

Photo file: GO_07e.jpg

Photo file: GO_07s.jpg

Photo file: GO_07w.jpg

Plot ID: GO_07
Survey Date: September 25, 2013
Cover Type:
Sage Cover: 10%
Other Shrub Cover: *Amelanchier utahensis* 30%, *Artemisia tridentata* 10%, *Symphoicarpos oreophilus* 5%, *Chrysothamnus viscosissimum* 2%
Total Shrub Cover: 47%
Grass Cover: 14%
Forb Cover: 7%
Aspect:
Slope: 16°
Insect/Disease:

Dominant Plant Species: *Eriogonum umbellatum*, *Castilleja* spp., *Mahonia repens*, *Carex geyeri*, *Pseudoroegneria spicata*, *Poa pratensis*, *Carex geophila*

Notes:

GO_09

Photo file: GO_09n.jpg

Photo file: GO_09e.jpg

Photo file: GO_09s.jpg

Photo file: GO_09w.jpg

Plot ID: GO_09
Survey Date: September 2, 2013
Cover Type: mixed mountain shrublands
Sage Cover: 0%
Other Shrub Cover: *Amelanchier utahensis* 80%, *Prunus virginiana* 5%, *Symphoicarpos oreophilus* 20%, *Quercus gambelii* 2%
Total Shrub Cover: 85%
Grass Cover: 10%
Forb Cover: 8%
Aspect:
Slope: 42°
Insect/Disease:

Dominant Plant Species: *Carex geyeri*, *Mahonia repens*

Notes:

GO_10

Photo file: GO_10n.jpg

Photo file: GO_10e.jpg

Photo file: GO_10s.jpg

Photo file: GO_10w.jpg

Plot ID: GO_10
Survey Date: October 9, 2013
Cover Type:
Sage Cover: 1%
Other Shrub Cover: *Amelanchier utahensis* 10%, *Quercus gambelii* 15%, *Symphoicarpos oreophilus* 60%, *Artemisia tridentata* 1%
Total Shrub Cover: 50%
Grass Cover: 75%
Forb Cover:
Aspect: East
Slope: 18°
Insect/Disease:

Dominant Plant Species:

Notes:

Grass Points

GR_06

Photo file: GR_06n.jpg

Photo file: GR_06e.jpg

Photo file: GR_06s.jpg

Photo file: GR_06w.jpg

Plot ID: GR_06
Survey Date: October 8, 2013
Cover Type: sagebrush
Sage Cover: 20%
Other Shrub Cover: *Symphoicarpos oreophilus* 40%, *Chrysothamnus viscosissimum* 10%, *Artemisia tridentata* 20%, *Amelanchier utahensis* 2%
Total Shrub Cover: 80%
Grass Cover: 70%
Forb Cover: 20%
Aspect: southwest
Slope: 4°
Insect/Disease:

Dominant Plant Species: *Carex geyeri*, *Poa secunda*, *Lupinus spp.*, *Balsamorhiza sagittata*

Notes:

GR_08

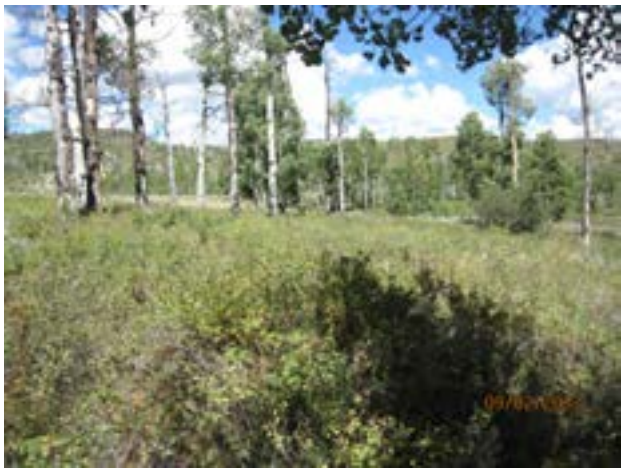

Photo file: GR_08n.jpg

Photo file: GR_08e.jpg

Photo file: GR_08s.jpg

Photo file: GR_08w.jpg

Plot ID: GR_08 **Survey Date:** September 2, 2013
Cover Type: *Symphorocarpos oreophilus*berry/*Populus tremuloides* **Sage Cover:** 0%
Other Shrub Cover: *Symphoricarpos oreophilus* 80%
Total Shrub Cover: 80% **Grass Cover:** 40%
Forb Cover: 5% **Aspect:** southwest
Slope: 4° **Insect/Disease:** *Populus tremuloides* fading…

Dominant Plant Species: *Populus tremuloides*, *Symphoricarpos oreophilus*, elytra, *Poa secunda*, *Pascopyrum smithii*, *Achillea millefolia*, *Lupinus spp.*, *Pseudoroegneria spicata*.

Notes:

GR_10

Photo file: GR_10n.jpg

Photo file: GR_10e.jpg

Photo file: GR_10s.jpg

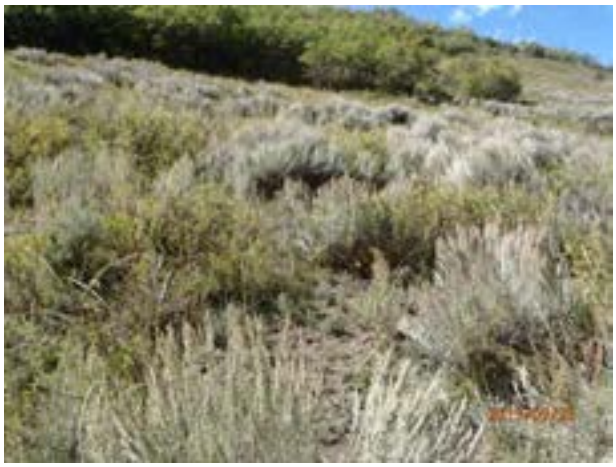

Photo file: GR_10w.jpg

Plot ID: GR_10
Survey Date: September 25, 2013
Cover Type: sagebrush
Sage Cover: 10%
Other Shrub Cover: *Artemisia tridentata* 10%, *Symphoricarpos oreophilus* 15%, *Chrysothamnus viscosissimum* 5%, *Oligosporus pacificus* 7%
Total Shrub Cover: 50%
Grass Cover: 20%
Forb Cover: 5%
Aspect:
Slope: 7°
Insect/Disease:

Dominant Plant Species: *Leymus cinereus*, *Poa pratensis*, *Lappula occidentalis*, *Viscia americana*, *Lupinus spp.*, *Penstemon strictus*

Notes:

Grass- Mixed Mountain Shrub Points

GM_01

Photo file: GM_01n.jpg

Photo file: GM_01e.jpg

Photo file: GM_01s.jpg

Photo file: GM_01w.jpg

Plot ID: GM_01
Survey Date: September 2, 2013
Cover Type: Mixed mountain shrub
Sage Cover: 0%
Other Shrub Cover: *Amelanchier utahensis* 25%, *Quercus gambelii* 30%, *Prunus virginiana* 1%, *Symphoricarpos oreophilus* 3%
Total Shrub Cover: 60%
Grass Cover: 30%
Forb Cover: 6%
Aspect: southwest
Slope: 20°
Insect/Disease:

Dominant Plant Species: *Quercus gambelii*, *Prunus virginiana*, *Amelanchier alnifolia*, *Symphoricarpos oreophilus*, *Carex geyeri*, *Aster* spp.

Notes:

GM_03

Photo file: GM_03n.jpg

Not Available

Photo file: GM_03e.jpg

Photo file: GM_03s.jpg

Photo file: GM_03w.jpg

Plot ID: GM_3
Survey Date: September 25, 2013
Cover Type: sagebrush
Sage Cover: 16%
Other Shrub Cover: *Amelanchier utahensis* 4%, *Artemisia tridentata* 16%, *Symphoicarpos oreophilus* 28%
Total Shrub Cover: 60%
Grass Cover: 24%
Forb Cover: 14%
Aspect:
Slope: 15°
Insect/Disease:

Dominant Plant Species: *Bromus inermis*, *Elymus cinereus*, *Carex geyeri*, pisipi, *Poa pratensis*, *Gallium spp.*, *Chrysothamnus viscosissimum*, *Lupinus spp.*, *Penstemon strictus*, *Eriogonum umbellatum*, *Helenium autumnale*

Notes:

GM_04

Photo file: GM_04n.jpg

Photo file: GM_04e.jpg

Photo file: GM_04s.jpg

Photo file: GM_04w.jpg

Plot ID: GM_04 **Survey Date:** October 8, 2013
Cover Type: Mixed mountain shrub **Sage Cover:** 0%
Other Shrub Cover: *Populus tremuloides* 15%, *Amelanchier utahensis* 10%, *Prunus virginiana* 2%, *Symphoicarpos oreophilus* 60%, *Quercus gambelii* 2%
Total Shrub Cover: 80% **Grass Cover:** 75%
Forb Cover: 10% **Aspect:**
Slope: 25° **Insect/Disease:**

Dominant Plant Species: *Carex geyeri*, *Poa pratensis*, *Gallium spp.*, *Achillea millefolia*, thistle, *Chenopodium leptophyllum*, *Mentha arvensis*

Notes:

GM_06

Photo file: GM_06n.jpg

Photo file: GM_06e.jpg

Photo file: GM_06s.jpg

Photo file: GM_06w.jpg

Plot ID: GM_06
Survey Date: October 8, 2013
Cover Type: *Populus tremuloides*/shrub
Sage Cover: 0%
Other Shrub Cover: *Amelanchier utahensis* 40%, *Populus tremuloides* 20%, *Symphorocarpos oreophilus* 65%
Total Shrub Cover: 80%
Grass Cover: 30%
Forb Cover: 10%
Aspect: east
Slope: 33°
Insect/Disease:

Dominant Plant Species: *Carex geyeri*, *Poa fendleri*

Notes:

GM_08

Photo file: GM_08n.jpg

Photo file: GM_08e.jpg

Photo file: GM_08s.jpg

Photo file: GM_08w.jpg

Plot ID: GM_08
Survey Date: September 25, 2013
Cover Type: Mixed mountain shrub
Sage Cover: 4%
Other Shrub Cover: *Amelanchier utahensis* 8%, *Quercus gambelii* 23%, *Prunus virginiana* 1%, *Symphoicarpos oreophilus* 20%, *Artemisia tridentata* 4%,
Total Shrub Cover: 58%
Grass Cover: 20%
Forb Cover: 10%
Aspect: southeast
Slope: 20°
Insect/Disease:

Dominant Plant Species: *Carex geyeri*, *Poa pratensis*, *Pseudoroegneria spicata*, *Galium triflorum*, *Achillea millefolia*, *Aster* spp., *Collinsia parviflora*

Notes:

GM_09

Photo file: GM_09n.jpg

Photo file: GM_09e.jpg

Photo file: GM_09s.jpg

Photo file: GM_09w.jpg

Plot ID: GM_09 **Survey Date:** September 25, 2013
Cover Type: Mixed mountain shrub **Sage Cover:** 4%
Other Shrub Cover: *Amelanchier utahensis* 2%, *Quercus gambelii* 34%, *Symphoricarpos oreophilus* 28%, *Artemisia tridentata* 4%, *Chrysothamnus viscosissimum* 15%,
Total Shrub Cover: 70% **Grass Cover:** 28%
Forb Cover: 15% **Aspect:** southwest
Slope: 17° **Insect/Disease:**

Dominant Plant Species: *Helenium autumnale*, *Carex geyeri*, *Ozmorhizza spp.i*, *Poa pratensis*, *Gallium spp.*, *Pseudoroegneria spicata*, *Balsamorhiza sagittata*, *Wyethia amplexicaulis*

Notes:

Mixed Conifer Points

MC_01

Photo file: MC_01n.jpg

Photo file: MC_01e.jpg

Photo file: MC_01s.jpg

Photo file: MC_01w.jpg

Plot ID: MC_01
Survey Date: September 2, 2013
Cover Type: Mixed conifer
Sage Cover: 0%
Other Shrub Cover: *Amelanchier alnifolia* 3%, *Symphoricarpos oreophilus* 28%, Douglas-fir 5%
Total Shrub Cover: 30%
Grass Cover: 70%
Forb Cover: 15%
Aspect: northwest
Slope: 30°
Insect/Disease: 80% of Douglas-fir dead

Dominant Plant Species: *Pseudotsuga menziesii*, *Amelanchier alnifolia*, *Symphoricarpos oreophilus*, *Ozmorhizza spp.i*, *Carex geyeri*, *Gallium spp.*, *Elymus trachycaulis*, *Corydalis aurea*, *Bromus anomalus*, *Bromus marginatus*, *Stipa purpurea*, *Cynoglossum officinalis*

Notes:

MC_02

Photo file: MC_02n.jpg

Photo file: MC_02e.jpg

Photo file: MC_02s.jpg

Photo file: MC_02w.jpg

Plot ID: MC_02 **Survey Date:** September 15, 2013
Cover Type: Mixed conifer **Sage Cover:** 0%
Other Shrub Cover: *Sambucus racemosa* 1%, *Symphoricarpos oreophilus* 1%, *Populus tremuloides* 30%
Total Shrub Cover: 2% **Tree Cover:** 30%
Grass Cover: 5% **Forb Cover:** 35%
Aspect: northeast
Slope: 20° **Insect/Disease:**
Dominant Plant Species: *Cynoglossum officinalis*, *Carex geyeri*, *Geranium* spp., *Gallium spp.*, *Chenopodium leptophyllum*, *Sambucus racemosa*

Notes: In an old burn, mostly all *Populus tremuloides* regeneration. Few spruce on the edge of burn at the top

MC_03

Photo file: MC_03n.jpg

Photo file: MC_03e.jpg

Photo file: MC_03s.jpg

Photo file: MC_03w.jpg

Plot ID: MC_03 **Survey Date:** September 15, 2013
Cover Type: Mixed conifer **Sage Cover:** 0%
Other Shrub Cover: *Ribes cereum* 20%, *Prunus virginiana* 5%, *Acer glabrum* 1% *Amelanchier alnifolia* 1%, *Symphoricarpos oreophilus* 1%, *Rosa woodsii* 1%, *Pseudotsuga menziesii* 55%, *Populus tremuloides* 5%
Total Shrub Cover: 40% **Tree Cover: 60%**
Grass Cover: 3% **Forb Cover:** 2%
Aspect: northwest
Slope: 23° **Insect/Disease:** Lots of down fall and very few standing dead

Dominant Plant Species: *Pseudotsuga menziesii*, *Amelanchier alnifolia*, *Symphoricarpos oreophilus*, *Carex geyeri*, *Thalictrum fendleri*
Notes:

MC_04

Photo file: MC_04n.jpg

Photo file: MC_04e.jpg

Photo file: MC_04s.jpg

Photo file: MC_04w.jpg

Plot ID: MC_04
Survey Date: September 15, 2013
Cover Type: Mixed conifer
Sage Cover: 0%
Other Shrub Cover: *Amelanchier alnifolia* 7%, *Symphoricarpos oreophilus* 45%, *Acer glabrum* 2%, *Populus tremuloides* 5%, Douglas-fir 28%
Total Shrub Cover: 55%
Tree Cover: 30%
Grass Cover: 27%
Forb Cover: 4%
Aspect: south
Slope: 23°
Insect/Disease: Some standing dead *Populus tremuloides*

Dominant Plant Species: *Pseudotsuga menziesii*, *Amelanchier alnifolia*, *Symphoricarpos oreophilus*, *Carex geyeri*, *Arctostaphylos uva-ursi*, *Cynoglossum officinalis*, *Mahonia repens*

Notes:

MC_05

Photo file: MC_05n.jpg

Photo file: MC_05e.jpg

Photo file: MC_05s.jpg

Photo file: MC_05w.jpg

Plot ID: MC_05
Survey Date: October 8, 2013
Cover Type: Mixed conifer
Sage Cover: 0%
Other Shrub Cover: *Pseudotsuga menziesii* 85%, *Amelanchier utahensis* 10%, *Symphorocarpos oreophilus* 6%,
Total Shrub Cover: 15%
Tree Cover: 85%
Grass Cover: 75%
Forb Cover: 10%
Aspect: northwest
Slope: 42°
Insect/Disease: Lots of down fall and very few standing dead

Dominant Plant Species:

Notes:

MC_07

Photo file: MC_07n.jpg

Photo file: MC_07e.jpg

Photo file: MC_07s.jpg

Photo file: MC_07w.jpg

Plot ID: MC_07
Survey Date: September 15, 2013
Cover Type: Mixed conifer
Sage Cover: 0%
Other Shrub Cover: *Rubus idaeus* 8%, *Symphoricarpos oreophilus* 1%, *Abies bifolia* 40%, *Pseudotsuga menziesii* 15%, *Populus tremuloides* 3%
Total Shrub Cover: 9%
Tree Cover: 50 %
Grass Cover: 15%
Forb Cover: 5%
Aspect: north
Slope: 23°
Insect/Disease:

Dominant Plant Species: *Pseudotsuga menziesii*, *Amelanchier alnifolia*, *Symphoricarpos oreophilus*, *Carex geyeri*, *Gallium spp.*, *Thalictrum fendleri*, *Rosa woodsii*, *Geranium viscossissimum*

Notes:

MC_08

Photo file: MC_08n.jpg

Photo file: MC_08e.jpg

Photo file: MC_08s.jpg

Photo file: MC_08w.jpg

Plot ID: MC_08
Survey Date: October 8, 2013
Cover Type: Mixed conifer
Sage Cover: 0%
Other Shrub Cover: *Pseudotsuga menziesii* 15% (60% is dead), *Acer glabrum* 1%, *Amelanchier utahensis* 8%, *Symphoicarpos oreophilus* 60%
Total Shrub Cover: 70%
Tree Cover: 15 %
Grass Cover: 80%
Forb Cover: 10%
Aspect: west
Slope: 41°
Insect/Disease:

Dominant Plant Species: *Carex geyeri*, *Bromus anomalus*, *Elymus glaucus*, *Chenopodium leptophyllum*, *Gallium spp.*

Notes:

Mixed Mountain Shrub Points

MM_05

Photo file: MM_05n.jpg

Photo file: MM_05e.jpg

Photo file: MM_05s.jpg

Photo file: MM_05w.jpg

Plot ID: MM_05 **Survey Date:** September 25, 2013
Cover Type: Mixed mountain shrub **Sage Cover:** 20%
Other Shrub Cover: *Amelanchier utahensis* 28%, *Symphoicarpos oreophilus* 10%, *Artemisia tridentata* 20%, *Chrysothamnus viscosissimum* 4%
Total Shrub Cover: 65% **Grass Cover:** 12%
Forb Cover: 6% **Aspect:**
Slope: 22° **Insect/Disease:**

Dominant Plant Species: *Eriogonum umbellatum*, *Carex geyeri*, *Gallium spp.*, *Pascopyrum smithii*, *Lupinus spp.*, *Penstemon strictus*, *Castillaja* spp.

Notes:

MM_07

Photo file: MM_07n.jpg

Photo file: MM_07e.jpg

Photo file: MM_07s.jpg

Photo file: MM_07w.jpg

Plot ID: MM_07
Survey Date: September 25, 2013
Cover Type: Mixed mountain shrub
Sage Cover: 18%
Other Shrub Cover: *Amelanchier utahensis* 20%, *Artemisia tridentata* 18%, *Chrysothamnus viscosissimum* 8%, *Symphoicarpos oreophilus* 6%
Total Shrub Cover: 65%
Grass Cover: 15%
Forb Cover: 9%
Aspect: east
Slope: 22°
Insect/Disease:

Dominant Plant Species: *Pascopyrum smithii*, *Poa pratensis*, *Carex geyeri*, *Eriogonum umbellatum*, *Viscia americana*, *Lupinus spp.*, *Heterotheca villosa*, *Castilleja* spp., *Penstemon procerus*

Notes:

MM_08

Photo file: MM_08n.jpg

Photo file: MM_08e.jpg

Photo file: MM_08s.jpg

Photo file: MM_08w.jpg

Plot ID: MM_08
Survey Date: September 2, 2013
Cover Type: Mixed mountain shrub
Sage Cover: 3%
Other Shrub Cover: *Amelanchier utahensis* 30%, *Purshia tridentata* 6%, *Symphoricarpos oreophilus* 4%
Total Shrub Cover: 40%
Grass Cover: 6%
Forb Cover: 5%
Aspect: southwest
Slope: 20°
Insect/Disease:

Dominant Plant Species: *Amelanchier utahensis*, *Purshia tridentata*, *Symphoricarpos oreophilus*, *Artemisia tridentata*, *Chrysothamnus viscosissimum*, *Eriogonum umbellatum*, *Lupinus spp*., *Carex geyeri*, *Quercus gambelii*, *Oryzopsis hymenoides*, *Viscia americana*

Notes:

MM_09

Photo file: MM_09n.jpg

Photo file: MM_09e.jpg

Photo file: MM_09s.jpg

Photo file: MM_09w.jpg

Plot ID: MM_09 **Survey Date:** October 8, 2013
Cover Type: Mixed conifer **Sage Cover:** 0%
Other Shrub Cover: *Pseudotsuga menziesii* 90%, *Populus tremuloides* 5%, *Amelanchier alnifolia* 10%, *Rosa woodsii* 3%
Total Shrub Cover: 10% **Grass Cover:**
Forb Cover: 30% **Aspect:** northwest
Slope: 28-30° **Insect/Disease:**

Dominant Plant Species: *Mahonia repens*, *Carex geyeri*, *Paxistima myrsinites*

Notes:

MM_10

Photo file: MM_10n.jpg

Photo file: MM_10e.jpg

Photo file: MM_10s.jpg

Photo file: MM_10w.jpg

Plot ID: MM_10 **Survey Date:** September 13, 2013
Cover Type: Mixed mountain shrub **Sage Cover:** 12%
Other Shrub Cover: *Amelanchier utahensis* 5%, *Purshia tridentata* 10%, *Symphoricarpos oreophilus* 3%, *Quercus gambelii* 3%, *Chrysothamnus viscossisimum* 1%
Total Shrub Cover: 30% **Grass Cover:** 7%
Forb Cover: 3% **Aspect:** West
Slope: 22° **Insect/Disease:**

Dominant Plant Species: *Amelanchier utahensis*, *Purshia tridentata*, *Symphoricarpos oreophilus*, *Artemisia tridentata*, *Chrysothamnus viscosissimum*, *Eriogonum umbellatum*, *Lupinus spp.*, *Carex geyeri*, *Quercus gambelii*, *Oryzopsis hymenoides*, *Viscia americana*

Notes:

Pinyon-Juniper Points

PJ-02

Photo file: PJ_02n.jpg

Photo file: PJ_02e.jpg

Photo file: PJ_02s.jpg

Photo file: PJ_02w.jpg

Plot ID: PJ-02
Survey Date: August 30, 2013
Cover Type: *Quercus gambelii*
Sage Cover: 0%
Other Shrub Cover: *Quercus gambelii* 80%, *Prunus virginiana* 10%, *Amelanchier alnifolia* 4%, *Symphoricarpos oreophilus* 18%
Total Shrub Cover: 99%
Grass Cover: 19%
Forb Cover: 5%
Aspect: west
Slope: 45°
Insect/Disease:

Dominant Plant Species: *Quercus gambelii*, *Prunus virginiana*, *Amelanchier alnifolia*, *Symphoricarpos oreophilus*, *Carex geyeri*, *Paxistima myrsinites*, *Mahonia repens*

Notes:

PJ-04

Photo file: PJ_04n.jpg

Photo file: PJ_04e.jpg

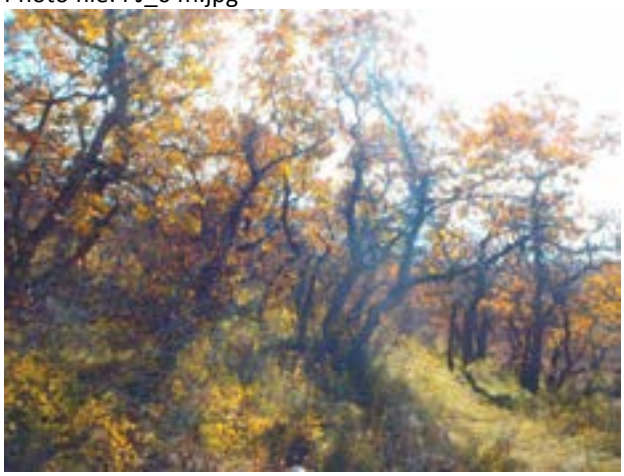

Photo file: PJ_04s.jpg

Photo file: PJ_04w.jpg

Plot ID: PJ-04
Survey Date: October 9, 2013
Cover Type: *Quercus gambelii*
Sage Cover: 15%
Other Shrub Cover: oak 15%, amuta 5%, *Artemisia tridentata* 15%, *Chrysothamnus viscosissimum* 10%
Total Shrub Cover: 50%
Grass Cover: 85%
Forb Cover: 15%
Aspect:
Slope: 15°
Insect/Disease:

Dominant Plant Species:

Notes:

PJ-05

Photo file: PJ_05n.jpg

Photo file: PJ_05e.jpg

Photo file: PJ_05s.jpg

Photo file: PJ_05w.jpg

Plot ID: PJ-05
Survey Date: August 30, 2013
Cover Type: Mixed mountain shrublands
Sage Cover: 5%
Other Shrub Cover: *Quercus gambelii* 10%, *Amelanchier utahensis* 17%, *Symphoricarpos oreophilus* 5%
Total Shrub Cover: 60%
Grass Cover: 18%
Forb Cover: 10%
Aspect: west
Slope: 40°
Insect/Disease:

Dominant Plant Species: *Amelanchier utahensis*, *Quercus gambelii*, *Artemisia tridentata*, *Symphoricarpos oreophilus*, *Chrysothamnus viscossisimum*, *Carex geyeri*, *Pascopyrum smithii*, *Mahonia repens*, *Penstemon strictus*.

Notes:

PJ-06

Photo file: PJ_06n.jpg

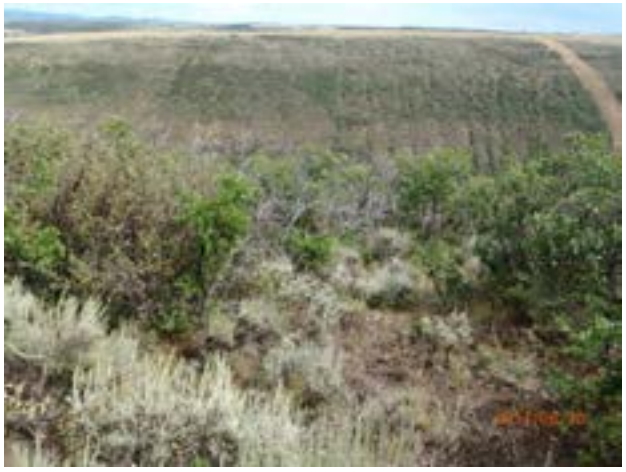

Photo file: PJ_06e.jpg

Photo file: PJ_06s.jpg

Photo file: PJ_06w.jpg

Plot ID: PJ-06
Survey Date: August 30, 2013
Cover Type: Mixed mountain shrublands
Sage Cover: 15%
Other Shrub Cover: *Quercus gambelii* 45%, *Amelanchier utahensis* 17%, *Purshia tridentata* 10%
Total Shrub Cover: 80%
Grass Cover: 12%
Forb Cover: 4%
Aspect: east
Slope: 18°
Insect/Disease:

Dominant Plant Species: *Quercus gambelii*, *Amelanchier utahensis*, *Artemisia tridentata*, *Purshia tridentata*, *Carex geyeri*, *Lupinus spp.*, *Achillea millefolia*, *Eriogonum umbellatum*, *Collinsia parviflora*

Notes:

PJ-10

Photo file: PJ_10n.jpg

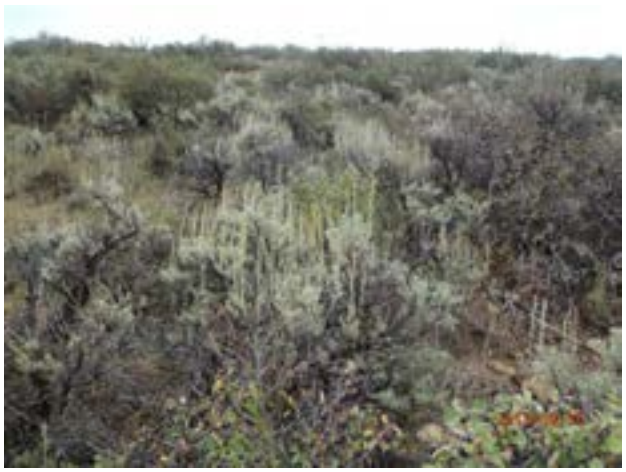

Photo file: PJ_10e.jpg

Photo file: PJ_10s.jpg

Photo file: PJ_10w.jpg

Plot ID: PJ-10
Survey Date: August 30, 2013
Cover Type: Mixed mountain shrublands
Sage Cover: 12%
Other Shrub Cover: *Amelanchier utahensis* 15%, *Cercocarpus montanus* 4%, *Symphoricarpos oreophilus* 4%
Total Shrub Cover: 36%
Grass Cover: 8%
Forb Cover: 17%
Aspect: west
Slope: 26°
Insect/Disease:

Dominant Plant Species: *Amelanchier utahensis*, *Artemisia tridentata*, *Cercocarpus montanus*, *Symphoricarpos oreophilus*, *Pascopyrum smithii*, *Eriogonum umbellatum*, *Oryzopsis hymenoides*, *Viscia americana*.

Notes:

Sagebrush Points

SA_02

Photo file: SA_02n.jpg

Photo file: SA_02e.jpg

Photo file: SA_02s.jpg

Photo file: SA_02w.jpg

Plot ID: SA_02
Survey Date: October 9, 2013
Cover Type: Sagebrush
Sage Cover: 65%
Other Shrub Cover: *Artemisia tridentata* 65%, *Symphoicarpos oreophilus* 3%, *Chrysothamnus viscosissimum* 2%, *Pinus edulis* 24%
Total Shrub Cover: 75%%
Grass Cover: 80%
Forb Cover: 8%
Aspect:
Slope: 9°
Insect/Disease:

Dominant Plant Species:

Notes:

SA_08

Photo file: SA_08n.jpg

Photo file: SA_08e.jpg

Photo file: SA_08s.jpg

Photo file: SA_08w.jpg

Plot ID: SA_08
Survey Date: October 9, 2013
Cover Type: Sagebrush
Sage Cover: 65%
Other Shrub Cover: *Artemisia tridentata* 65%, *Symphoicarpos oreophilus* 3%, *Chrysothamnus viscosissimum* 2%
Total Shrub Cover: 80%
Grass Cover: 80%
Forb Cover: 8%
Aspect:
Slope: 9°
Insect/Disease:

Dominant Plant Species:

Notes:

SA_09

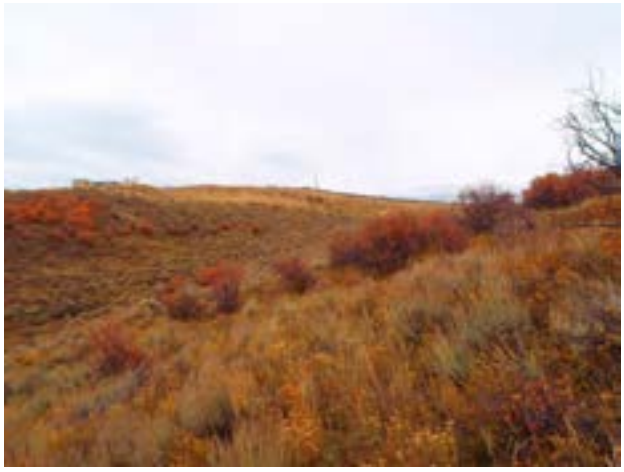

Photo file: SA_09n.jpg

Photo file: SA_09e.jpg

Photo file: SA_09s.jpg

Photo file: SA_09w.jpg

Plot ID: SA_09
Survey Date: October 9, 2013
Cover Type: Sagebrush
Sage Cover: 40%
Other Shrub Cover: *Artemisia tridentata* 40%, *Symphoicarpos oreophilus* 10%, *Chrysothamnus viscosissimum* 5%, *Amelanchier utahensis* 2%
Total Shrub Cover: 70%
Grass Cover: 75%
Forb Cover: 10%
Aspect:
Slope: 20°
Insect/Disease:

Dominant Plant Species:

Notes:

SA_10

Photo file: SA_10n.jpg

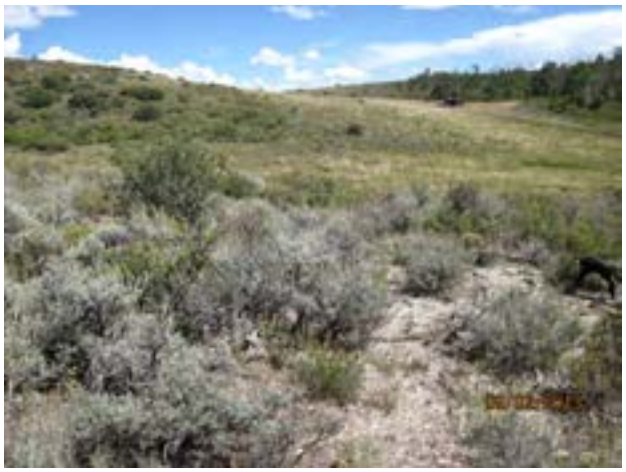

Photo file: SA_10e.jpg

Photo file: SA_10s.jpg

Photo file: SA_10w.jpg

Plot ID: SA_10
Survey Date: September 2, 2013
Cover Type: Sagebrush
Sage Cover: 38%
Other Shrub Cover: *Artemisia tridentata* 38%, *Symphoricarpos oreophilus* 11%, *Amelanchier utahensis* 2%
Total Shrub Cover: 50%
Grass Cover: 8%
Forb Cover: 4%
Aspect: south
Slope: 8°
Insect/Disease:

Dominant Plant Species: *Artemisia tridentata*, *Symphoricarpos oreophilus*, *Amelanchier utahensis*, hetspp., *Lupinus spp*., *Castilleja* spp., *Chrysothamnus viscosissimum*, *Eriogonum* spp., *Pseudoroegneria spicata*, *Poa secunda*, *Comandara umbellata*.

Notes:

Extra-1

Photo file: Oops-1n.jpg

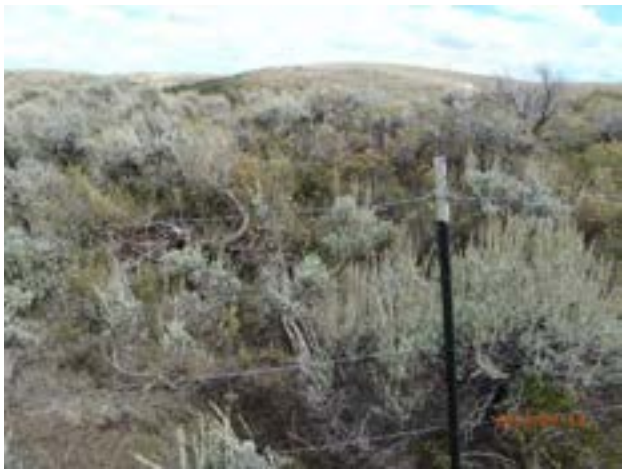

Photo file: Oops-1e.jpg

Photo file: Oops-1s.jpg

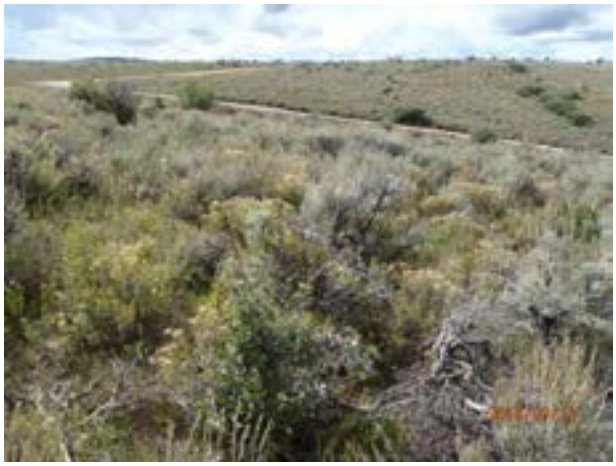

Photo file: Oops-1w.jpg

Plot ID: Oops-1
Survey Date: September 13, 2013
Cover Type: Sagebrush
Sage Cover: 35%
Other Shrub Cover: *Amelanchier utahensis* 1%, *Chrysothamnus viscossisimum* 25%, *Symphoicarpos oreophilus* 2%
Total Shrub Cover: 60%
Grass Cover: 30%
Forb Cover: 6%
Aspect: northwest
Slope: 5°
Insect/Disease:

Dominant Plant Species: *Eriogonum umbellatum*, *Comandara umbellata*, *Astragalus convallarius*, *Penstemon* spp., *Carex geyeri*, *Poa pratensis*, *Pseudoroegneria spicata*

Notes:

Sage-Grassland Points

SG_03

Photo file: SG_03n.jpg

Photo file: SG_03e.jpg

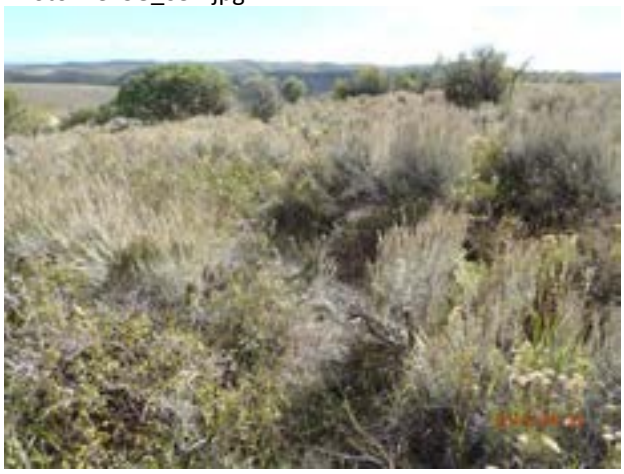

Photo file: SG_03s.jpg

Photo file: SG_03w.jpg

Plot ID: SG_03
Survey Date: September 25, 2013
Cover Type: Sage-Grassland
Sage Cover: 40%
Other Shrub Cover: *Artemisia tridentata* 29%, *Symphoicarpos oreophilus* 20%, *Chrysothamnus viscosissimum* 10%, *Amelanchier utahensis* 1%, *Quercus gambelii* 1 %
Total Shrub Cover: 58%
Grass Cover: 60%
Forb Cover: 8%
Aspect: East
Slope: 5°
Insect/Disease:

Dominant Plant Species: *Bromus inermis*, *Carex geyeri*, *Eriogonum umbellatum*, *Pseudoroegneria spicata*, *Chenopodium leptophyllum*

Notes: Grazed, nearby sage-grouse roost pile

SG_06

Photo file: SG_06n.jpg

Photo file: SG_06e.jpg

Photo file: SG_06s.jpg

Photo file: SG_06w.jpg

Plot ID: SG_06
Survey Date: September 13, 2013
Cover Type: Sage-Grassland
Sage Cover: 40%
Other Shrub Cover: *Artemisia tridentata* 40%, *Purshia tridentata* 15%, *Amelanchier utahensis* 1%, *Symphoicarpos oreophilus* 2%, *Chrysothamnus viscossisimum* 15%
Total Shrub Cover: 50%
Grass Cover: 40%
Forb Cover: 10%
Aspect: southwest
Slope: 5°
Insect/Disease:

Dominant Plant Species: *Carex geyeri*, *Poa pratensis*, *Pseudoroegneria spicata*, *Lupinus spp.*, *Helenium autumnale*, *Eriogonum umbellatum*.

Notes:

SG_07

Photo file: SG_07n.jpg

Photo file: SG_07e.jpg

Photo file: SG_07s.jpg

Photo file: SG_07w.jpg

Plot ID: SG_07
Survey Date: September 15, 2013
Cover Type: Sage-Grassland
Sage Cover: 23%
Other Shrub Cover: *Artemisia tridentata* 23%, *Purshia tridentata* 28%, *Amelanchier alnifolia* 6%, *Symphoicarpos oreophilus* 1%, *Chrysothamnus viscossisimum* 8%, *Quercus gambelii* 2%
Total Shrub Cover: 55%
Grass Cover: 10%
Forb Cover: 6%
Aspect: south
Slope: 13°
Insect/Disease:

Dominant Plant Species: *Pseudoroegneria spicata*, *Achillea millefolium*, *Eriogonum umbellatum*, *Penstemon* spp., *Opuntia polyacantha*, *Aster* spp.

Notes:

Sage- Mixed Mountain Shrub Points

SM_01

Photo file: SM_01n.jpg

Photo file: SM_01e.jpg

Photo file: SM_01s.jpg

Photo file: SM_01w.jpg

Plot ID: SM_01
Survey Date: September 2, 2013
Cover Type: Sage-mixed mountain shrub
Sage Cover: 7%
Other Shrub Cover: *Amelanchier utahensis* 40%, *Purshia tridentata* 30%, *Symphoricarpos oreophilus* 5%
Total Shrub Cover: 75%
Grass Cover: 6%
Forb Cover: 5%
Aspect: southwest
Slope: 20°
Insect/Disease:

Dominant Plant Species: *Amelanchier utahensis*, *Purshia tridentata*, *Symphoricarpos oreophilus*, *Artemisia tridentata*, *Castilleja* spp., *Chrysothamnus viscosissimum*, *Eriogonum umbellatum*, *Carex geyeri*, *Penstemon procerus*, *Poa secunda*

Notes:

SM_03

Photo file: SM_03n.jpg

Photo file: SM_03e.jpg

Photo file: SM_03s.jpg

Photo file: SM_03w.jpg

Plot ID: SM_03
Survey Date: October 9, 2013
Cover Type: Sage-mixed mountain shrub
Sage Cover: 10%
Other Shrub Cover: *Quercus gambelii* 10%, *Amelanchier utahensis* 20%, *Artemisia tridentata* 10%, *Symphoicarpos oreophilus* 2%
Total Shrub Cover: 55%
Grass Cover: 55%
Forb Cover: 5%
Aspect: southwest
Slope: 32°
Insect/Disease:

Dominant Plant Species:

Notes:

SM_04

Photo file: SM_04n.jpg

Photo file: SM_04e.jpg

Photo file: SM_04s.jpg

Photo file: SM_04w.jpg

Plot ID: SM_04
Survey Date: October 9, 2013
Cover Type: Sage-mixed mountain shrub
Sage Cover: 7%
Other Shrub Cover: *Quercus gambelii* 10%, *Artemisia tridentata* 12%, *Amelanchier utahensis* 5%, *Symphoicarpos oreophilus* 5%, *Chrysothamnus viscosissimum* 2%
Total Shrub Cover: 40%
Grass Cover: 80%
Forb Cover: 5%
Aspect:
Slope: 31°
Insect/Disease:

Dominant Plant Species:

Notes:

SM_09

Photo file: SM_09n.jpg

Photo file: SM_09e.jpg

Photo file: SM_09s.jpg

Photo file: SM_09w.jpg

Plot ID: SM_09
Survey Date: September 9, 2013
Cover Type: Sage-mixed mountain shrub
Sage Cover: 60%
Other Shrub Cover: *Artemisia tridentata* 60%, *Symphorocarpos oreophilus* 20%, *Quercus gambelii* 2%
Total Shrub Cover: 80%
Grass Cover: 80%
Forb Cover: 10%
Aspect:
Slope: 4°
Insect/Disease:

Dominant Plant Species:

Notes:

BEFORE THE UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT DATA QUALITY OFFICIAL

GARFIELD COUNTY, COLORADO	)	**Data Quality Act Challenge**
GRAND COUNTY, COLORADO	)	**to U.S. Department of the Interior**
JACKSON COUNTY, COLORADO	)	**Dissemination of Information**
MESA COUNTY, COLORADO	)	**Presented in the Bureau of**
MOFFAT COUNTY, COLORADO	)	**Land Management National**
RIO BLANCO COUNTY, COLORADO	)	**Technical Team Report**
CARTER COUNTY, MONTANA	)	
FALLON COUNTY, MONTANA	)	
FERGUS COUNTY, MONTANA	)	
MCCONE COUNTY, MONTANA	)	
MUSSELSHELL COUNTY, MONTANA	)	
PHILLIPS COUNTY, MONTANA	)	
PRAIRIE COUNTY, MONTANA	)	
RICHLAND COUNTY, MONTANA	)	
TOOLE COUNTY, MONTANA	)	
YELLOWSTONE COUNTY, MONTANA	)	March 18, 2015
ELKO COUNTY, NEVADA	)	
EUREKA COUNTY, NEVADA	)	
UINTAH COUNTY, UTAH	)	
WESTERN ENERGY ALLIANCE	)	
AMERICAN EXPLORATION & MINING	)	
ASSOCIATION	)	
COLORADO MINING ASSOCIATION	)	
COLORADO WOOL GROWERS ASSOCIATION	)	
INDEPENDENT PETROLEUM ASSOCIATION	)	
OF AMERICA	)	
INTERNATIONAL ASSOCIATION OF	)	
DRILLING CONTRACTORS	)	
MONTANA ASSOCIATION OF OIL, GAS &	)	
COAL COUNTIES	)	
MONTANA PETROLEUM ASSOCIATION	)	
NEVADA MINING ASSOCIATION	)	
PETROLEUM ASSOCIATION OF WYOMING	)	
PUBLIC LANDS COUNCIL	)	
UTAH MULTIPLE USE COALITION	)	

Petitioners

v.

BUREAU OF LAND MANAGEMENT

AN AGENCY OF THE U.S. DEPARTMENT OF THE INTERIOR

CHALLENGE PURSUANT TO THE DATA QUALITY ACT

Information Quality Act Processing Officer
Information Resources Governance Division
Information Resources Management Directorate
Bureau of Land Management
1849 C Street, NW, Mailstop 20M
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I. Introduction

The counties and organizations listed above (the "Petitioners") hereby submit this Challenge for Correction of Information ("Challenge") against the Bureau of Land Management ("BLM") *Report on National Greater Sage-Grouse Conservation Measures* (the "NTT Report")[1] pursuant to the Federal Information Quality Act (44 U.S.C. § 3516) ("Data Quality Act," or "DQA"), and the "Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information disseminated by Federal Agencies" issued by the Office of Management and Budget (67 Fed. Reg. 8452 (Feb. 22, 2002) ("OMB Guidelines")), as well as the "Information Quality Guidelines" of the U.S. Department of the Interior (67 Fed. Reg. 50687 (Aug. 5, 2002) ("DOI Guidelines")) and BLM Guidelines ("BLM Guidelines")[2] collectively known as (the "Guidelines") as well as Presidential memoranda and secretarial orders on scientific integrity and transparency as discussed below.

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[1] BLM, Sage-Grouse National Technical Team, A Report on National Greater Sage-Grouse Conservation Measures, http://www.blm.gov/pgdata/etc/medialib/blm/co/programs/wildlife.Par.73607.File.dat/GrSG%20Tech%20Team%20Report.pdf (Dec. 21, 2011).

[2] BLM, Information Quality Guidelines, http://www.blm.gov/style/medialib/blm/national/national_page.Par.7549.File.dat/guidelines.pdf.

In March of 2010, the U.S. Fish and Wildlife Service ("FWS") issued a listing decision on greater sage-grouse ("GRSG") under the Endangered Species Act ("ESA").[3] The FWS cited an alleged inadequacy of existing regulatory mechanisms as a factor in its warranted but precluded decision.[4] Pursuant to a settlement agreement with activist litigants, the FWS agreed to consider listing the species under the ESA by September 30, 2015.[5] The settlement agreement is presently being challenged by at least one of the aforementioned Petitioners. In the 2010 listing decision, BLM was identified as having a unique ability to conserve GRSG as it manages 51% of GRSG habitat.[6] BLM Resource Management Plans ("RMPs") were identified as an existing regulatory mechanism for GRSG.[7]

In response to the potential listing, BLM chartered a Sage-Grouse National Technical Team ("NTT") to develop policies and strategies on GRSG conservation under its jurisdiction. On December 27, 2011, the Washington, D.C. BLM Office released Instruction Memorandum number 2012-044,[8] which directed all BLM planning efforts across the GRSG range to consider conservation measures for GRSG when revising or amending its RMPs, including specifically the NTT Report.[9]

Pursuant to the National Environmental Policy Act ("NEPA"),[10] BLM and the U.S. Forest Service ("USFS") drafted amendments for some 98 land use plans across 11 western states "to identify and incorporate appropriate GRSG conservation measures…." (the "Land Use

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[3] 75 Fed. Reg. 13910 (Mar. 23, 2010).
[4] 75 Fed. Reg. 13910; NTT Report at 4; BLM, *Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement*, https://www.blm.gov/epl-front-office/projects/lup/36511/44083/47470/default.jsp;jsessionid=F525468403EFCDF53E7B387DAE45C8B0?projectName=Northwest+Colorado+Greater+Sage-Grouse+Draft+RMP+and+EIS at p. xxi (August 2013).
[5] http://naturalresources.house.gov/blog/?postid=306049.
[6] 75 Fed. Reg. 13910 at 13975.
[7] *Id.*
[8] BLM, *BLM National Greater Sage-Grouse Land Use Planning Strategy*, www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2012/IM_2012-044.html (Dec. 27, 2011).
[9] *See* Utah GRSG DEIS at 1-24.
[10] 42 U.S.C. §4331 *et seq*.

Plan Amendments").[11] BLM and USFS intend to make final decisions on these plans in 2015 so that regulatory mechanisms are included before FWS makes a listing decision.

The Petitioners have reviewed the NTT Report and found it to be inaccurate, unreliable, and biased in violation of the DQA and the Guidelines. The NTT Report purports to "provide the latest science and best biological judgment to assist in making management decisions." Instead, the NTT Report represents a partial presentation of scientific information, and justifies a narrow range of preferred conservation measures and policies that will be imposed throughout the West. Among other serious shortcomings described herein, the NTT Report is not based on reasonable consideration of the regulatory tools BLM already has, such as BLM Manual 6840, multiple authorities to require project-specific wildlife protection and habitat enhancement measures, and private on-the-ground conservation efforts.[12]

The DQA, Section 515 of the Treasury and General Government Appropriations Act of FY 2001 (Public Law 106-554), requires federal agencies to ensure and maximize the quality, objectivity, utility, and integrity of information, including statistical information disseminated by federal agencies on or after October 1, 2002. Agencies are required to review the quality of information before its dissemination and treat information quality as integral to every step.

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[11] BLM, *Federal Agencies Announce Initial Step to Incorporate Greater Sage-Grouse Conservation Measures into Land Management Plans* (Dec. 8, 2011), http://www.blm.gov/wo/st/en/info/newsroom/2011/december/NR_12_08_2011.html ("Greater sage-grouse currently use as much as 47 million acres of land managed by the BLM, and about nine million acres of land managed by the USFS. As many as 98 BLM Resource Management Plans address greater sage-grouse, while the USFS expects to evaluate conservation measures into as many as nine Land and Resource Management Plans considered high priority for the conservation of sage-grouse."); BLM, *Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement* at xxvi, and 5-6 (August 2013), https://www.blm.gov/epl-front-office/projects/lup/36511/44083/47449/Draft_Grouse_EIS_Build_1.pdf ("The COT Report includes areas identified as priority areas for conservation, the most important areas needed for maintaining GRSG representation, redundancy, and resilience across the landscape.").

[12] *See* Megan Maxwell, *BLM's NTT Report: Is it the Best Available Science or a Tool to support a Predetermined Outcome?* at ii. Available at: http://www.miningamerica.org/wp-content/uploads/NWMA-Review-of-NTT-Report-May-2013.pdf.

The OMB government-wide guidelines impose three core responsibilities on the agencies:

- First, the agencies must embrace a basic standard of "quality" as a performance goal, and agencies must incorporate quality into their information dissemination practices. OMB's guidelines explain that "quality" encompasses "utility" (usefulness to its intended users), "integrity" (security), and "objectivity." "Objectivity" focuses on whether the disseminated information is accurate, reliable, and unbiased as a matter of presentation and substance.

- Second, the agencies must develop information quality assurance procedures that are applied before information is disseminated.

- Third, the OMB government-wide guidelines require that each agency develop an administrative mechanism whereby affected parties can request that agencies correct poor quality information that has been or is being disseminated. If one is dissatisfied with the initial agency response to a correction request he or she may file an administrative appeal.

The NTT Report qualifies as both information disseminated by BLM, and as BLM-sponsored information.[13] Because U.S. Department of the Interior ("DOI") agencies are considering Land Use Plan Amendments based upon the NTT Report, and it may be utilized in a listing decision for GRSG under the ESA, the NTT Report is "influential" information subject to even higher standards of quality.[14] The NTT Report is not subject to any exclusion from the DQA nor from the Guidelines.[15]

A number of serious flaws exist with the NTT Report that, if implemented, will have enormous social and economic consequences in the West without commensurate benefits to local GRSG populations and habitat. BLM must rectify these issues and recognize that state and local conservation efforts are already underway that have proven more accurate and effective than the top-down, one-size-fits-all federal approach taken in the NTT Report.

Therefore, Petitioners request BLM retract the NTT Report and all reliance thereon in existing and subsequent agency land use plans, Land Use Plan Amendments, decisions on

[13] BLM Guidelines 1(d).
[14] BLM Guidelines 2(b).
[15] *See, e.g.* BLM Guidelines 1(e).

permits, authorizations, and the listed status of GRSG under the ESA. Alternatively, BLM could issue an amended NTT Report that uses sound analytical methods and the best data available, including specifically the information omitted in the current Report and referenced herein, ensuring transparency and objectivity in the information disseminated.

The best available science indicates that BLM should be far more flexible and adaptive in its approach to GRSG. Among other things, BLM should consider incorporating state, local, and private GRSG conservation plans and efforts consistent with the DQA, the Guidelines, DOI and Presidential orders, and its statutory multiple use mandates discussed herein.

The information disseminated should be corrected upon consideration of the most recent or thorough information from stakeholders, the public and the scientific community. This challenge constitutes the most recent and thorough information such that BLM should retract or amend the NTT Report accordingly.

II. The Petitioners

Petitioners have a direct interest in the quality and integrity of agency science and decision making, to ensure effective conservation. The Petitioners engage in ranching, grazing, mining, and energy development on multiple-use federal, state and private lands throughout the West, or are counties that rely on these activities for their economic and social viability. The Petitioners are particularly attuned to how the NTT Report affects management of public lands in the West. The management restrictions, regulatory measures, and closures recommended in the NTT Report will negatively impact the economy, the future viability of countless communities, local governments, small businesses, family farms and ranches, mining enterprises, electricity and oil and natural gas development in the West. There will be a profound and particularized impact on the Petitioners, as:

- Counties:
  - Colorado: Garfield County, Grand County, Jackson County, Mesa County, Moffat County, Rio Blanco County
  - Montana: Carter County, Fallon County, Fergus County, McCone County, Musselshell County, Phillips County, Prairie County, Richland County, Toole County, Yellowstone County
  - Nevada: Elko County, Eureka County
  - Utah: Uintah County

- Western Energy Alliance (the "Alliance") represents more than 450 companies engaged in all aspects of environmentally responsible exploration and production of oil and natural gas across the West. The Alliance represents independents, the majority of which are small businesses with an average of fifteen employees.

- American Exploration & Mining Association is a 120 year old, 2,500 member, non-profit, non-partisan trade association based in Washington. AEMA members reside in 42 states and are actively involved in prospecting, exploring, mining, and reclamation closure activities on federally administered lands, especially in the West. Our diverse membership includes every facet of the mining and represents a true cross-section of the American mining community from small miners and exploration geologists to junior and large companies. Most of our members are individual citizens or small businesses.

- Colorado Mining Association is an industry association, founded in 1876, whose more than 1,000 members include individuals and organizations engaged in the exploration, development and production of coal, metals, agricultural and industrial minerals throughout Colorado, the west and the world. CMA's membership also includes persons and enterprises providing support, services and supplies to the mining industry.

- Colorado Wool Growers Association was founded in 1926. It is premier legislative, regulatory, and policy management organization for the Colorado sheep industry.

- Independent Petroleum Association of America (IPAA) represents the thousands of independent oil and natural gas producers and service companies across the United States. Independent producers develop 95 percent of domestic oil and gas wells, produce 54 percent of domestic oil and produce 85 percent of domestic natural gas. IPAA members are dedicated to meeting environmental requirements while economically developing and supplying energy resources for consumers.

- The International Association of Drilling Contractors (IADC) is a leading oil and gas trade association and it is considered the authoritative body in the drilling space. Headquartered in Houston, Texas, IADC represents the interest of drilling contractors operating throughout the world including all oil and gas producing areas of the United States.

- Montana Association of Oil, Gas & Coal Counties is a non-profit corporation providing leadership on energy issues and promoting responsible energy development for the future of Montana. There are 34 counties that belong to the Association.

- The Montana Petroleum Association is a voluntary, non-profit trade association, whose members include oil and natural gas producers, gathering and pipeline companies, petroleum refineries and service providers and consultants.

- The Nevada Mining Association (NvMA) is a statewide trade organization formed over 100 years ago to address issues facing the mining industry in Nevada. The association has hundreds of members representing mine operators, the exploration community and vendors.

- The Petroleum Association of Wyoming (PAW) is Wyoming's largest and oldest oil and gas organization dedicated to the betterment of the state's oil and gas industry and public welfare. PAW members, ranging from independent operators to integrated companies, account for approximately ninety percent of the natural gas and eighty percent of the crude oil produced in Wyoming.

- The Public Lands Council (PLC), headquartered in Washington, D.C., represents ranchers who use public lands, manage the natural resources and preserve the unique heritage of the West. PLC is a Colorado nonprofit corporation. PLC represents state and national cattle, sheep and grasslands associations. PLC works to maintain a stable business environment in which livestock producers can conserve the natural resources of the West while producing food and fiber for the nation and the world.

- Utah Multiple Use Coalition: Recognizing Utah is a public lands state, eighteen organizations relying on access for natural resources, grazing, recreation and jobs banded together for a single united voice. Through prudent application of multiple-use management principles, precious recourses such as timber, wildlife, forage, minerals, energy, water and recreation can co-exist with Utah's unique and sensitive environments. Coalition members include the Utah Farm Bureau, Utah Mining Association, Utah Woolgrowers, Utah Rural Electric Association, and Western Counties Alliance.

The Petitioners primary representatives can be reached at the following addresses:

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III. The NTT Report Violates the Quality, Objectivity, Utility and Integrity Standards of the DQA and its Guidelines

The NTT Report: (1) was developed with unsound research methods including partial and biased presentation of information; (2) ignores studies that do not support its theses; (3) jumps to conclusions that are not scientifically supported but are pure conjecture; and (4) disseminates information that is neither objective nor reliable and that lacks scientific integrity.

Both the DQA and the Guidelines require agencies to "ensure and maximize" the quality, "objectivity, utility, and integrity" of information disseminated by federal agencies.[16] "Utility" refers to "the usefulness of the information to its intended users, including the public."[17] For all of the reasons discussed herein, the NTT Report fails to meet quality, objectivity, utility and integrity standards of the DQA, the Guidelines and the additional authorities cited herein. *E.g.* Exhibit A at 1, 19, and 33; *see also* Exhibit B at 17 and 24.

Accordingly, Petitioners ask BLM to correct, retract or supplement information referenced in the NTT Report and also seeks to ensure that all information disseminated by BLM meets the requirements of the DQA and the Guidelines.

A. The NTT Report is Not Transparent

The NTT Report fails to meet quality and utility standards of the DQA and the Guidelines. The OMB Guidelines 11require a high degree of transparency for influential information such as the NTT Report. Transparency equates to disclosure of the "data and methods of analysis" such that replication of results could be achieved.[18] Peer-review of original

[16] DQA § 515(a), OMB Guidelines, § 11(2), 67 Fed. Reg. at 8458.
[17] OMB Guidelines V(2). 67 Fed. Reg. at 8459 (emphasis added).
[18] OMB Guidelines V(3)(b)(ii).

and supporting data and results "does not necessarily imply that the results are transparent and replicable."[19]

OMB has recognized that the benefits of transparency extend well beyond the ability to identify errors in government work. Far more important is the ability to assess the extent to which results hinge upon an agency's choices in analysis.[20] "Agency guidelines shall, however, in all cases, require a disclosure of the specific data sources that have been used and the specific quantitative methods and assumptions that have been employed."[21] OMB explains that: "[i]n assessing the usefulness of information that the agency disseminates to the public, the agency needs to consider the uses of the information not only from the perspective of the agency but also from the perspective of the public. As a result, when transparency of information is relevant for assessing the information's usefulness from the public's perspective, the agency must take care to ensure that transparency has been addressed in its review of the information.[22]

The NTT Report has been far from transparent. BLM convened closed-door sessions and private correspondence to bolster science cited in the NTT Report shortly before its release to the public. *See* Exhibit A at 1-2. As discussed herein, peer review on the NTT Report was also done behind closed doors and with no public input. *See* Exhibit A at 24-26. BLM failed to disclose virtually any information until forced to do so by the Alliance's Freedom of Information Act ("FOIA") litigation.

BLM failed to provide basic information to the public about the NTT Report, despite the heavy reliance on it in multiple Land Use Plan amendments. The Alliance went to great lengths to obtain relevant information about peer reviews on the NTT Report. Faced with agency

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[19] OMB, Guidelines *for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies*, http://www.whitehouse.gov/omb/fedreg_reproducible.
[20] *Id*.
[21] OMB Guidelines V. (emphasis added).
[22] OMB Guidelines, § V(2). 67 Fed. Reg. at 8459 (emphasis added).

noncompliance, the Alliance filed two FOIA requests and a FOIA lawsuit against BLM for information that should have already been in the public domain pursuant to the DQA, its Guidelines, and presidential and secretarial memoranda and orders discussed further herein.

FOIA requires an agency to respond to such requests within 20 business days. BLM refused to disclose all of the information requested by the Alliance in these FOIA requests until the Alliance initiated litigation. It took more than seven months to receive the information requested. These actions ultimately resulted in the disclosure of more than 880 pages of relevant information that should have been disclosed and open for public review and comments.

Had BLM complied with the aforementioned authorities, many of the Alliance's extensive legal efforts would have been unnecessary and the public could have timely ascertained whether these documents were scientifically sound and substantially capable of replication.

B. The NTT Report is Not Reproducible

Transparency is a lynchpin to reproducibility. "The purpose of the reproducibility standard is to cultivate a consistent agency commitment to transparency about how analytic results are generated: the specific data used, the various assumptions employed, the specific analytic methods applied, and the statistical procedures employed."[23] "Reproducibility means that the information is capable of being substantially reproduced, subject to an acceptable degree of imprecision."[24] The more important the information disseminated, the more rigorous the standard.[25]

The NTT Report fails to meet DQA standards for quality. The OMB Guidelines provide that higher standards than peer review applies to influential information, namely a "substantial

[23] *Id*.
[24] *See* OMB Guidelines V10.
[25] OMB Guidelines V10.

reproducibility standard."[26] The DOI and BLM have adopted, and indeed must adopt, OMB Guidelines. In appropriate cases, OMB encourages the agencies to consider "confirmation" as a standard in assessing the objectivity of original and supporting data.[27] "The more important the information, the higher the quality standards to which it should be held, for example in those situations involving 'influential scientific, financial or statistical information'"….[28]

The NTT Report is highly influential, in that it "will have or does have a clear and substantial impact on important public policies or important private sector decisions."[29] Pursuant to BLM's Guidelines, the NTT is influential in that it "is expected to have a clear and substantial impact at the national level for major public and private policy decisions as they relate to Federal public lands and resource issues."[30] A clear and substantial impact has a "high probability of occurring," as BLM and USFS already are in the process of incorporating recommendations from the NTT Report into some 98 Land Use Plan Amendments across the nation.[31]

The NTT Report fails to meet the substantially reproducible standard required under the DQA and the Guidelines. *E.g.* Exhibit A at 2-3, 18, 20, and 33; *see also* Exhibit B at 3-4, 10-12, 26-27, and 29.

C. The NTT Report Fails the Required Robustness Checks

To the extent the agency believes it cannot disclose certain information in the NTT Report, robustness checks are required for ensuring compliance with the DQA because the public will not be afforded any other mechanism for determining objectivity, utility and reproducibility. In fact, the "agencies shall apply <u>especially rigorous robustness checks</u> to analytic results and

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[26] 67 Fed. Reg. 8452, 8457 (Feb. 22, 2002).
[27] *Id*.
[28] OMB Guidelines V(3)(b)(ii).
[29] *See* OMB Guidelines V(9).
[30] BLM Guidelines 2(b).
[31] Aris Evia,National System of Public Lands, *BLM & Sage-Grouse Management & Conservation*, http://onda.org/get-involved/events/desert-conference-2012/presentations/sage-grouse-aris-evia at page 8.

document what checks were undertaken."[32] DOI Guidelines mirror this requirement, but the NTT Report did not undergo rigorous checks.

The OMB explained in its February 22, 2002 agency-wide guidelines that the "general standard" for these robustness checks is "that the information is capable of being substantially reproduced, subject to an acceptable degree of imprecision."[33] "For example, a qualified party, operating under the same confidentiality protections as the original analysts, may be asked to use the same data, computer model or statistical methods to replicate the analytic results reported in the original study."[34]

The robustness checks required are missing or inadequate. For all but a handful of the studies relied upon by the NTT Report, complete data are not publicly available.

D. The NTT Report Contains Conflicts of Interest

The Departmental Manual ("DOI Manual")[35] defines a conflict of interest as "any personal, professional, financial, or other interests that conflict with the actions or judgments of those covered by this policy when conducting scientific and scholarly activities or using scientific and scholarly data and information because those interests may: (1) significantly impair objectivity; (2) create an unfair competitive advantage for any person or organization; or (3) create the appearance of either."[36]

A number of the relevant regulations and guidance stress the importance of independence[37] and the need to avoid conflicts of interest.[38] Among other things, independence

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[32] OMB Guidelines V3.b.ii.B.ii (emphasis added).
[33] 67 Fed. Reg. 8452, 8457 (Feb. 22, 2002).
[34] OMB, *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies*, http://www.whitehouse.gov/omb/fedreg_reproducible (effective Jan. 3, 2002).
[35] *Available at:* http://elips.doi.gov/elips/browse.aspx.
[36] 305 DM 3.
[37] Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities 59 Fed. Reg. 34270 (Jul. 1, 1994); OMB Peer Review Bulletin; Memorandum for the Heads of Executive Departments and Agencies. 74 Fed. Reg. 10671 (Mar. 11, 2009), available at: http://www.gpo.gov/fdsys/pkg/FR-2009-03-11/pdf/E9-5443.pdf

means that a peer reviewer should not have been a contributor to the work product leading to the listing of a species and the peer reviewer has not been influenced by funding considerations. The National Academy of Sciences ("NAS") considers financial interests, access to confidential information, reviewing one's own work, public statements and positions, and employees of sponsors as problems to be avoided in its conflicts policy.[39]

The NTT Report fails on all those standards. A small number of GRSG specialist-advocates have had a disproportionate influence on formulating federal policy including their overlapping participation in preparation of the NTT and COT Reports as well as the highly influential USGS GRSG Monograph and peer reviews thereon. Since the three documents have interlocking relationships among their authors and peer reviewers which overlap with the authors of the few studies on which the Reports depend, the result is an insularity that clearly violates DQA and the Guidelines. More diverse expertise and viewpoints are clearly needed.

BLM failed to consider a range of diverse and objective scientific viewpoints and, instead, relied heavily on a small, select group of specialist-advocates with homogenous and biased opinions. For instance, Dr. Jack Connelly served as both a COT member and as the co-editor of the Monograph. Dr. Steven T. Knick was an NTT author and another co-editor of the Monograph. Similarly, Shawn Espinosa was involved in the preparation of both the NTT and COT reports. Likewise, Dr. David E. Naugle was not only an NTT member, but also served as a

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(http://www.whitehouse.gov/sites/default/files/microsites/ostp/scientific-integrity-memo-12172010.pdf); Performance Work Statement for Scientific, Technical and Advisory Services (http://www.fws.gov/informationquality/peer_review/IDIQ_Performance_Work_Statement_17Nov2011.pdf); Information Quality Guidelines and Peer Review (http://www.fws.gov/informationquality/topics/InformationQualityGuidelinesrevised6_6_12.pdf).

[38] Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports (http://nationalacademies.org/coi/); Final Information Quality Bulletin for Peer Review 70 Fed. Reg. 2664 (Jan. 14, 2005); Memorandum for the Heads of Executive Departments and Agencies (http://www.whitehouse.gov/sites/default/files/microsites/ostp/scientific-integrity-memo-12172010.pdf); Department Manual, Part 305, Chapter 3 (http://www.fws.gov/science/pdf/DOIScientificIntegrityPolicyManual.pdf).

[39] *Available at:* http://www.nap.edu/openbook.php?isbn=0309059437&page=9

source of support for the FWS document, which cited his work frequently.

Further demonstrating the lack of diversity along with the lack of independence in authorship is the fact that the authors of these influential reports frequently cited to their own previous work. For instance, Naugle, an NTT member, cited to his own work, Walker and Naugle 2011, in preparing the NTT Report. Another NTT member, Knick, cited his own work repeatedly throughout the NTT report. Knick and Hanser 2011 was cited six times in the NTT report, Knick et al. 2003 was cited once in the NTT Report, and Knick et al. 2011 was cited six times in the NTT report.

If these authors weren't citing their own work, they were citing the work of colleagues with whom they had a long history of collaboration. For example, in the NTT Report, Naugle cited to Doherty et al. 2008 six times, Walker et al. nine times, Holloran 2005 twelve times, and Tack three times. However, Naugle had previously collaborated and co-authored papers with each of the four aforementioned authors. Naugle published Naugle et al. 2011a, which included as co-authors Doherty, Walker, Copeland, Holloran, and Tack. Naugle and Walker were also co-authors on another paper, Doherty et al. 2011. Naugle also co-authored at least three other papers with Doherty (Doherty et al. 2010a, Doherty et al. 2010b, and Doherty et al. 2011). Doherty and Holloran have been co-authors on at least one other paper.

The Reports rely on the same limited set of studies, reflecting a lack of diversity of viewpoints among the Reports. Doherty et al. 2008 was cited six times in the NTT Report and once in the COT Report. Walker et al. was cited nine times in the NTT Report and twice in the COT Report. Holloran 2005 was cited twelve times in the NTT Report and twice in the COT Report and nineteen times in the 2010 FWS listing decision on GRSG. Knick et al. was cited once in the NTT Report and fourteen times in the COT Report. Knick and Hanser was cited six

times in the NTT Report, eight times in the COT Report, and thirty-eight times in the 2010 GRSG listing decision. Knick et al. was cited six times by the NTT Report and twice by the COT Report. Leu and Hanser 2011 was cited in the USGS Monograph and three times in the COT Report. Yet with all the self-referential citing, these Report authors failed to consider a wide body of scientific literature, which is provided in Exhibit C.

Finally, there were a number of instances where authors who contributed to the Reports reviewed and edited their own work. For instance, Naugle served as his own editor for Naugle et al. 2011a. Similarly, in the NTT Report, Knick cited to his own work, Knick et al. 2003, which he also edited.

These facts demonstrate that a handful of scientists, who have pre-established professional relationships and singular viewpoints, have had a disproportionately substantial influence on the Reports. When there is reliance upon singular viewpoints, and researchers who have overlapping participation in preparation of influential documents and peer reviews, there is a violation of the governing authority on scientific research and data. Such actions also fail to maintain independence and the avoidance of conflicts of interest.

Furthermore, many of the authors responsible for the reports leading to the listing of the species have historically demonstrated a disregard for the policies on independence in the peer review process. The Center for Environmental Science, Accuracy, & Reliability ("CESAR") exposed similar issues in its review of the USGS GRSG Monograph, which involved a number of the authors who were also involved in the NTT and COT Reports, and found a lack of independence in both authorship in peer review.[40] Likewise, here, there is a discernible pattern of disregard for the policies and regulations governing independence and conflicts of interest.

[40] https://www.hightail.com/download/UW14OU1VMVh0TWxYd3NUQw.

As recently as March 12, 2015, Reese, Beck, and Holloran co-signed a letter to individual White House and DOI officials advocating for the most egregious regulatory restrictions in the NTT Report and virtually threatening an ESA listing if such measures were not adopted.[41] Other signatories included COT member Connelly, NTT member Rinkes and Monograph authors Garton and Braun. This and similar activity indicates that these scientists have overstepped their bounds, and have gone from providing independent, objective science to advocating policies based on their biases.

The conflicts of interest that permeate the NTT Report violates numerous sources of authority, including the DQA, its implementing Guidelines, the DOI Manual, NAS policy and various secretarial orders and presidential memoranda discussed herein.

E. The NTT Report Did Not Undergo Adequate nor Open Peer Review

The NTT Report failed to undergo adequate peer review as required by the DQA, the Guidelines and the presidential and secretarial orders and memoranda discussed herein. Peer review is a process by which something proposed, as for research or publication, is evaluated by a group of experts in the appropriate field.[42] Peer review is used to ensure work meets the appropriate standards of the scientific and technical community,[43] and maximizes the quality, objectivity, utility, and integrity of provided information.[44] Reviewers are typically anonymous and independent to help foster unvarnished criticism and to discourage cronyism in funding and publication decisions,[45] and are not selected from among the authors' close colleagues, students, or friends. Such was not the case here.

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[41] Baker et al. letter to Secretary of the Interior Sally Jewell and Secretary of Agriculture Tom Vilsack dated March 11, 2015.
[42] Merriam-Webster, "*peer review*," http://www.merriam-webster.com/dictionary/peer%20review.
[43] *Id.*
[44] OMB, *Memorandum for Heads of Departments and Agencies* ("M-05-03), http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf.
[45] *See Id.* at 2.

1. Peer Review Standards

The DOI's Information Quality Mission Statement provides, in pertinent part:

> "In order to ensure the accuracy and integrity of its published scientific information, DOI follows a robust peer review process wherein the information undergoes internal peer review and is subject to public scrutiny. DOI agencies are to maintain the highest standards possible for published information to ensure integrity and transparency."[46]

We question how "robust" the peer review process actually was. For one, BLM failed to meet applicable peer review planning standards.[47] In addition, BLM did not subject peer review of the NTT Report to any public scrutiny.

DOI Guidelines require not only that information be consistent with the Guidelines, but that the agency maintain an administrative record of review proceedings.[48] BLM failed to do so. Further, for influential information, DOI commits to provide "more rigorous review of the conclusions than the review performed by the originating office."[49] No such rigorous review was undertaken for the NTT Report.

The government-wide guidance to peer review of government science is established in the "*Final Information Quality Bulletin for Peer Review*" issued by the Office of Management and Budget (OMB) of the Executive Office of the President (the "OMB Peer Review Bulletin").[50] The OMB Peer Review Bulletin provides detailed guidelines for peer review of influential scientific information and applies more stringent peer review requirements to highly influential scientific assessments. Peer review shall be solely of scientific and technical

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[46] DOI, Chief Information Officer, *Information Quality Mission Statement*, http://www.doi.gov/archive/ocio/iq.html (emphasis added).
[47] *See* DOI: Chief Information Officer, Department of the Interior Information Quality Mission Statement, DOI Bulletin for Peer Review, http://www.doi.gov/archive/ocio/iq_1.html.
[48] DOI Guidelines II.5.
[49] *Id.*
[50] *Id.*

matters.[51] It typically evaluates 1) the clarity of hypotheses, 2) the validity of the research design, 3) the quality of data collection procedures, the robustness of the methods employed, 4) the appropriateness of the methods for the hypotheses being tested, 5) the extent to which the conclusions follow from the analysis, and 6) the strengths and limitations of the overall product.[52]

The OMB Peer Review Bulletin requires that reviewers are selected based upon 1) expertise, to ensure that the selective reviewer has the knowledge, experience, and skills necessary to perform the review; 2) balance, to represent a diversity of scientific perspective relevant to the subject; 3) independence, to ensure that the reviewer was not involved in producing the draft document to be revised; and 4) conflict of interest, to examine prospective reviewers' potential financial conflict including significant investments, consulting arrangements, employer affiliations, and grants/contracts.[53]

The rigorous review required by the DQA, the Guidelines and the OMB Peer Review Bulletin was not completed for the NTT Report.

2. Peer Review Failed to Undergo Public Comments

BLM failed to produce administrative record for peer review as required by the DQA and the Guidelines. Further, DOI provides no evidence that it rigorously reviewed the NTT Report. BLM certainly did not submit peer reviews on the NTT Report to the public for review and comment. Only upon commencement of FOIA litigation did BLM divulge the information requested relative to peer review on the NTT Report. This information should have already been publically available pursuant to the authorities referenced above.

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[51] U.S. Nuclear Regulatory Commission, *Applying OMB Peer Review Guidelines* (ML05100303), http://www.nrc.gov/public-involve/ml051600303.pdf

[52] *See Id*. at 3.

[53] OMB, Memorandum for Heads of Departments and Agencies ("M-05-03), http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf.

The OMB Peer Review Bulletin[54] established specific requirements for "influential scientific information" and "highly influential scientific assessments." Agencies are directed to disclose the names of the reviewers and their affiliations.[55] And, "an agency conducting a peer review of a highly influential scientific assessment must ensure that the peer review process is transparent by making available to the public the written charge to the peer reviewers, the peer reviewers' names, the peer reviewers' report(s), and the agency's response to the peer reviewers' report(s)."[56] BLM failed to do so.

BLM issued a Memorandum in June of 2013[57] summarizing its policy with respect to public transparency in the peer review process (the "BLM Memorandum"). If the peer review process is challenged under the Information Quality Act, the peer reviewer's name(s), the peer reviewer's report(s), and the agency's response to the peer reviewer's report(s) must be made public.[58] BLM did not meet these requirements.

In reference to its peer review planning process requirements, DOI directs readers to links[59] to its agencies' websites. Notably, the BLM peer review link contains absolutely no reference to peer review nor to peer review planning.[60] Rather, BLM simply links to its DQA Guidelines and challenges and responses thereunder.[61] Following the links regarding Peer

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[54] 70 Fed. Reg. 2664 (Jan. 14, 2005).
[55] *Id.* (emphasis added).
[56] *Id*.
[57] BLM, Assistant Director, Information Resources Management, Peer Review of Influential Scientific Information (June 6, 2013), *available at* http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2013/im_2013-137__peer.html.
[58] *See* BLM, *Data Quality Guidelines/Bulletin for Peer Review*, http://www.blm.gov/wo/st/en/National_Page/Notices_used_in_Footer/data_quality.html; *see also* Bureau of Land Management, *Information Quality Guidelines*, http://www.blm.gov/style/medialib/blm/national/national_page.Par.7549.File.dat/guidelines.pdf (updated February 9, 2012).
[59] It should be noted that the most recent Peer Review Report referenced by DOI in its link for "Information Quality and Peer Review Reports," was from FY2010.
[60] http://www.blm.gov/wo/st/en/National_Page/Notices_used_in_Footer/data_quality.html.
[61] *Id.*

Review Reports to BLM, it appears BLM has never submitted a Peer Review Report for public review.

3. Persuasive Showing the NTT Report Was Not Objective

OMB guidelines state that information will generally be presumed to be objective if data and analytic results have been subjected to formal, independent peer review; however, this presumption is rebuttable "based on a persuasive showing by a petitioner in a particular instance."[62] The OMB guidelines also specify certain standards for agency sponsored peer reviews. The issue is what will be considered a "persuasive showing" that will overcome the presumption of objectivity under the proposed agency guidelines. An example of such a review is the process used by scientific journals.[63] However, even journal peer review does not necessarily equate to quality. As OMB has recognized, there are well-documented examples of flawed science published in respected journals.[64] Accordingly, the presumption is rebuttable.[65]

In this case, BLM has not met the applicable standards. As referenced above, serious conflicts issues abound with regard to the reviewers of the NTT Report and those selected to help bolster scientific weaknesses therein shortly before its release.

The peer review of the NTT Report was coordinated by Nevada Department of Wildlife Director, Ken Mayer. Incredibly, the reviewers were not asked to provide a scientific review:

> "[W]e are not asking for a strict scientific review, but rather an assessment of the CM [conservation measures] and the appropriateness of circumstances that a manager would apply the CM and will these CMs meet the objectives of preventing losses or degradation of habitat and prevent decreases in the distribution of sage-grouse."[66]

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[62] 67 Fed. Reg. 8452, 8454 (Feb. 22, 2002).
[63] *Id.*
[64] *Id.*
[65] *Id.*
[66] Ken Mayer letter to NTT Report reviewers (Oct. 11, 2011).

This clearly violates the letter and intent of the DQA, the OMB Peer Review Bulletin and the Guidelines. It should also be noted that reviewers were given only ten days to review the NTT Report.[67]

The peer review process was hardly open or rigorous. The Alliance was forced to litigate against BLM under FOIA to obtain what should have been disclosed and open for public comment. Moreover, BLM failed to address several comments and issues raised by peer reviewers in the NTT Report. *See* Exhibit A at 26-33. These issues constitute the "persuasive showing" required to overcome the presumption of objectivity. Even then, some of the reviewers expressed real concerns with the NTT Report. "In summary, the approach taken in the document is rather short-term and narrow, and it seems to miss the opportunity to take a more holistic and long-term view of sage-grouse management."[68] Another reviewer noted "The document is an odd mix of scientific citations and policy decisions, with no real tie between the two. This seems a strange blend of policy loosely backed by citations, with no analysis of science. Because there is no iteration of the rational scientific basis for the very prescriptive strategies, I would anticipate strong blowback by Industry and by Environmental Groups… ."[69]

Yet another reviewer remarked, "[T]he document suffers from a 1-size fits all approach that lacks context." Exhibit A at page 28. Lumping all seasonal habitats into either "priority" or "general" is "tremendously simplistic."[70] Additional criticism included a lack of definition of priority and general habitat, a lack of performance or realistic adaptive management; and a lack of flexibility with regard to No Surface Occupancy ("NSO") buffer requirements.[71]

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[67] *Id.*
[68] Reviewer 3 at 2.
[69] Reviewer 2 at 2; *see also* Exhibit A at 31..
[70] Reviewer 2 at 5.
[71] *Id.* at 6 and 15; *see also* NTT Report at 20-23 (No surface occupancy or use is allowed on the lands described),

BLM clearly failed to address these fundamental shortcomings with the NTT Report. Peer review of the NTT Report was inadequate because each of the comments received were not incorporated or rebutted by the NTT in writing, as is the accepted practice in scientific peer review. *See* Exhibits A and B. Accordingly, the NTT Report falls short of the DQA, the Guidelines and the OMB Peer Review Bulletin.[72] It also contradicts BLM's own DQA memorandum specifically addressing peer review.[73]

F. The NTT Report Was Not Based on the Best Available Science

The NTT Report fails to meet DQA standards for quality, objectivity, utility and integrity. Agencies are directed[74] to adopt congressional standards of scientific integrity stemming from the Safe Drinking Water Act ("SDWA").[75] For agency action based on science, the SDWA standards must entail "(i) the best available, peer-reviewed science and supporting studies conducted in accordance with sound and objective scientific practices; and (ii) data collected by accepted methods or best available methods (if the reliability of the method and the nature of the decision justifies use of the data)."[76] Executive Order 13562 also requires that regulations "must be based on the best available science:"[77]

Here, the NTT Report and the studies cited therein fail to meet the best available science standards. *See* Exhibit A at 2, 6 and 10; *see also* Exhibit B at 10-11 and 24-25. Specifically, it suffers: flawed methodology, modeling and assumptions as well as erroneous and biased interpretation of results. Significant uncertainties in the NTT Report are ignored and conjecture

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[72] http://www.blm.gov/pgdata/etc/medialib/blm/national/national_page.Par.7549.File.dat/guidelines.pdf.
[73] BLM, Peer Review of Influential Scientific Information, http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2013/im_2013-137__peer.html (June 6, 2013).
[74] OMB Guidelines V3.b.ii.B.ii.C.
[75] 42 U.S.C. § 300g-1(b)(3)(A).
[76] OMB, Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminted, http://www.whitehouse.gov/omb/fedreg_reproducible.
[77] Federal Register, Vol. 76, No. 14 (January 21, 2011) at 3821. Executive Order 13563: *Improving Regulation and Regulatory Review*, http://www.gpo.gov/fdsys/pkg/FR-2011-01-21/pdf/2011-1385.pdf.

and opinion are presented as facts. Moreover, the onerous regulatory measures recommended in the NTT Report are far from justified. In fact, they impose an incredible burden on the Petitioners and the public without scientific justification.

The entire process initiated by BLM to incorporate the NTT Report into its Land Use Plan Amendments is fraught with substantial procedural, legal and scientific flaws. BLM's NTT Report is the source for many of the scientific flaws (described above), which was recognized by DOI employees and discussed in internal emails questioning the legality of some of the conservation measures recommended in the NTT Report:

> "…But, does the NTT really want to recommend something that is blatantly illegal(?)…"[78]

Peer reviewers for the NTT Report also warned the team of the scientific and legal flaws:

> "Are you going to sit back and have catastrophic wildfires dictate your outcome?...Are winter ranges a constant vegetation type? No, so why would you state such an objective?...This type of passive management is helping further degrade critical habitats…"[79]
>
> This seems a strange blend of policy *loosely* backed by citations, with no analysis of the science (emphasis added). [80]

Regrettably, DOI decision-makers did not heed warnings like this from DOI staff and peer reviewers and proceeded with publishing the NTT Report knowing that there were significant internal concerns about the report. For these reasons, and due to the over reliance on the NTT Report across alternatives , the Land Use Plan Amendments suffer in quality, specifically utility and scientific integrity, and are thus, inconsistent with the requirements of the DQA, Guidelines, and presidential memoranda.

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[78] FOIA Response, *supra*, note 3.
[79] Maxwell, note 2 at 5 (internal citation omitted).
[80] *Id*. at 3 (internal citation omitted).

Unfortunately, the NTT Report and many of the studies upon which it relies have significantly flawed assumptions, questionable analytic models and questionable statistical procedures. *See* Exhibit A at 14-15; *see also* Exhibit B at 1, 4, 7, 21-23, 26, and 29-30. Virtually all of the significant studies relied upon in the NTT Report utilize models. *See* Exhibit B, *gen*. The NTT Report relies extensively upon these models and even models built upon models to evaluate the alleged human footprint on sagebrush habitat and alleged GRSG population responses. In contravention of the Guidelines, BLM has not demonstrated to OMB that there is no other option than to use these third-party models.

While federal agencies often use various models developed by third parties to formulate policies based upon influential scientific information, OMB Guidelines require that influential scientific information be reproducible. This reproducibility standard generally requires that the models, data used to develop the models, and computer code used to develop such information be publicly available.

Here, BLM has not identified several sources in the NTT Report and has not disclosed the supporting data and models for the public to assess the objectivity of the Report. The models relied upon are quite complex. However, because the underlying data used in many of them have not been fully released nor provided to peer reviewers for independent analysis, they are neither transparent nor reproducible. The peer reviewers, journal editors, or scientific and regulatory audience cannot independently evaluate the quality and potential biases in the data and studies.

Moreover, the data have been collected by different people in different states using different standards and levels of effort--all of which have changed over time. The data are not properly curated or maintained in a central repository. Metadata to describe precisely how the

data were collected, recorded and summarized along with quality and control assurances are undocumented. Additionally, depending upon the state or federal agency, key variables have not been released. Simply put, the raw data and methods that one could potentially use to reproduce the final data sets are not available either because they are not released, undocumented, or may no longer exist. The models themselves often exhibit a complete lack of transparency and reproducibility. *See* Exhibit B, *gen*.[81] What little background presented to the public regarding the models is presented in a confusing fashion with only vague references to the assumptions upon which it was based.

States within the range of the GRSG collect annual counts on leks. Integral to understanding GRSG is the means by which to count their populations and to predict potential trends. As discussed in Exhibits A and B herein, agency biologists have cherry-picked lek count data from the states to form the basis of opinions memorialized in the key reports utilized by BLM. The modeling efforts within these studies form the backbone of the federal, top-down approach being imposed through the Land Use Plan Amendments. *See* Exhibit A at 2, 15, 19-20, and 33-34; see also Exhibit B at 7, 10, 13, and 28. Without the underlying data, these reports are neither transparent nor reproducible.

Through its FOIA efforts and litigation, the Alliance learned the NTT authors recognized significant scientific shortcomings with their draft report. As a result, a "Science Support Team" was convened in a closed-door meeting in Phoenix, Arizona shortly before the report was finalized to "<u>further strengthen the science underpinnings to our conservation measures."</u> Likely in violation of the Federal Advisory Committee Act ("FACA"), BLM provided no public notice

[81] Note: The NTT Report does not mention that Walker et al. 2007 used model selection procedures that were not statistically reliable. The study used nine predictor variables, with just nine years of data, to compare 19 models, in an attempt to identify combinations of predictor variables that would potentially explain patterns in the data. However, for model selection to work properly, the number of predictor variables must be smaller in comparison to the number of observations (in this case, the number of years of data).

nor opportunity to participate in the Science Support Team effort. Former Colorado Division of Wildlife Director Tom Remington led the effort, constituting another likely FACA violation, as Remington was no longer an agency employee when this occurred.[82] The identities of persons involved in this review were finally provided through FOIA litigation.

The NTT Report and efforts to bolster the science cited within it were rife with conflicts. Two of the "Science Support Team" members that were disclosed after FOIA litigation, Naugle and Knick, were frequently cited in the NTT Report. Naugle et al. 2011 (chapter 21 of the GRSG Monograph) was cited eight times in the 2010 WBP decision and three times in the NTT Report. Knick 2011 (chapter 13 of the GRSG Monograph) was cited nine times in the 2010 WBP decision, four times in the COT Report and once in the NTT Report; Knick and Hanser 2011 (chapter 18 of the Monograph) was cited 38 times in the 2010 WBP decision, eight times in the COT Report and six times in the NTT Report. In the NTT review process, Dr. Knick added a citation to himself in the NTT Report for the flawed proposition, "[S]mall increases in the human footprint (a collective measure of anthropogenic disturbance) within 3.1 miles resulted in large increases in probability of lek extirpation."

Where the science could not be bolstered, Tony Apa, an NTT member, wrote in an email to other NTT members Hagen, Kick, Naugle, Deibert, Kemmner, Espinosa, Robinson, and Morales:

> "I've tried to identify those biological recommendations that may need a scientific citation. I've taken my hand at highlighting as well and those things I flagged are in grey. I'm working on an introductory part on certainty of conclusions and inference space with regards to science without relating it to any study in particular and run it by everyone. *If we don't have the science I'm assuming it will be our best professional judgement* (emphasis added).

[82] http://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/data_quality_2.Par.10399.File.dat/2013%201104%20BLM%20Response_Sgamma%20Letter%20-%202013-10-24.pdf

Recognizing issues with scientific support and the issues raised by reviewers, Appendix A was added to the NTT Report to allegedly provide "context" for the conservation measures.[83] However, Appendix A is simply an excerpt from the 2010 listing decision describing the life history requirements of the GRSG. It does little to address the significant issues raised by reviewers or pursuant to the DQA and the Guidelines as discussed herein.

The NTT also attempts to provide justification for the science used in the report by providing Appendix B: "Scientific Inference." While inference is commonly made in scientific research, all other aspects of the study must be sound, and the inferred conclusion must logically follow from the facts. In Appendix B, BLM states:

> "Many of the studies cited are from different researchers, study sites, methodologies, and/or years which assists and improves the certainty of the conclusion and inference space (Fig. 1), *but ultimately, it is incumbent upon managers to assess their level of risk (consequences of being wrong) with management decisions based upon the cited findings.*" [84]

Because several of the most influential studies cited in the NTT Report contain significant flaws (*See* Exhibits A and B) any inferences made by study authors or BLM is also flawed. Furthermore, by making recommendations and then seeking scientific justification for them, the NTT was in effect backing into their preferred conclusions rather than providing a comprehensive and objective treatment of alternatives.

G. The NTT Report Lacks Objectivity and Exhibits Bias

The NTT Report is biased by the use of policy-driven assumptions, inferences, and uncertainties that are not supported by scientific data. It inadequately treats uncertainties through presumptive interpretations of data and inaccurate portrayal of threats through differential treatment of environmental factors.

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[83] *See* Maxwell, *infra* at 1.
[84] NTT Report at 57

The DQA requires agencies to issue guidelines ensuring and maximizing the "objectivity" of all information they disseminate. The OMB guidelines implementing the legislation define "objectivity," and that definition includes a requirement that information be "unbiased" in presentation and substance. "Objectivity," along with "unbiased," is correctly considered to be, under the OMB guidelines, an "overall" standard of quality.[85]

In this case, the NTT Report fundamentally and erroneously assumes GRSG populations are in decline, and that declines in lek attendance equate to population declines. It also concedes to a near-total lack of knowledge on how GRSG respond to anthropogenic disturbance, yet proposes multitudes of unfounded regulatory restrictions to address them.[86]

The NTT Report is not presented in an accurate, clear, complete and unbiased manner.[87] *See* Exhibits A and B, *gen*. For example, with regard to coal mining, without substance or authority, the NTT report recommends finding all surface mining of coal unsuitable under certain criteria.[88] With no support, it recommends granting no new mining leases unless all surface disturbances are outside priority habitat as well as restrictions on facility and timing restrictions and other mitigation requirements are recommended. In the absence of unbiased supporting evidence, the NTT Report asserts that energy development causes impacts that are "universally negative and typically severe," a false sentiment extracted directly from Naugle 2011a.

Naugle served as his own editor for Naugle et al. 2011a. This GRSGS Monograph chapter is cited eight times in the 2010 WBP decision and three times in the NTT Report for the erroneous narrative that oil and natural gas development is uniformly deleterious to GRSG populations. The authors examined 32 published papers, reports, management plans, and theses

[85] 67 Fed. Reg. 8452, 8458 (Feb. 22, 2002).
[86] *See* NTT Report at 57.
[87] *See* OMB Guidelines V(3)(a).
[88] NTT Report at 24.

regarding biological responses of sage grouse to energy development and then dismissed all but seven studies. This *"critical review"* is not impartial because the authors are also authors on four of the seven pieces of the literature reviewed. Four of the seven studies focused on impacts to GRSG in areas of *intensive* energy development and are not necessarily representative of less intensive energy development, development based on newer environmental regulations, or newer technologies. Studies not written by the authors were reinterpreted.

The NTT Report relies upon Naugle for the frequently repeated and erroneous assumption that avoidance results in population decline to support the flawed "professional judgement" that 3% disturbance caps are necessary for GRSG. However, Naugle et al. 2011a does not mention, measure or support a 3% threshold. It is seriously misrepresented in the NTT Report.

Yet another issue is the NTT Report's proposal to withdraw priority habitat from locatable mineral entry without providing any scientific justification. Based on studies readily available to the NTT, USGS in its baseline environmental report published after the NTT Report found that mining of various Federal mineral resources (locatable and saleable) currently affects approximately 3.6% of potential GRSG habitat directly *across the entire range* of the GRSG. Despite having the same information available to them about the small amount of impact, the NTT Report proposed withdrawing lands from locatable mineral entry. Withdrawals of the magnitude proposed by the NTT conflict with FLPMA's[89] multiple-use mandate, § 22 of the General Mining Law, and the Mining and Minerals Policy Act;[90] and cannot be implemented.

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[89] 43 U.S.C. §§ 1701 *et seq*, (*E.g*. Under Section 1701(a)(7) of FLPMA, BLM is required to manage the public lands on the basis of multiple use and sustained yield. Multiple use management is a concept that describes the complicated task of achieving a balance among the many competing uses on public lands, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife, and fish, and uses serving natural scenic, scientific and historic values.); *see also Norton v. Southern Utah Wilderness Alliance*, 542 U.S. 55, 58 (2004).

[90] 30 U.S.C. §§ 22-24, 26-30, 33-35, 37, 39-43, 47 (2000).

Withdrawal of this magnitude can only be made by an Act of Congress or by the Secretary pursuant to the requirements and procedures of FLPMA § 204(c) for a period not to exceed 20 years.

Where appropriate, BLM states it will seek input from appropriate stakeholders and the scientific community.[91] Here, BLM has sought only selective input in a way that likely violates FACA as well as the DQA and its Guidelines. Moreover, the fields of GRSG biology and ecology have not been stagnant. To the contrary, newer and more sophisticated modeling, as well as evolving understanding of ecologically mechanisms impacting the GRSG is now available. *See* Exhibit C. This has "substantially changed" the body of knowledge; and thus, supersedes and outdates the draconian, ill-formed opinions and policy measures found in the NTT Report. For example, the one-size-fits-all application of the proposed conservation measures has been categorically opposed by the scientific community and other DOI agencies, including even FWS and USGS.

The NTT Report presents a biased view of oil and natural gas operations by conveying that "impacts are universally negative and typically severe." It then selectively presented information in support of its conclusions, while ignoring contrary information. Key assertions in the NTT Report are both biased and in error, especially the frequently repeated, but erroneous assumption, that a temporary decrease in lek counts immediately adjacent to active wells is equivalent to a population decline.

The NTT Report is also biased in its characterization of sagebrush restoration efforts. While restoration in some areas can be challenging, it is a result of multiple compounding factors, which are not necessarily present across the range of the species. Further, it is overly

[91] BLM Guidelines 2(c).

simplistic and inaccurate to say that restoration is too difficult, or unsuccessful. Restoration and the factors that limit restoration are far too complicated to make such a blanket statement.

All of the aforementioned issues evidence bias and lack of objectivity in contravention to the DQA, the Guidelines and Executive Order 13563, which calls for "objectivity of any scientific and technical information and processes used to support [an] agency's regulatory actions."[92]

H. The NTT Report Contains Selective Citations

All scientific information and data, not just selective use of information, needs to be made available and considered in influential documents such as the NTT Report. The NTT Report selectively presents information while ignoring information contrary to its preferred conservation measures. Rather, it represents a partial presentation of scientific information to justify a narrow range of preferred conservation measures and policies. Exhibit C contains an extensive selection of studies completely ignored in the NTT Report or published subsequent thereto.

The NTT Report omits numerous scientific papers and reports on oil and gas mitigation measures for GRSG, the mitigation of raven predation on GRSG, the fact that the GRSG disperse over greater distances than previously thought, and that they traverse (fly) over or around roads, agricultural areas, and oil and gas development.[93] S*ee also* Exhibits A and B, *gen*. The NTT Report is obsolete due to the rate at which research on the GRSG is being conducted. BLM must consider studies like Kehmeir et al. 2014 to ensure the integrity of its policies and

[92] *Available at: http://www.gpo.gov/fdsys/pkg/FR-2011-01-21/pdf/2011-1385.pdf.*

[93] J. Kehmeier, N. Wojcick, J. Millspaugh, C. Hansen, M. Rumble, S. Gamo and G. Miller, *Overview of Greater-Sage-Grouse Monitoring Efforts*, Chokecherry and Sierra Madre Wind Energy Project, Carbon County, Wyoming (2014).

information it disseminates. *See* Exhibit C. Neither did BLM use the best available science on beneficial impacts of livestock grazing and predator control, as discussed below.

There are substantial technical errors in the NTT Report including misleading use of citations and use of citations that are not provided in the "Literature Cited" section.[94] This makes it difficult to provide scientific verification.[95] For example, two of the researchers, J.W. Connelly and B.L. Walker, are referenced frequently in the NTT Report, but 34% of the citations had no corresponding source available to review.[96] This limits the ability of outside reviewers or the public to verify claims reducing the NTT Report's utility and usefulness, and reduces the report's scientific integrity.[97] Additionally there are articles listed in "Literature Cited" that are not used within the NTT Report itself.[98] The NTT Report is also guilty of misleading use of authority.[99] *See also* Exhibits A and B, *gen*. Finally, the NTT Report ignores substantial information and fails to include studies published in subsequent years. *See* Exhibit C. For these reasons the NTT Report fails to meet the standards of utility, integrity, and ultimately quality pursuant to the DQA.

The NTT Report often mis-cites studies as if they support its preconceived regulatory goals. For example, the NTT Report stipulates that with regard to fuel management, sagebrush cover should not be reduced to less than 15%.[100] However, Connelly et al. 2000, the source cited, does not stand for this proposition.[101] This one-size-fits-all prescription does not take into account differences in seasonal requirements, or the importance of understory health. In some

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[94] Maxwell *infra* at 13-14.
[95] *Id*. at 14.
[96] *Id*.
[97] *Id*.
[98] *Id*.
[99] *Id*.
[100] Available at: http://www.blm.gov/pgdata/etc/medialib/blm/co/programs/wildlife.Par.73607.File.dat/GrSG%20Tech%20Team%20Report.pdf.
[101] Maxwell at 14.

site-specific instances, reducing sagebrush may be appropriate to enhance native perennial grasses. Importantly, Connelly et al. 2000 distinguished between types of habitat and provides that corresponding sagebrush canopy percentages vary from 10% to 30% depending on habitat function and quality.[102] Connelly et al. 2000 does state that land treatments should not be based on schedules, targets, and quotas.[103]

Further, in the discussion regarding prescribed burns, Connelly et al. 2000 notes that not all prescribed burns result in adverse impacts to GRSG. Rather, impacts are dependent upon the type of seasonal habitat. While the author does describe some adverse impacts related to nesting habitat, this cited paper does not discuss any of these prescribed burn treatments in terms percentage of canopy cover.[104]

IV. Proposed Restrictions are Contrary to the DQA

The new best management practices ("BMPs") proposed in the NTT Report are unnecessarily restrictive, are not supported by scientific information, do not address specific cause and effect mechanisms that are known to be deleterious to sage grouse, and in some cases are not achievable (i.e. restoring land to pre-mining topography). These recommendations were made without any tracking and testing of the effectiveness of existing BMPs.

Throughout the NTT Report, BLM proposes proscriptive management regimes based upon fundamentally flawed science including:

- Four-mile No Surface Occupancy (NSO) of active leks
- 3% limit on surface disturbance
- 50-70% sagebrush cover threshold
- Right-of-Way (ROW) exclusion and avoidance areas
- 1 disturbance per 640 acres.

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[102] *Id.*
[103] John W. Connelly, Michael Schroeder, Alan Sands, & Clait Braun, *Guidelines to Manage Sage-Grouse Populations and Their Habitats*, 28 Wildlife Society Bulletin 967-985 (2000).
[104] *See* Connelly et al. 2000 at 972-974.

In addition, the BLM through the NTT Report proposes arbitrary conservation measures based on unproven assumptions that:

- a minimum range of 70% of the acreage in sagebrush cover is required for long-term persistence of GRSG
- 15-25% minimum canopy cover is necessary in all GRSG seasonal habitats
- a temporary decrease in local lek attendance equates to a population decline.

These arbitrary measures conflict with studies that indicate sagebrush cover preference differs between seasons, and thus using a single percent cover is inappropriate and is not supported by scientific research described in the literature. *See* Exhibit C. Moreover, a one-size-fits-all limit of 3% on disturbances is unsupported, as discussed in detail below.

BLM manages millions of acres of GRSG habitat across 11 western states, which consists of highly varied ecological conditions, as well as varied threats to the GRSG and its habitat. The NTT Report provides recommendations for GRSG across its entire range including specific habitat prescriptions applicable to all GRSG seasonal habitats. Although this "one-size-fits-all" management approach may be convenient to administer, it is completely inappropriate for the GRSG because of their broad ecological range, variations in population traits and characteristics and the variability in habitat conditions and threats within the range. These variations make managing GRSG and their habitat a complex task that must consider site-specific conditions and variables. Simplifying GRSG management by creating range-wide habitat prescriptions or percent disturbance thresholds fails to target the specific sub-regional and population scale factors, as well as seasonal habitat preferences. The simplistic "one-size-fits-all" approach completely fails to recognize this variation and complexity. This critical flaw renders the habitat management recommendations in the NTT Report likely fail to protect GRSG and habitat range-wide and could even result in unintended adverse consequences. For example, the NTT's passive restoration and fire management strategies, and one-size fits-all vegetative requirements

could increase the risk of catastrophic fire and habitat destruction in areas already under extreme threat of wildfire by limiting grazing that reduces fuels and repurposing firefighting resources toward suppression (which will result in additional fuel build up and larger fires as compared to using controlled burns). In addition, proposed prohibitions on road construction and travel restrictions hinder access for firefighting and other purposes as seen in Oregon.

A. Four-Mile Buffers in the NTT Report are Unsupported by Scientific Evidence

The presumed necessity of a four-mile radius NSO buffer around sage grouse leks is based upon the subjective opinion of selected authors. *See* Exhibit A at 18-19; *see also* Exhibit B at 5-6, 13, 23, and 30. The studies cited in support of a four-mile buffer did not test this as compared to alternative buffer distances, thus, the NTT Report mischaracterized the findings of these studies.[105]

The primary rationale presented by the NTT Report that the majority of nests are located within four miles of a lek such that four-mile NSOs are required is not sound. There are no data that demonstrate a four-mile buffer addresses any specific threat such as predation, functional disturbance of leks from noise or activity, or that such a buffer would result in any quantifiable benefit in terms of increased survivorship or reproduction. Instead, the presumed necessity is solely based upon the subjective opinions expressed in the NTT Report and correlative studies regarding local lek counts, none of which identify any causal mechanism for localized effects which are improperly characterized as negative and permantent population effects.

Further, the flawed opinions of the NTT authors are based on assumptions that nesting habitat is the limiting factor across all populations, and that 90% of all nests must be protected in order for GRSG to persist. However, there is no evidence that a four-mile buffer will result in

[105] The NTT Report mis-cites Giesen 1995, Graham and Jones 2005 and Graham and Connell 2004 as support for 4-mile buffers. These papers lacked any hypotheses testing. Rather, they simply recorded finding GRSG nests within four miles of leks.

quantifiable population level benefits to GRSG in terms of increased survivorship or reproduction. Data from the Pinedale Planning Area demonstrate GRSG populations have increased despite intensive energy development in Jonah, Labarge, and the Pinedale Anticline within four miles of active leks.[106] *See* Exhibit A at 5-6, and 17-21. Notably, many of these areas developed prior to widespread use of directional drilling and clustered development. Accordingly, impacts from oil and natural gas development today are smaller.[107]

The NTT Report states that "[I]mpacts as measured by the number of males attending leks are most severe near the lek, remain discernible out to >4 miles (Holloran 2005, Walker et al. 2007, Tack 2009, Johnson et al. 2011), and often result in lek extirpations (Holloran 2005, Walker et al. 2007)."[108]

However, the NTT Report failed to mention the methodological problems of those studies or the fact that none of those studies reported a population-level decline in GRSG rather than a localized effect on rates of male lek attendance near the disturbance. *See* Exhibit A at 5 and 18; *see also* Exhibit B at 30. The population predictions made by Holloran 2005 have failed to manifest, and Walker et al. 2007 and Johnson et al. 2011 are severely flawed. *See* Exhibit A at 4-5, and 24; *see also* Exhibit B at 10, 13, and 30. These are hardly the "strong evidence" in support of draconian land use and timing restrictions that the NTT purports. NTT at 19.

The NTT Report also fails to mention that Holloran 2005, using much larger sample sizes (n=213 vs. n=77), reported nest success that was virtually identical and not significantly different between disturbed and undisturbed areas compared to Lyon and Anderson's (2003) results. The NTT Report cannot selectively use results from Lyon and Anderson (2003) to support its

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[106] *Id.*; *See also* Wyoming Game and Fish Department, *Wyoming Sage-Grouse Population Lek Count Data* (2013); Wyoming Oil and Gas Conservation Commission *Well Data*; Disturbance Data from PAPO, JDMIS, and PDMIS databases.
[107] Applegate and Owens 2014; Kirol et al. 2015.
[108] NTT Report at 20.

recommendations while failing to state that they were statistically insignificant and contrary to more recent and comprehensive data. The DQA requires that information used by agencies be based upon verifiable and repeatable data, and not based upon opinion.

These buffers are driven by policy considerations rather than defensible biological criteria and do nothing to mitigate specific cause and effect threats to GRSG. This one-size-fits-all approach clearly fails to address specific threats or their underlying mechanisms, and variation in seasonal habitat use across populations. *See* Exhibit A at 5, 18- 21; *see also* Exhibit B at 7-8, 18, 22, and 26. Further, it leaves no allowance for conservation plans tailored to local conditions. Conservation measures best suited to one region are not necessarily suited to another region. *See* Exhibit B at 7, 11, 26 and 30. It is particularly important to acknowledge local conditions because the negative impacts of federal environmental decisions fall "solely on states, local communities, businesses, jobs, and private property owners."[109]

The practical effect of the proposed restrictions would be to protect vast areas of non-habitat and marginal habitat with no demonstrable benefit to the GRSG populations. The area of this four-mile radius surrounding each lek is 50 square miles.[110] *See* Exhibit A at page 19. Given the topography of the GRSG habitat, substantial acreage within four miles of leks might not be suitable GRSG habitat. This overly broad restriction will greatly limit activities including year-round oil and natural gas development and its associated benefits, which include reduced truck traffic, fewer emissions, and phased development.[111]

The Land Use Plan Amendments, discussed in detail below are incorporating NTT recommendations for seasonal four-mile NSO buffers around active leks during lekking, nesting,

[109] Western Governor's Association, *Policy Resolution 13-08 – Endangered Species Act*, p. 3.
[110] NTT Report at 32.
[111] Ramey et al. 2011.

and early brood rearing in all designated habitat.[112] Even the NTT Report states that a "4-mile NSO [no surface occupancy] buffer would not be practical given most leases are not large enough to accommodate a buffer of this size, and lek spacing within priority habitats is such that lek based buffers may overlap and preclude all development."[113]

For all of these reasons, the information disseminated does not meet DQA standards for objectivity and integrity, and must therefore, be retracted or corrected. Moreover, by acting on flawed measures in the NTT Report, BLM has committed itself to an action before making a final decision. This could be construed as pre-decisional and an irreversible, irretrievable commitment of resources contrary to NEPA.[114]

B. Disturbance Caps in the NTT Report are Unsupported

The NTT Report proposes a 3% cap on disturbance that is not scientifically supported. Instead it is based on opinions, selective citation, and invalid assumptions that temporary displacement of GRSG in a developed area equates to a population decline, or that GRSG avoidance of an area equates to a population decline.

The NTT Report presented no scientific data that achieving less than 3% total disturbance is: (1) scientifically defensible; (2) achievable; (3) would result in stable GRSG populations; (4) would not result in irreparable harm to other species; and (5) would not unnecessarily have a negative effect on local economies. *See* Exhibits A and B, *gen*.

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[112] *See* NW CO GRSG DEIS at 161-165; The dates for nesting/early brood-rearing habitat vary by field office. Every field offices' nesting/early brood-rearing habitat starts on March 1 except for the White River Field Office which starts on April 15. All of the field offices' nesting/early brood-rearing habitat ends on June 30 with the exception of White River which ends on July 8. However, BLM statewide dates for nesting/early brood-rearing habitat are March 1 – July 15.

[113] NTT Report at 21.

[114] *See* 40 C.F.R. § 1502.2(g); *see also* Applegate and Owens 2014; and Kirol et al. 2015.

While BLM states that mapping data for these disturbance thresholds will be consistent with the DQA,[115] it has yet to recognize that the best mapping data are from the states and local governments.

For instance, Garfield County developed a Greater Sage-Grouse Conservation Plan based on the best available science and a tailored approach to private and public land management to benefit the species.[116] In recognition of the County's unique GRSG habitat characteristics (i.e. extreme topographic variation and naturally fragmented suitable habitat patches), Garfield County commissioned an in-depth analysis of its 2,956 square miles, revealing that nearly 70%of Garfield County is not suitable for GRSG.[117] However, there are small but important patches of suitable GRSG habitat in Garfield County, amounting to at least 70,000 acres.[118] Garfield County's plan accordingly focuses conservation efforts on that suitable habitat.

In addition, the NTT Report makes no allowance for including local sage grouse conservation plans at the county level or by private landowners that have tailored conservation measures to local conditions, including unique habitat and threats, and socio-economic factors. *See also* Exhibit A at 3, 16, and 18.

State and local conservation efforts have proven more accurate and effective than the one-size-fits-all federal approach taken in the NTT Report. *See* Exhibit A at 2, 15-16, and 21. In fact, in the Land Use Plan Amendments, BLM admits that local data have been omitted and there

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[115] *Id.*

[116] Garfield County, Board of County Commissioners, *Greater Sage-Grouse Conservation Plan*, http://www.garfield-county.com/community-development/documents/FINAL-Approved-Grouse-Plan-Amendment%201_11-20-2014.pdf (adopted Mar. 18, 2013) (amended Nov. 17, 2014) (Habitat mapping provided by state and federal agencies were not accurate and did not provide adequate planning information)

[117] *Id*. at 10-17, and 35-37 (the Garfield County plan utilized highly sophisticated and peer reviewed habitat modeling completed in November of 2014 that proved a 67% decrease in potentially suitable habitat from Colorado Parks and Wildlife's model, indicating that CPW and BLM over-mapped 147,000 acres of private and public land).

[118] *Id*. at 7-8, 16-18, and 25-26 (acreage includes suitable habitat for all range of GRSG lifespan behavioral requirements).

are inconsistencies between Western Association of Fish and Wildlife Agencies ("WAFWA")-level and local planning-level data.[119]

The concept of capping anthropogenic and total disturbances envisioned is fundamentally flawed, and BLM has not provided sufficient scientific data to support the disturbance cap concept or its effectiveness. Further, BLM has not explained the difference between temporary and permanent disturbances, and how each will be applied towards the threshold. For example, BLM defines "temporary use" as an activity "considered to be one that is not fixed in place and is of short duration."[120] This definition lacks specificity and could be widely interpreted. By contrast, the Utah state conservation plan specifically defines "temporary" as "[a]ny ground disturbing activity where the effects would be expected to last less than five years."[121]

Oil and natural gas development activities are by nature temporary disturbances. The highest level of surface disturbance associated with development occurs during the construction drilling and completion phases, which can last from a few weeks to a few months. Once production is achieved, companies reclaim a large portion of the area disturbed for development and long-term disturbance represent only a small fraction of the initial disturbance.

Much like the four-mile NSO buffers, the proposed disturbance caps are one-size-fits-all regulatory prescriptions with no allowance for GRSG conservation plans tailored to local conditions.[122] As one NTT reviewer stated:

> "if this document is to be effective in defining conservation measures on a range-wide basis, it must take into account the considerable large-scale variation in plant community ecology present within the range of the GRSG. Otherwise we are faced with species-centric generalizations of the effects of ecological processes that may or may not represent the ecological reality."[123]

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[119] *See* UT GRSG DEIS, 3.1 at 3-2.
[120] *See* UT GRSG DEIS at Glossary-26.
[121] *Utah's Conservation Plan for Greater Sage-Grouse.* Page 28. February 14, 2013.
[122] *Id*. at ¶ 5.1, p. 21-22.
[123] NTT Report Peer Review Comments at 4.

Again, the peer reviewers warn against the rigidness of the NTT's one-size-fits-all measures and their applicability range-wide. BLM has not addressed these significant issues in the NTT Report in contravention of the DQA and the Guidelines.

BLM has not provided sufficient scientific data to support the disturbance thresholds concept or its effectiveness. These issues, along with the opaque calculation methodology, are fraught with challenges that will prevent consistent and clear implementations. Disturbance caps are not based on the best available science. They are based upon the opinions of authors, and selective citation of information rather than data. *See* Exhibit A at 2-3, 8, 17-19, 22, 24, and 33; *see also* Exhibit B, *gen*.

C. Habitat Threshold Discrepancies

BLM through the NTT Report proposes a blanket 15-25% sagebrush canopy threshold for all seasonal habitats. The information contained in "Appendix A" to the NTT Report does not support the habitat thresholds enumerated in the NTT Report. In fact, the NTT Report's one-size-fits-all recommendations would likely lead to contrary results applied across the range.[124]

It is well known that sagebrush cover requirements vary between seasons and across populations. In some cases sagebrush is not even the limiting factor, rather "other" shrub cover is the most important factor.[125] For example, one peer reviewer notes that 20% sagebrush cover is not necessarily "healthier" than an area that has 10% sagebrush cover and good grass densities. Another peer reviewer states, "[i]n many areas site potential will be below 15% so this blanket

[124] Maxwell *infra* at 1.
[125] *See* Kolada E, M. Casazza, J. Sedinger. 2009. Ecological factors influencing nest survival of greater sage-grouse in Mono County, California. The Wildlife Society, Journal of Wildlife Management 73(8):1341-1347.

statement seems a little irrelevant. Why not say the sagebrush will not be reduced below site potential…"[126]

In addition, in a report produced by USGS, the authors further call into question the sagebrush cover objective in the NTT Report with this statement:

> "The natural variation in vegetation, the dynamic nature of sagebrush habitats, and the variation in the habitats selected by GRSG across a landscape imply that characterizing habitats *using a single value or narrow range of values, for example, 15- to 25-percent sagebrush-canopy cover in breeding habitat [Citation omitted], is insufficient to describe GRSG habitat requirements.* The differing seasonal habitat requirements of GRSG dictate that multiple vegetation attributes, across the landscape and in particular sites, are important, reinforcing emphasis that combinations of shrub overstory and herbaceous understory, which are both important as habitat components during different seasons, are important in combination and across scales."[127]

One of the primary objectives of the NTT Report is "to protect sage-grouse habitats from anthropogenic disturbances that will reduce distribution or abundance of sage-grouse."[128] To achieve this, the NTT sets forth sub-objectives. Two of the four sub-objectives assert that 70% of the range within priority habitat needs to provide "adequate" sagebrush habitat to meet GRSG needs, and that discrete anthropogenic disturbances in priority habitat be limited to less than 3% of the total GRSG habitat *regardless of ownership* (NTT at 7).[129] However, these objectives are not supported by the literature. *See* Exhibits A and B, *gen*. The NTT Report failed to disclose that very little is known about adequate patch size, which is the minimum range of the landscape required for the GRSG to persist. Scientific research has refuted the belief that there is a widely-accepted or "magic" number in terms of habitat patch size or population number that can defensibly be used to identify a "viable" population of any species, much less GRSG.[130] Yet the

[126] NTT Report Peer Review Comments at 16.
[127] Manier at 24, internal citation omitted.
[128] NTT Report at 7.
[129] *See* Maxwell at 2.
[130] Flather et al. 2011.

NTT Report perpetuates a "magic number" nonetheless: "Within priority habitat, a minimum range of 50-70% of the acreage in sagebrush cover is required for long-term GRSG persistence (Aldridge et al. 2008, Doherty et al.2010, Wisdom et al. 2011)."[131]

The NTT Report failed to disclose the critical statistical flaws associated with Wisdom et al. 2011. Thus, differentiating and applying significance or importance of each variable is flawed and should be taken with less than a grain of salt. For example, sagebrush cover was just one of 22 variables evaluated by Wisdom et al. 2011 and the authors did not adequately account for correlation among variables.

The NTT Report also mischaracterized cited studies to support the sagebrush cover objective. At best, Aldridge et al. 2008 suggests that "*preferably*" 65% is necessary for GRSG to persist, but the results of this study give measurements related to range persistence and how that correlates to extirpation and only provides this threshold anecdotally. These results do not indicate that 70% or even 65% of the habitat must be suitable, only that fringe populations are more likely to be extirpated.[132] In addition, both Aldridge et al. 2008 and Wisdom et al. 2011, rely on Schroeder et al. 2004's pre-settlement mapping, which is highly subjective and speculative. CESAR identified significant issues with Schroeder et al. 2004.[133]

Moreover, the USGS baseline environmental report (Manier) indicates that habitat fragmentation "generally begins to have significant effects on wildlife when suitable habitat becomes less than 30 to 50% of the landscape" (USGS Report at 26), considerably below the blanket 70% threshold. BLM fails to show how the goal of 70% sagebrush cover in priority habitat is necessary, reasonable, and achievable, or how it would actually benefit GRSG.

Hubbell and Hubbell 2011; Ramey et. al. 2014.
[131] NTT Report at 6.
[132] *See* Maxwell at 15.
[133] https://www.hightail.com/download/UW14OU1VMVh0TWxYd3NUQw.

Neither the NTT Report nor its attached "Appendix A" provide sufficient reasons or support for these habitat thresholds nor for consolidating all GRSG seasonal habitat range-wide regardless of relative importance or quality.

D. Noise Restrictions in the NTT Report are Unsupported and Unreasonable

The NTT's one-size fits all noise recommendations for oil and natural gas operations violate the DQA and the Guidelines in that they are not scientifically sound. Ambient sound levels of 20-24 db(A) and a 10 db(A) limit is a one-size-fits-all recommendation that is not representative of local conditions and is unrealistically low for windy areas where the research was conducted. The proposed noise levels are unsupported by any sort of unbiased, systematic data collection across seasons. They are made without any knowledge of what thresholds would limit sage grouse reproduction or survivorship.

The NTT's treatment of noise is completely inconsistent with the previous background of 39 dBA background plus the 10 decibel threshold. This overly restrictive threshold is based on a questionable study referenced directly in the NTT Report and will be difficult, if not impossible to achieve. Specifically, there is no peer reviewed data that supports a background at dawn for a 20-24 background level. BLM needs to remove this item from the NTT Report and replace it with the 39 dBA which is currently in use when assessing noise considerations in GRSG habitat. *See* Exhibit A at 11, and 17-20; *see also* Exhibit B at 2 and 27. None of the noise studies cited in the NTT Report, Patricelli et al. (2010), Blickley et al. (in preparation), or Blickely and Patricelli (i*n press*) found population declines as a result of noise from oil and gas operations. Further, the NTT Report did not accurately portray the methods and results of the studies by Patricelli et al. (2010) and Blickley et al. (in preparation). Recordings of operations and traffic noise were

played back at the edges of leks at sound pressure levels in excess of what they would be on the majority of lands managed by the BLM where oil and natural gas operations occur.

The NTT Report noise recommendations were based on the subjective opinions of the authors of cited studies rather than data. *See* Exhibit A at 19-20; *see also* Exhibit B at 2 and 27. The cited studies, all performed by one research group, used substandard equipment and employed methods that were inconsistent with professional data collection and reporting standards in the industry that are used to ensure unbiased and systematic data collection. Exhibit B at 26. What is being proposed for noise thresholds is an impossible standard to achieve found in an idyllic wilderness setting and described with non-standard equipment and unaccepted techniques; BLM land that is administered for multiple uses is not pristine wilderness. Moreover, for all but a handful of studies, complete data is not publicly available. The raw data in the cited noise studies that has been made available is not reproducible.

These studies do not support the proposition for which they are cited in the NTT Report. They do <u>not</u> report population-level effects to GRSG. Rather, temporary avoidance was observed under very specific circumstances with no evidence of deleterious effects on fitness. *See* Exhibit A at 5, and 17-18; *see also* Exhibit B at 2, 6, 11, 17, and 30. Moreover, the authors, and the NTT Report, fail to examine whether noise could have positive effects on GRSG—such as interference with predation or whether daily motorized trips to noise monitoring stations to replace batteries may have interfered with test results.

The most recent science indicates GRSG use greater variances in habitat[134] and that noise tolerances and habitat selection in areas of high road density are greater than previously

[134] Reinhart et al. 2013

documented.[135] Moreover, topographic roughness appeared to be a much stronger indicator of habitat avoidance than anthropogenic disturbances.

V. The NTT Report Misrepresents Several Key Issues

A. Population Trends and Persistence

The NTT Report fundamentally and erroneously ignores accurate population data and adopts flawed modeling approaches that have consistently failed to accurately predict populations. The NTT Report also ignores natural population fluctuations and creates a narrative that assumes GRSG populations are in decline despite contrary evidence. Such assertions are without basis given the status of GRSG populations today.[136]

For example, Utah's 2009 Greater Sage-Grouse Management Plan states that Utah has 429 known leks, 304 of which have been active in the past 5 years. Some 328 leks are occupied. Moreover, Garton et al. 2011 and Knick and Hanser 2011 are no longer the best available science, as discussed in detail below.

Predicted population declines have failed to come true; particularly in the Pinedale area in Wyoming. While surface disturbance from oil and natural gas had local negative effects on male lek attendance, it did not result in significant effects at a population level.[137] In Pinedale, specific predictions of population level declines have failed to come true.[138] Rather, the Pacific Decadal Oscillation ("PDO") a climate index derived from sea surface temperatures in the North Pacific accounted for 78% of population variations in Pinedale and 67% in Wyoming GRSG working groups.[139] If the primary climate drivers of GRSG populations are not taken into

[135] Patricelli et al. 2012.
[136] *See* Ramey, Thorley and Ivey 2014.
[137] Ramey, Thorley and Ivey 2014.
[138] Ramey and Ivey 2014.
[139] Ramey, Thorley and Ivey 2014.

account in the NTT Report (and they are not) then management prescriptions are based on erroneous information and suffer from fundamental flaws.

BLM's reliance on Connelly et al. (2004) and Garton et al. (2011) in its Land Use Plan Amendments to "normalize[d] and analyze[d] the lek data to provide less biased population trend conclusions across the range of the species" is also misplaced.[140] BLM has not produced any data to demonstrate that the targets for GRSG populations and leks are achievable or how the targets will allegedly enhance genetic connections, especially when the role of female grouse in the population monitoring is completely ignored. In addition, Ramey et al. 2014 detected several errors in the calculations of Garton et al. 2011 that dramatically skew probabilities to estimated declines over time. *See* Exhibit D at 3 and 6.[141]

There is no evidence of the purported population declines nor genetic isolation that BLM contends. In his recently published study, Dr. Robert Zink, "compare[d] genetic variability measures with quantitative estimates of population trends to determine whether the effects of population declines can be observed at two geographic scales in the microsatellite and mitochondrial DNA data…"[142] Populations in decline should show reduced genetic diversity with corresponding risks to population persistence. But for GRSG, Dr. Zink found, "the expected population genetic signatures of differences in population size were not observed." Dr. Zink concluded, "[T]here is no clear evidence that the population genetic variability of the greater GRSG has been influenced by range reduction and fragmentation" and that "there is no evidence of heightened inbreeding in smaller populations."

It should be noted that FWS and USGS convened a closed-door workshop on October 22-23, 2014 in Ft. Collins, Colorado entitled "Expert Elicitation Workshop on the Genetics of

[140] UT GRSG DEIS 3.2.1 at 3-8.
[141] Ramey et al. 2014.
[142] *See* Zink 2014.

Greater-Sage Grouse" (the "Workshop'). The aim of the Workshop was auspiciously to work on "specific technical questions." The way in which the agencies convened this Workshop also drew sharp rebukes and calls for transparency from 18 Members of Congress in an October 16, 2014 letter to Interior Secretary Sally Jewell.[143] Petitioners believe the way the Workshop was convened and conducted likely violates FACA, the DQA and its Guidelines as well as presidential memoranda and DOI orders on scientific integrity and transparency. We caution BLM not to adopt or incorporate any alleged findings from this closed-door Workshop, and instead to incorporate the work of Dr. Zink.

The NTT Report mischaracterizes the health of GRSG populations. Zink 2014 found that despite reported population declines, populations were not experiencing genetic decline typically associated with imperiled species. As discussed below, GRSG populations naturally fluctuate and differences in methodologies and inaccuracies inherent in lek counts must be considered. In Utah, the number of leks counted has increased from a low of 125 to 361 currently.[144] In regards to males counted, the increase is even more dramatic: 1,555 males in 1996 to 5,973 in 2006 (280%).[145]

BLM also acknowledges in its Land Use Plan Amendments that, "GRSG in Colorado have been increasing for about the last 17 years, and breeding populations have not declined for the last 39 years,"[146] and that sagebrush habitat in Jackson County, which harbors the second largest population in the planning area is, "largely intact, and there is little threat of fragmentation."[147] Data from the Nevada Department of Wildlife (NDOW) indicates GRSG

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[143] Committee on Natural Resources, *18 Members of Congress Question the Interior Department's Bias & Lack of Transparency with Federal Sage Grouse Science* (October 16, 2014) http://naturalresources.house.gov/news/documentsingle.aspx?DocumentID=397887
[144] Utah GRSG DEIS 3.2.1 at 3-8.
[145] *Id.*
[146] *See* Northwest Colorado GRSG DEIS at 253 *citing* Figure 3-5.
[147] *Id.* at 246.

populations have been increasing over the last three years. According to NDOW, the 2010 fall population estimate increased about 18% compared to the 2009 estimate, and the population has been increasing since 2008. Only by ignoring valid state data can the NTT Report persist in a narrative of population decline.

By mischaracterizing the nature of GRSG population trends, the NTT Report violates the DQA, the Guidelines and the additional authorities referenced herein.

B. GRSG Populations Naturally Fluctuate

Fundamentally, the NTT Report fails to recognize that populations of any given species naturally fluctuate. This significant error of omission violates quality, objectivity and integrity standards of the DQA and the Guidelines. Populations of many species are known to be extremely dynamic and it is critical to understand the trends in population dynamics and the factors responsible for population variability to properly evaluate and manage a species. Understanding natural fluctuations in abundance and the population dynamics of individual and range-wide populations is also essential for the proper status assessment of a species.

GRSG live longer, have higher winter survival rates, lower rates of reproduction, and are more migratory over greater distances than acknowledged in the NTT Report.[148] The NTT Report fails to take into account that populations of species are responsive to such factors as seasonal and long-term fluctuations in regional weather conditions, short-term weather extremes and stochastic events, intra- and inter-species competition for resources, intra- and inter-species behavioral competition, predator-prey relationships, and subtle or severe changes in habitat quality. As discussed in Section I.3 above, climactic patterns associated with the PDO greatly influence GRSG populations in Wyoming.[149] These and other factors may influence a species

[148] Connelly et al. 2011.
[149] *See* Ramey, Thorley and Ivey 2014..

greatly, and may mask or prevent a correct interpretation of direct and indirect anthropomorphic factors.

GRSG populations characteristically exhibit multi-annual fluctuations in abundance (Appendix 1, Figure 1 and 2), indicating that some mechanism or combination of mechanisms are causative factors.[150] Factors influencing GRSG abundance may include weather patterns and the composition and abundance of predators that influence nesting success (Montana GRSG Working Group 2005). Nesting success and chick survival is considered to be the most significant parameter affecting population dynamics.[151]

Published studies of factors affecting nest success and GRSG chick survival have focused on micro-scale habitat factors such as percent coverage and height of forbs and grasses and availability of arthropods.[152] These studies follow logically from previous research on GRSG brood habitat selection (Sveum et al. 1998, Drut et al. 1994a, Wallestad 1971, Klebenow 1969) and chick diets (Drut et al. 1994b, Johnson and Boyce 1990, Peterson 1970, Klebenow and Gray 1968). The NTT Report ignored many relevant studies. *See* Exhibit C. Collectively, these studies clearly demonstrate that nesting GRSG typically select relatively mesic habitats with abundant forbs and arthropods and that chick survival is highly correlated with these factors. Chick survival has been shown to be an important determinant of population growth rates, yet relatively little is known about chick survival at the population level relative to large-scale abiotic factors such as regional variation precipitation and temperature.

Guttery et al. 2013 reported that climatic variables play a primary role in determining GRSG reproductive success and the study demonstrated that temperature and precipitation have significant effects on chick survival. Similarly, Blomberg et al. 2012 found strong correlation

[150] USFWS 2013, Fedy and Doherty 2010, Montana GRSG Working Group 2005.
[151] Schroeder et al. 1999.
[152] Aldridge and Boyce 2007, Dahlgren et al. 2010, Gregg and Crawford 2009.

between multiple climatic variables and GRSG population dynamics (see Appendix 1, Figure 3 and Figure 4). These, and many other studies published subsequent to the NTT Report, must be considered by BLM. *See* Exhibit C.

Annual recruitment of GRSG was higher in years with higher precipitation, based on annual precipitation, annual rainfall, and average winter snow depth. Likewise, GRSG population growth was positively correlated with annual rainfall and mean monthly winter snowpack in the study area. Annual survival of adult male GRSG was negatively affected by high summertime temperatures, with higher survival rates in years with relatively low maximum temperatures. These results are consistent with the hypothesis that water balance in sagebrush systems is important to GRSG populations and the stability of GRSG populations is dependent upon stable annual survival rates and occasional large inputs of new individuals into the population when climatic conditions are favorable for chick and juvenile survival.

Extended periods of below normal precipitation and shorter term severe drought may reduce the abundance and duration of herbaceous cover at nest sites, and result in a reduction in the quantity and quality of food resources available to hens and chicks, which, if severe, could jeopardize GRSG survival.[153] The NTT Report conveniently ignored environmental impacts to GRSG and focused almost exclusively on alleged human impacts. Prolonged drought during the 1930's and mid-1980's to early 1990's coincided with declining GRSG populations throughout much of the species' range (Patterson 1952, Fischer 1994, Hanf et al. 1994, Connelly and Braun 1997, Braun 1998). From 1985 through 1995, the entire range of GRSG experienced severe drought as defined by the Palmer Drought Severity Index, with the exceptions of north-central Colorado and southern Nevada (USFWS 2013). Heath et al. 1997 concluded that drought conditions during spring and summer 1994 in Wyoming resulted in impaired productivity and

[153] McCarthy and Kobriger 2005, Connelly et al. 2004, Fischer et al. 1996.

decreased survival of GRSG, most likely because of subsequent decreases in forb production and increased predation resulting from a lack of sufficient cover.

The amount and timing of spring and summer rainfall affects annual plant production and influences population dynamics of GRSG, causing short term fluctuations of less than 10 years in GRSG abundance.[154] Wet springs often result in increased green-up and an increase in the variety of forbs, and consequently insects, on the sage-steppe thereby increasing chick survival.[155] Wyoming Game and Fish Department 2009 reported increases in GRSG numbers in Wyoming during the late 1990's with some individual leks seeing three-fold increases in the number of males between 1997 and 1999. This increase was synchronous with increased spring precipitation over the period. The return of drought conditions in the early 2000's appeared to have led to decreases in chick production and survival, thus resulting in declining populations. Conversely, extreme precipitation during spring and summer caused widespread flooding in 2011 in southeastern Montana and increased GRSG nest failure and depressed hatch rates.[156]

Cold, wet weather or extremely low temperatures during the hatching period can result in loss of chicks and young birds to hypothermia.[157] Measures of drought, precipitation, and temperature can be correlated to winter snow pack which is known to be a major driver of vegetation dynamics throughout much of the mountainous regions of western North America.[158] Long, cold winters with deep snows that cover sagebrush plants on winter ranges can be a threat to survival because GRSG are totally dependent upon sagebrush as food during winter months.[159]

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[154] Eustace 2002.
[155] McCarthy and Kobriger 2005, Blomberg et al. 2012.
[156] Foster et al. year unknown.
[157] McCarthy and Kobriger 2005, Hannon and Martin 2006.
[158] Walker et al.1993.
[159] McCarthy and Kobriger 2005.

Until several recent studies, there was no evidence that severe winter weather affected GRSG populations unless sagebrush habitat had been greatly reduced (Connelly et al. 2000). Danvir 2002 recorded declines in a GRSG population following deep snow winters of 1985-86 and 1992-93 in Wyoming. The theory being that the GRSG survival rates declined because the species became more visible, and vulnerable to predation, and that there was increased competition with jackrabbits, mule deer, and other grouse for the sagebrush foliage available above the snowpack. Moynahan et al. 2006 found that a severe winter affected survival of GRSG in Montana from 2001 to 2004. Similarly, Anthony and Willis 2009 reported strong evidence that severe weather (i.e., mean daily min. temp, extreme min. temp, snow depth) affected survival of female GRSG in southeastern Oregon.

The effects of both annual and long-term fluctuations in weather patterns on the nest success and survival of GRSG have been well documented. Short-term fluctuations in weather patterns are significant factors contributing to the annual and near future population status, while long term weather patterns have a greater effect on condition of habitats occupied by the population and play a larger role in determining the long term trends of the population.[160]

Critical information on natural population fluctuations and the factors that drive them such as weather patterns and survival rates are glaringly omitted in the NTT Report. Taking into account natural fluctuations in GRSG population and their primary drivers, and using explicit, data-driven population models such as Bayesian hierarchical state-space models must be included in any objective and statistically rigorous evaluation of the population status.[161] An accurate assessment of GRSG population dynamics and fluctuations are also critical to proper species management and developing effective conservation and mitigation strategies. Rather

[160] McCarthy and Kobriger 2005.
[161] Coates et al. 2014.

than conducting a trends analysis or considering environmental factors that impact populations, the NTT Report blindly assumes that long-term population trends can be controlled through restrictions on human activity and curtailing multiple uses of public lands.

In addition, the NTT Report sets an improper regulatory threshold that GRSG populations must be stable or increasing in all cases, which is arbitrary, capricious, and unscientific in violation of the DQA, the Guidelines and the additional authorities cited herein.

C. Predation and Predator Control

The NTT Report ignores substantive threats to GRSG in favor of pre-conceived notions of human impact in violation of the DQA and the Guidelines. Predation is the most common cause of direct mortalities of the GRSG. GRSG eggs are preyed upon by red foxes (*Vulpes vulpes*), coyotes (*Canis latrans*), American badgers (*Taxidea taxus*), common ravens (*Corvus corax*), and black-billed magpies (*Pica hudsonia*). Common predators of juvenile and adult GRSG are golden eagles (*Aquila chrysaetos*), prairie falcons (*Falco mexicanus*), other raptors, coyotes, American badgers, and bobcats (*Lynx rufus*). Younger birds, especially broods, are preyed upon by common ravens, red foxes, northern harriers (*Circus cyaneus*), weasels (*Mustela sp.*), and various species of ground squirrels and snakes.

Of these predators, the common raven is the most abundant and has the greatest impact on the survivorship of the GRSG. Raven populations have increased an estimated 300% in the past 27 years in the United States (Sauer et al. 2008) with reports of 1,500% increases within a 25-year period in some areas of the West.[162] The NTT Report virtually ignores this critical fact. While not a migratory species, crows and ravens are inexplicably protected under the Migratory Bird Treaty Act ("MBTA").[163] Nowhere does the NTT Report call out that the primary predator

[162] Boarman 1993.
[163] 50 C.F.R. § 20.100.

of GRSG is protected by the MBTA such that predator control efforts that would benefit GRSG are hindered by regulatory red-tape and FWS approvals.

Mortality due to predation during the first few weeks after hatching is estimated to be 82%.[164] In regards to Gunnison sage-grouse, "survival of juveniles to their first breeding season was estimated to be low (10%)," which could be similar for GRSG.[165] The NTT Report alleges nest success and survival studies are impacted by predation only where poor land management, which the NTT Report seems to characterize as grazing, is an issue. Failure to recognize the significant impacts of predation and the attempt to attribute such impacts to human influences clearly exhibits bias in the NTT Report. Moreover, nothing is presented to quantify the habitat conditions that are purported to increase the significance of predation and nothing to identify the significance those conditions to sage grouse habitat throughout their range in the NTT Report.

The common raven is clever and highly adaptable, which allows it to opportunistically exploit food resources provided by human activities. Ravens routinely forage at landfills, in dumpsters, and at livestock operations and they commonly scavenge on carcasses of animals killed by vehicle strikes. The explosive increase in raven abundance has resulted in large increases in predation, and has contributed to the severe decline of many species including the desert tortoise (*Gopherus* sp.), marbled murrelet (*Brachyramphus marmoratus*), least tern (*Sternula antillarum*), California condor (*Gymnogyps californianus*), and GRSG.[166]

The NTT Report suggests GRSG nest predation and nest success is related to the amount of herbaceous cover surrounding nest sites.[167] However, the NTT Report ignores substantial evidence indicating that most GRSG nests are lost to predators such as red foxes, badgers,

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[164] Gregg *et al.* 2007.
[165] GUSG Threatened Listing, 79 FR 69192, 69274 (Nov. 20, 2014).
[166] Snyder et al. 1986; Borman 2003; Boarman et al. 2006; Bui 2009; Bui et al. 2010; Wyoming Game and Fish 2012.
[167] Connelly et al. 1994, Braun 1998, Schroeder and Baydack 2001, Coates 2007, Hagen 2011.

coyotes, black-billed magpies, and common ravens, even in excellent GRSG habitat. *See* Exhibit A at 11-13; *see also* Exhibit B at 22.[168]

The negative effects of predation and raven abundance on nest success have been well documented. GRSG nests are subject to varying levels of predation, either total (all eggs destroyed) or partial (one or more eggs are destroyed). In either case, hens abandon the nests.[169] Re-nesting efforts may partially compensate for the loss of nests due to predation (Schroeder 1997) but may not completely offset the losses. Additionally, the presence of high numbers of predators within a GRSG nesting area may negatively affect GRSG productivity without causing direct mortality. Loss of breeding hens and young chicks to predation can influence overall GRSG population numbers, as these two groups contribute most significantly to population productivity.[170]

According to Valkama et al. (2005), predation may influence grouse population dynamics by reducing nest success, survival of juveniles especially during the first few weeks after hatching, and annual survival of breeding age birds. Similarly, others found that nest predation can be a limiting factor for GRSG population sustainability.[171] Moynahan et al. (2007) reported that 54% of nest failures were caused by predation. Gregg et al. (2007) estimated that GRSG mortalities due to predation were as high as 82% during the first few weeks after hatching.

Raven abundance was strongly associated with GRSG nest failure in northeastern Nevada, resulting in negative effects on GRSG reproduction.[172] The study associated increased raven abundance with a reduction in the time spent off the nest by female GRSG, thereby potentially compromising the ability to secure sufficient nutrition to complete the incubation

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[168] *See also* Gregg et al. 1994, Heath et al. 1997, Holloran 1999, Connelly et al. 2004.
[169] Coates 2007.
[170] Baxter et al. 2008.
[171] Nelson 1955, Gregg et al. 1994, Schroeder and Baydack 2001.
[172] Coates 2007.

process. Similarly, high corvid abundances attributed to increased GRSG nest and brood failure in western Wyoming (Bui 2009). Coates and Delehanty (2010) found that GRSG nest failure and observed raven predation of GRSG nests were associated with indices of raven abundance. Decreases in daily survival rate (DSR) of GRSG were attributed to increased raven abundance.

Unlike other population limiting factors (e.g., habitat, weather, and drought), predation can realistically be reduced by applying appropriate management measures.[173] Management of some predator populations, especially raven populations occurring in areas where GRSG mortality is high, is needed to ensure that GRSG populations are not depressed by a known and easily mitigated source of mortality.

In 2001, the U.S. Department of Agriculture (USDA) Animal Plant Health Inspection Service (APHIS) Wildlife Services (WS) initiated a systematic raven management program in Nevada to reduce raven numbers in GRSG habitat. The primary method of raven removal was through chicken egg baits treated with DRC-1339 (3-chlorop- toluidine hydrochloride). Coates and Delehanty (2004) observed that GRSG nest success near these raven removal activities was significantly greater (73.6%) than the mean nest success (42.6%) based on 14 studies from 1941 to 1997.[174] They also observed that raven numbers in treated areas declined from a high of $5/km^2$ to low of $0.31/km^2$ over a period of five month.

In 2007, the USDA/APHIS/WS began testing the effects of the removal of common ravens using baits treated with DRC-1339 to livestock depredation in southern Wyoming. This program provided additional information of the potential effects of raven removal on GRSG nest success. It was found that the nest success of GRSG was reduced when ravens were present within 550 meters of a nest. The study also reported that the abundance of ravens can be

[173] Cote and Sutherland 1997.
[174] Schroeder et al. 1999.

substantially reduced at a relatively large scale (15-km radius or 706.5 km^2) by using DRC-1339; raven densities decreased by 61% at removal sites compared to an increase of 42% at non-removal sites. In areas occupied by ravens, average GRSG nest survival was estimated at 22%; and in areas absent of ravens, nest survival was estimated at 41%. This suggests that areas with high raven populations may contribute to lower GRSG population growth rates (Dinkins 2013). Cote and Sutherland (1997), using meta-analytic techniques, found that predator removal has a large, positive effect on post breeding population size and hatching success for several species of game birds.

Results of these raven removal efforts suggest that well-designed raven management strategies could substantially increase GRSG nest survival rates in areas where raven predation is a substantial contributing factor to nest failure. Long-term solutions to reduce artificially high raven abundances are necessary to address the detrimental effects of raven predation on GRSG and other imperiled species. Reducing raven abundance has been shown to be effective using some lethal means, and reducing numbers may also be possible using other as yet untested lethal and non-lethal means. Effective lethal control might be accomplished by shooting, removal of raven nests and eggs, and poisoned baits. Effective non-lethal control might be accomplished by reducing or eliminating nesting structures and/or making subsidized food resources such as road-kill, dead livestock, and garbage, unavailable. Despite the research and application of these methods for raven management, the NTT selectively chose to disregard them.

The negative effects of predation on the nest success of the GRSG have been well documented and should be included in any objective and complete analysis of threats to GRSG. The FWS GRSG listing decision (USFWS 2010) recognized predation as a primary threat to the

GRSG and devoted three pages of discussion to this issue.[175] Despite this, some recent efforts to develop range-wide conservation objectives for the GRSG and to inform the public of the upcoming 2015 listing decision failed to recognize and address predation as a primary threat to the species. The NTT Report fails to recognize predation as the single most important factor affecting the abundance of the GRSG.

The NTT Report virtually ignored the topic of predation and the major body of scientific literature on raven predation and experimental data on predator management. Substantial and critically important information on these topics is available from a variety of sources including Boarman 1993; Boarman 2003; Boarman et al. 1995; Boarman and Heinrich 1999; Boarman et al. 2006; Bedrosian and Craighead 2010; Bui 2009; Cagney et al. 2010; Christiansen 2011; Coates 2007; Coates and Delehanty. 2004; Coates et al. 2008; Coates and Delehanty 2010; Conover et al. 2010; Cote and Sutherland 1997; DeLong 1995; Gregg et al. 1994; Heinrich et al. 1994; Moynahan et al. 2007; Preston 2005; Ramey, Brown, and Blackgoat 2011; Schroeder and Baydack 2001; Snyder et al. 1986; Sovada et al. 1995; Watters et al. 2002; and Webb et al. 2009. Finally, recent work Baxter et al. 2013 shows even bottlenecked GRSG populations can see marked population improvements following predator control efforts.[176]

The NTT Report ignored the body of literature relevant to raven predation on GRSG, including its deleterious effect on survivorship and recruitment, and most importantly, the integrated management strategies that can reduce losses of GRSG. Only two references related to predation on GRSG were cited (Greg et al. 1994 and Hagen 2011) and the word "raven" was mentioned only once, at page 63. The NTT Report did not mention predator management that could benefit GRSG within high risk areas and instead, viewed predation as a byproduct of

[175] 75 Fed. Reg. at 13910.
[176] Baxter et al. 2013.

human activities that could be regulated by land health assessments and emphasizing vegetation cover as a means to measure and mitigate livestock use; or increasing landscape level habitat connectivity. This extremely passive and scientifically untested approach is speculative at best and will not result in a reduction of the short- or long-term threats caused by high raven abundances.

Even though the NTT Report contends that predation impacts are solely related to habitat condition, there is no information to suggest that habitat conditions alone will compensate for excessively high predator populations. Rather, the NTT Report should incorporate recommendations for predator management as an important tool to assure GRSG survival.

The information disseminated concludes that, regardless of habitat conditions, predation does not affect GRSG populations in general. However, the removal of predators was a primary factor in the recovery and delisting of the Aleutian Canada goose in North America.[177] In delisting the Aleutian Canada goose, FWS also recognized the removal of predators benefited not only that species, but many other bird species on the islands, including puffins, murres, and auklets.[178]

The NTT Report provides limited and selective evaluations of threats to GRSG, and ignores the major body of scientific literature that is available on raven predation and experimental predator management. In order to comply with the DQA and the Guidelines, BLM needs to address and incorporate this information on the effects of predation and predator control into the NTT Report.

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[177] 66 Fed. Reg. 15643 (Mar. 20, 2001); *see also* FWS News Release, March 19, 2001.

[178] 66 Fed. Reg. 15643 (Mar. 20, 2001); *see also* Press Release, U.S. Fish and Wildlife Service, An Endangered Species Success Story: Secretary Norton Announces Delisting of Aleutian Canada Goose, (Mar. 19, 2001).

D. Hunting

The NTT Report virtually ignores hunting as a threat to GRSG. FWS has estimated the GRSG population to be 535, 542.[179] Some 207,430 GRSG were harvested during hunting seasons between 2001 and 2007.[180] New data and research published by Gibson et al. 2011 have refuted the frequently repeated belief that there is a no additive demographic effect of hunting on GRSG populations. Thus, the hunting of some populations can have an effect not only on those populations but also on nearby populations that are not hunted (but are linked by dispersal).[181]

The BLM must address and incorporate up-to-date information on threats to GRSG from hunting in the NTT Report to comply with the DQA and the Guidelines.

E. West Nile Virus

The NTT Report overstates the threat to GRSG from the West Nile Virus (WNV). It recommends pest management through a number of pesticide applications, yet fails to acknowledge mosquitoes are already sufficiently managed and there are new technologies other than larvicides that have been proven effective to controlling mosquito populations. According to data from the Centers for Disease Control (CDC), the risk to avian species from WNV has declined to virtually nothing since 2006. This is another example of BLM using only a portion of the available information to address the impacts, in this case of WNV on GRSG, resulting in onerous and unfounded mitigation requirements.

F. Oil and Natural Gas Operations

While conceding there is little published research on the topic, BLM describes energy development as one of the greatest threats to GRSG. As one example, Holloran 2005 and Knick and Hanser 2011 (Knick and Hanser were cited six times in the NTT Report and 38 times in the

[179] 75 Fed. Reg. 13910, 13921 (Mar. 23, 2010).
[180] Reese and Connelly 1997.
[181] Gibson et al. 2011.

2010 GRSG listing decision) claim populations in the Colorado Plateau have a 96% chance of declining below 200 males by 2037 due primarily to threats from oil and gas.

Significant flaws in the NTT Report include mandates with respect to habitat requirements and threshold values, issues of scale and failure to recognize and incorporate existing regulatory and conservation efforts.[182] For example, BLM has ignored uncertainties inconvenient to its one-size-fits-all regulatory approach and failed to acknowledge studies that might lead to a broadening of conservation alternatives to decision-makers.[183]

The NTT Report, as well as Naugle et al. and Copeland 2011a, and other studies herein, grossly exaggerate the potential impacts of energy development and GRSG despite the findings that there is little overlap between energy development (and potential for development) and GRSG habitat.[184]

The NTT Report heavily relies upon Knick et al. 2013, Knick and Hanser 2011, Garton et al. 2011 and others. But the majority of the underlying data relative to these studies, especially that collected before the late 1990s, is nearly worthless (as is some of the more recent data) due to undocumented methods, mixed methods, suspect values, satellite leks, incorrect datums, single counts, biased counts, and uncertainties that are not acknowledged. *See* Exhibit B, *gen*.

There are significant issues with the NTT Report itself, and the supporting studies upon which it relies. *See* Exhibits A and B, *gen*. BLM has not utilized accepted methods or best available methods along with sound and objective scientific practices in the NTT Report.[185] The NTT Report failed to acknowledge lower impact technologies and mitigation currently in

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[182] *See* Maxwell, infra at 4, 16.
[183] *See* Ramey et al. 2011; *see also* Exhibit C.
[184] *See* John Platt, Scientific American, *Sage Grouse and Oil Drilling Can Co-Exist, Says New Report*, http://blogs.scientificamerican.com/extinction-countdown/2014/10/17/sage-grouse-oil-drilling/ (Oct. 17, 2014); (please note that Naugle and Copeland are not cited in the NTT report, but were reviewed because studies that are cited in the NTT report cite Naugle and Copeland).
[185] *Id.*

use by the oil and natural gas industry, including specifically those detailed in Ramey, Brown, and Blackgoat 2011 and in a presentation to the NTT by BLM staff. In addition, the NTT report asserts that impacts from oil and natural gas development are "universally negative and typically severe"[186] but provides no scientific data to support that assertion. Further, the research that supports the one-size-fits-all recommendations in the NTT does not represent less intensive development scenarios.[187]

Other errors of omission in the NTT Report include numerous scientific papers and reports on oil and gas and mitigation measures. For example, work by Renee Taylor,[188] and others, demonstrates that temporary GRSG population variations can occur in historic oil and gas areas in Wyoming. In addition, more recent studies conducted in Wyoming suggest that GRSG respond positively to mitigation.[189] *See* Exhibit C.

The projected negative effects of oil and natural gas were greatly overestimated in those early studies, such as Lyon and Anderson 2003, Holloran 2005, Walker et at. 2007, and Doherty et al. 2008. This can be attributed to the fact that those studies were conducted before extensive restoration and mitigation efforts for sage grouse were undertaken, and before improved technology such as directional drilling and clustered development had reduced overall environmental impacts.[190] It is imperative that BLM acknowledge these facts as well as technical information compiled by BLM on contemporary oil and natural gas well technology and best management practices for wildlife mitigation.

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[186] NTT Report at 19.
[187] Applegate and Owens 2014.
[188] Taylor, R.C., B. Russell, and B.P. Taylor 2010. Synopsis Greater sage-grouse populations and energy development in Wyoming: 2010 update. Unpublished report by Taylor Environmental Consulting, Casper, Wyoming.
[189] Kirol et al. 2015.
[190] *See* Ramey et al. 2011; Applegate and Owens 2014.

Companies may not apply for an APD without first completing project-specific environmental analysis under NEPA. When BLM determines that there sill be significant impact to GRSG or other resources for that matter, it prepares and Environmental Impact Statement (EIS) that includes mitigation measures for protecting GRSG. BLM and the companies make a firm commitment that the mitigation measures in the EIS will be enforced through Conditions of Approval ("COA") on APDs. As the APD is absolutely required before drilling can occur, this amounts to a regulatory mechanism that should be recognized by FWS. In fact, a study prepared by SWCA Environmental Consultants found that most major oil and natural gas companies have more stringent standards in place than the agencies acknowledge. From just a sample of 103 NEPA documents for oil and natural gas projects, the study found that companies have implemented 773 conservation measures for GRSG. This equates to an average of 6.5 firm, enforceable regulatory commitments through Conditions of Approval (COAs) on APDs to protect GRSG.[191]

These measures include monitoring existing populations; restricting human activities to protect leks; interim and final reclamation; noxious weed control; dust suppression through application of water or chemical suppressant to roadways; seeding of all disturbed areas that are not used during the well production phase; NSO buffers to protect wetlands; and general noise abatement.[192] Companies have performance standards in place to proactively reduce threats to the GRSG.[193] Additionally, the oil and natural gas companies have made concerted efforts to

[191] *See Id*. at page 5; *see also* List of NEPA Documents Reviewed beginning at page 35.
[192] *Id*. at page 7-8.
[193] *Id*. at page 23.

reduce human-subsidized GRSG predators, and access to wastewater pits to prevent GRSG oiling and drowning.[194]

Ultimately, SWCA Environmental Consultants determined that when appropriate conservation and mitigation measures are used, NEPA is a valid regulatory mechanism to protect and conserve the GRSG, as there is certainty that each COA or conservation measure will be implemented.[195] The effectiveness of the NEPA process is enhanced when coupled with monitoring performed by oil and natural gas operators as well as state and federal agencies.[196]

Moreover, the COT Report fails to acknowledge the regulatory mechanisms already inherent to BLM's regulation and management of the onshore oil and natural gas program. No drilling, access, seismic studies or any other surface disturbing work can proceed without regulatory authorization by BLM. This regulatory authorization comes in multiple forms, but the primary are commitments made in project-specific NEPA documents, and Applications for Permit to Drill ("APD").

Companies may not apply for an APD without first completing project-specific environmental analysis under NEPA. When BLM determines that there sill be significant impact to GRSG or other resources for that matter, it prepares and Environmental Impact Statement (EIS) that includes mitigation measures for protecting GRSG. BLM and the companies make a firm commitment that the mitigation measures in the EIS will be enforced through Conditions of Approval ("COA") on APDs. As the APD is absolutely required before drilling can occur, this amounts to a regulatory mechanism that should be recognized by FWS. In fact, a study prepared by SWCA Environmental Consultants found that oil and natural gas companies have more

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[194] *Id*. at page 18; *see also* 139 (Exxon Mobile: "It will be the responsibility of the operator to effectively preclude migratory bird access to, or contact with, reserve pit contents that possess detrimental properties (i.e., through ingestion or exposure) or have potential to compromise the water-repellent properties of birds' plumage").
[195] *Id*. at page 27.
[196] *Id*. at page 31.

stringent standards in place than the agencies acknowledge. From just a sample of 103 NEPA documents for oil and natural gas projects, the study found that companies have implemented 773 conservation measures for GRSG. This equates to an average 6.5 firm, enforceable regulatory commitments through COAs on APDs to protect GRSG. [197]

These measures include monitoring existing populations, restricting human activities to protect leks, interim and final reclamation, noxious weed control, dust suppression through application of water or chemical suppressant to roadways, enforcing speed limits, seeding of all disturbed areas that are not used during the well production phase, NSO buffers to protect wetlands, and general noise abatement.[198] Additionally, oil and natural gas companies have made concerted efforts to reduce human-subsidized GRSG predators, and access to wastewater pits to prevent GRSG oiling and drowning.[199]

NEPA is indeed a valid regulatory mechanism to protect and conserve GRSG, as there is certainty that each COA or conservation measure will be implemented.[200] The Western Governor's Association has compiled similar useful information on existing conservation efforts.[201] The State of Colorado audited COAs recommended by Colorado Parks and Wildlife through Colorado Oil and Gas Conservation Commission rules and found a 97% adoption and implementation rate:

> "Results show very high correlation between Best Management Practices (BMPs) recommended by SPW for protection of GrSG habitat and voluntary adoption. In other words, CPW met with operators every time a permit for drilling in GrSG habitat was sought. During those consultations, CPW recommended a series of actions designed to minimize or eliminate impacts on habitat. Adoption of those recommendations by an operator is entirely voluntary under the 1200-series

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[197] *See Id*. at page 5; *see also* List of NEPA Documents Reviewed beginning on page 35.
[198] *Id*. at page 7-8.
[199] *Id*. at page 18; *see also* 139 (Exxon Mobile: "It will be the responsibility of the operator to effectively preclude migratory bird access to, or contact with, reserve pit contents that possess detrimental properties (i.e., through ingestion or exposure) or have potential to compromise the water-repellent properties of birds' plumage").
[200] *Id*. at page 27.
[201] http://www.westgov.org/.

regulations, but our analysis suggests that they are adopted 97% of the time. Please see Appendix B for the full report."[202]

The BLM has ignored these, and other, extensive existing regulatory mechanisms in the NTT Report in violation of the DQA and the Guidelines. This regulatory certainty should be acknowledged by BLM in the NTT Report.

G. Livestock Grazing

The NTT Report fails to recognize the best available science on livestock grazing. Among others, the NTT Report recommends changes in grazing regarding season or timing of use, numbers of livestock, distribution; intensity of use, and type of livestock.[203] In addition, the Report recommends removing, modifying or marking fences and, most egregiously, the retirement of grazing permits and allotments.[204]

Instead of focusing on the negative impacts of historic grazing the agency should be evaluating the application of and results of modern proper grazing management.[205] Historic grazing and research reports of specific grazing practices are immaterial to the question of how modern grazing management practices affect sage grouse habitat.

A 1990 US-DOI BLM report shows that good condition rangeland increased by 100% and poor condition rangeland decreased by 50% between 1936 and 1989. In the years since, there has been extensive progress in the implementation of proper grazing management on federal, state and private lands. Furthermore, it is more important and useful to consider

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[202] http://cpw.state.co.us/Documents/WildlifeSpecies/SpeciesOfConcern/GreaterSageGrouse/ColoradoSynthesisReportFINAL.pdf

[203] The NTT Report cites Connelly et al. 2011c for this proposition. Issues with Connelly et al. are addressed elsewhere herein.

[204] The NTT Report cites Crawford et al. 2004 for this proposition.

[205] *See* Launchbaugh 2012; Mosley and Brewer 2006; Briske et al. 2011.

rangeland trends rather than current condition. Regardless of current ecological status, rangelands that are in an upward ecological trend also have improving sage grouse habitat.

It is well established that "In the 1960s and 1970s, Idaho had large numbers of sage grouse and extensive livestock grazing. This suggests that healthy sage grouse populations and livestock grazing are compatible. In short, livestock grazing that results in rangeland in good ecological condition also provides acceptable sage grouse nesting, chick rearing and winter habitat."[206]

Two elements of the NTT Report are clearly contradictory where in one case it suggests grazing has an impact on predation that may affect bird populations and in the second case concludes that predation does not affect bird populations. Moreover, the Wyoming Department of Agriculture has strongly stated livestock grazing has no negative effects on the GRSG.[207]

According to the USDA National Agricultural Statistics, Wyoming sheep numbers were at or near all-time highs the same year greater sage grouse numbers were at or near all time highs (1969).[208] Sheep numbers have dropped precipitously over the last several decades in Wyoming and other western states.[209] Predator numbers have increased accordingly. In fact, the Wyoming Department of Agriculture stated, "[H]abitat alteration caused by livestock grazing (mosaic creation), as well as the predator control offered by livestock producers, have improved and benefited [sic] sage grouse."[210]

Besides ignoring these data from the states, which are the most accurate source, BLM wholly failed to analyze the effectiveness of current livestock grazing and range management

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[206] Idaho Sage Grouse Management Plan (1997).
[207] Letter from Jim Schwartz, Wyoming Department of Agriculture, to Dr. Pat Diebert, U.S. Fish and Wildlife Service (July 30, 2004) (on file with the Wyoming Department of Agriculture).
[208] http://www.nass.usda.gov:81/ipedb/report.htm).
[209] *Id.*
[210] Letter from Jim Scwharz, *infra*.

frameworks, standards, and guidelines and failed to consider site-specific considerations to provide case-by-case determinations of effective regulatory mechanisms actually needed for a location. BLM's one-size-fits-all approach is inappropriate.[211]

FWS explicitly stated in the 2010 listing decision that it "lack[ed] the information necessary to assess how [the implementation of rangeland health assessments] effects [sic] sage-grouse conservation." Yet in the NTT Report BLM declared the existing regulatory mechanism for livestock grazing and range management inadequate, an assertion simply not backed by actual data or analysis.

BLM's definition of "disruptive activity" is entirely too broad and arbitrary, and risks precluding livestock grazing in certain areas during the March 1 to June 30 timeframe without a sound scientific basis. BLM further failed to consider that livestock grazing benefits GRSG habitat and that regulatory restrictions on grazing could threaten the viability of ranching in the West. This is contrary to the DQA, its Guidelines and the best interests of the GRSG.

The NTT Report also undercuts the balanced grazing program passed by Congress as the Taylor Grazing Act ("TGA"). Congress intended TGA land be used primarily for grazing. The NTT Report advocates single-use management in direction contravention to existing laws such as the TGA. Accordingly, the NTT Report as implemented through Land Use Plan Amendments and/or a potential listing of GRSG will result in significant economic and social impacts. Federal agency demands for current conservation efforts fail to provide a true holistic approach to managing multiple ownership lands in an economically sustainable manner.

BLM must recognize that regulatory burdens such as those advocated in the NTT Report, could prove so burdensome that ranching on private lands will become unsustainable. Private lands integral to GRSG conservation will then be marketed and sold. When this land is

[211] *See* Schutlz 2004 (specific herbaceous height and cover values across the range of GRSG are inappropriate).

subdivided, GRSG populations may suffer. Accordingly, the very regulatory mechanisms proposed may threaten the productive private and public land relationships that sustain ranching, rural communities and wildlife populations.

The NTT Report did not include input from any affected stakeholders or interdisciplinary experts aside from state and federal scientists and specialists. It ignores regional variances in GRSG needs, and does not present a comprehensive representation of the literature and research surrounding livestock grazing. For example, the NTT Report ignored Cagney et al. 2010 which demonstrates positive attributes of grazing in Wyoming for nesting and early brood rearing habitat.

While the NTT Report briefly mentions the role of livestock grazing in reducing fine fuels and states that "proper livestock management…can assist in meeting GRSG habitat objectives," it fails to recognize that grazing is a key contributor to GRSG habitat and conservation and omits the many positive impacts of grazing. Grazing is integral to reducing fuels.[212] Without grazing, GRSG habitat would suffer greatly in the West.[213] The many contributions of grazing and ranching, which are largely ignored or understated in the NTT report, include:

- Preservation of open space
- Noxious weed and invasive species eradication and containment
- Production of forb growth that is preferred by GRSG to non-grazed areas
- Wildfire prevention and controlled burn efforts
- Development of wildlife watering sources, including placement of bird ladders in troughs
- Predator management

Other problems with the NTT Report include: the recommendation to authorize only new water developments "when priority sage-grouse habitat would benefit from the development," a clear

[212] *See* Davies et al. 2008; Diamond et al. 2009; Messmer and Peterson 2009; Freese et al. 2013; Taylor 2006; and Mosley and Roselle 2006.
[213] *See* Launchbaugh 2012; Mosley and Brewer 2006; Briske et al. 2011.

violation of state water laws in contravention of the McArran Amendment; and illegal recommendations for retirement of grazing permits in priority sage-grouse areas. The NTT Report goes so far as to direct planners to "identify the specific allotment(s) where permanent retirement of grazing privileges is potentially beneficial." Such aberration from federal statute is vehemently opposed by the Public Lands Council and other agricultural groups as it would put at risk ranchers' ability to stay in business, thereby threatening the open spaces which they own and/or manage and which constitute vast areas of GRSG habitat.

Not only did the BLM Washington, D.C. office require BLM to change regulatory mechanisms applicable to livestock grazing and range management, IM 2012-044 directed BLM Field Offices to adopt a variation of the NTT report as the preferred alternative in Land Use Plan Amendments in violation of NEPA and FLPMA. BLM's decision to rely on this report lacked a rational factual foundation in violation of the DQA and the Guidelines.

As the Public Lands Council has stated in its comments, "[P]reordaining the outcome of Land Use Plan Amendments is unlawful … and particularly arbitrary "given neither the NTT report nor BLM independently ever analyzed the issue of whether existing regulatory mechanisms governing livestock grazing and range management were adequate to protect [GRSG]."[214]

H. State, Local and Private Conservation Efforts

The NTT Report fails to recognize the states have undertaken significant efforts to conserve GRSG. State conservation plans are preferable alternatives to the misdirected management protocols in the NTT Report. Federal agencies can rely upon state, regional, and

[214] Public Lands Council (PLC) and the National Cattlemen's Beef Association (NCBA) Comments on Wyoming Greater Sage-Grouse 9-Plan EIS, March 26, 2014, P. 4-6.

local plans in their consideration of environmental impacts under NEPA,[215] yet BLM has not adequately considered state and local GRSG conservation planning efforts pursuant to 43 CFR § 1610.

Depending on how BLM maps priority habitat, the flawed management prescriptions found in the NTT Report could extend to areas outside GRSG habitat, thereby imposing onerous restrictions with no benefit to the species. Such areas, include towns, rock outcrops, alkali flats or piñon-juniper stands, and would be identified by site-specific review by agency biologists in discussion with the states and other agencies as appropriate.[216] Local government, industry and agriculture are noticeably absent from such discussions.

BLM must provide for appropriate input from such stakeholders, refine its habitat mapping using higher resolution data, delete areas of non-habitat and marginal habitat from consideration, and refrain from imposing restrictions that are not scientifically defensible. Furthermore, BLM has not provided a mechanism to ground-truth the habitat areas on a project-specific basis before imposing restrictions, or to monitor its quality or use in the future. Without ground-truthing and future monitoring, the agencies will likely preclude multiple uses in areas that do not actually support GRSG habitat or active leks, unnecessarily preventing economic activities without commensurate benefit to GRSG populations and habitat. Garfield County, Colorado's GRSG mapping provides a keen example of how federal, and even state, mapping unnecessarily includes huge expanses of areas that are not GRSG habitat.

Similarly, as Utah Governor Herbert has pointed out, state plans better balance future economic activities with robust protections for GRSG, and were developed using a bottom-up

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[215] *See, e.g.* 40 CFR § 1502.21; *Georgia River Network v. U.S. Army Corps of Engineers*, 334 F. Supp. 2d 1329, 1345 (N.D. Ga. 2003) (agency properly relied upon federal, state and local regulations, including local land use plan); *Sierra Club North Star Chapter v. La Hood*, 693 F. Supp. 2d 958, 990 (D. Minn. 2010) (accepting reliance on local plans in indirect effects analysis).

[216] *See* MA-GRSG-2, Table 2.1, UT GRSG DEIS at 2-16.

process with input from diverse stakeholders, rather than the top-down approach taken by the agencies.[217]

The NTT Report fails to adequately consider the states' primary authority over wildlife management and their central role in managing GRSG populations and habitat within their borders. The states are better suited than the federal government to manage GRSG as such action falls within their traditional jurisdiction and professional expertise. Active consultation between the states and federal agencies, as well as local governments and local GRSG working groups, is a more effective approach than the top-down, one-size-fits-all restrictions in the NTT Report.

The NTT Report mischaracterizes conservation efforts on private land as inferior to federal land acquisition and management. This view is contrary to what has been espoused as the "new paradigm" of cooperative conservation. There are numerous published papers on the success of private land conservation versus a federal "command and control" approach that have been ignored in the NTT Report. *See* Exhibit A at 9.[218]

Even the federal government's Sage Grouse Initiative has recognized the importance of private lands to GRSG conservation.[219] Irrigation on private land provides an important link to GRSG leks which are often located on drier public lands. As *The Progressive Rancher* reported, hundreds or more small homesteads covered large portions of Nevada in the late 1800s to the mid-1900s.[220] The homesteads were nearly always located on a spring or stream that the owners used to irrigate meadows. The homesteaders also vigorously shot and trapped predators, such as

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[217] http://fox13now.com/2014/11/13/sage-grouse-gets-federal-protection-utah-officials-react/.

[218] The NTT Report assumes that voluntary conservation measures on private land are inferiors to federal land management and recommends the transfer of private lands into the federal domain.

[219] Sage Grouse Initiative. 2014. *Private Lands Vital to Conserving Wet Areas for Sage Grouse Summer Habitat,* Science to Solutions Series Number 4. Sage Grouse Initiative. 4pp. http://www.sagegrouseinitiative.com/.

[220]Progressive Rancher, July/August Edition.http://www.progressiverancher.com/Resources/ProgressiveRancher_JulyAug2014.pdf .

coyotes, ravens and badgers. As the Reason Foundation summarized, "[T]he result, according to the article, was a higher sage grouse population than exists today and a distinct geography to the grouse's high quality water-dependent habitat: lots of it in small pockets scattered widely across the landscape."[221]

Contrary to some assertions, federal regulation of private land is not conducive to continued conservation. Rather, federal regulation has a significant chilling effect on local, state and private conservation efforts. For example, when the FWS proposed listing the Gunnison GRSG despite over $50 million in state investment and 65,000 acres of private lands protected by conservation easements, county officials felt deeply betrayed. Commission Chair Paula Swenson said she was "furiously frustrated" and Commissioner Jonathan Houck, former mayor of the town of Gunnison, said he felt "cut off at the knees."[222] Upon listing the Gunnison GRSG, Colorado Governor John Hickenlooper, in a significant bipartisan press release with Members of Colorado's Congressional Delegation, stated:

> "We are deeply disappointed the U.S. Fish and Wildlife Service chose to ignore the extraordinary efforts over the last two decades by the state, local governments, business leaders and environmentalists to protect the Gunnison sage grouse and its habitat. This sends a discouraging message to communities willing to take significant actions to protect species and complicates our good faith efforts to work with local stakeholders on locally driven approaches. In short, this is a major blow to voluntary conservation efforts and we will do everything we can, including taking the agency to court, to fight this listing and support impacted local governments, landowners and other stakeholders."[223]

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[221] Brian Seaholes, *Sage Grouse Success is Inextricably Linked to Ranching and Farming in the West According to the Co-author of a Groundbreaking New Study*, http://reason.org/blog/show/sage-grouse-success-is-inextricably# (Oct. 9, 2014 at 9:43 AM).

[222] Lynn Bartels, The Denver Post, *Gunnison Seeks to Protect Grouse, Residents from Endangerment Listing*, http://www.denverpost.com/news/ci_26539987/gunnison-seeks-protect-grouse-residents-from-endangerment-listing (Sept. 15, 2014).

[223] Official Colorado State Web Portal, *Gov. Hickenlooper, Senators Bennet and Udall and Congressman Topton Issue Statements on Gunnison sage Grouse Listing Decision*, http://www.colorado.gov/cs/Satellite?c=Page&childpagename=GovHickenlooper%2FCBONLayout&cid=1251658153409&pagename=CBONWrapper (Nov. 12, 2014) (last visited on Dec. 23, 2014 at 4:43 PM).

In response to the Gunnison listing decision, the Colorado Cattlemen's Association issued a release titled, "Lawsuit-Inspired Listing Ends 20 Years of Conservation Efforts."[224] Similarly, in a letter to Interior Secretary Sally Jewel, the Western Governor's Association expressed deep disappointment in one-size-fits-all regulatory restrictions proposed for GRSG and that coordination with the states was "treated more as an afterthought."[225]

These assertions are backed by sound evidence. According to the NRCS, private conservation efforts declined by 95% when the FWS proposed listing the bi-state population of GRSG. Even worse, private landowners understandably manage their lands specifically to avoid the presence of species once they have been listed under the ESA.[226]

In ignoring the benefits of state, local and private conservation efforts violates the DQA, the Guidelines and the additional authorities discussed herein.

I. Multiple-Use Mandates

The NTT Report conflicts with BLM's statutory multiple-use mandate, as it elevates conservation above all other uses of public lands. Implementation of the NTT Report in Land Use Plans Amendments will impede BLM's statutory mission and adversely affect agriculture, recreation, local governments, utilities, mining and the ability to explore for, produce, and transport domestic energy on public lands.

In enacting the Federal Land Policy and Management Act in 1976 (FLPMA, 43 U.S.C 1701 *et seq*), Congress directed the Secretary of the Interior to consider a broad range of resource issues, land characteristics, and public needs and values in determining how public lands should

[224] http://us8.campaign-archive2.com/?u=8f5fe0c71eb61a94f0da35e3f&id=7432815534

[225] http://westgov.org/news/298-news-2014/800-western-governors-concerned-federal-work-with-states-on-sage-grouse-conservation-an-afterthought-seek-clear-concise-input

[226] Brian Seasholes of the Reason Foundation has provided an excellent summary of landowner reactions to the perverse disincentives of the ESA: http://reason.org/blog/show/the-state-of-the-birds-2014-report.

be managed. FLPMA directs BLM to manage public lands for multiple uses and to consider a wide range of resource values, including the need to protect wildlife and quality of habitat, in the context of the Nation's needs for minerals, energy, food, fiber, and other natural resources. Section 102(a)(8) requires BLM to manage the public lands in a "manner that will protect the quality of scientific, scenic historical, ecological, environmental…values" (U.S.C. 1701(a)(8)). Section 102(a)(7) establishes multiple use and sustained yield land management directives and requires the Secretary to develop "… goals and objectives [that are] established by law as guidelines for public land use planning, and that management be on the basis of multiple use and sustained yield unless otherwise specified by law" (U.S.C. 1701(a)(7)). In defining the term "multiple use" FLPMA § 103(c) directs the Secretary to ensure:

> "…the management of the public lands and their various resource values so that they *are utilized in the combination* that will best meet the present and future needs of the American people; making the most judicious use of the land for some or all of these resources…to conform to changing needs and conditions; the use of some land for less than all of the resources; *a combination of balanced and diverse resource uses* that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values." (43 U.S.C § 1702(c), emphasis added).

Therefore, under the multiple-use requirements, wildlife and other uses are on equal footing. Consequently, BLM must strike an appropriate balance between potentially competing interests and land management objectives, while considering the needs of *all* species, including the needs of humans. This balance is to be achieved in the Section 102 land use planning process and the resulting RMPs. *FLPMA does not authorize the subordination of any of these uses in preference*

for a single land use such as sage-grouse habitat conservation. BLM in applying an emphasis on one resource, GRSG, across 50 million acres[227] is not consistent with FLPMA.

BLM must also consider how the GRSG centric management contained in the NTT Report and the resulting land use plan amendments is appropriate in the context of other special status species. BLM must resolve these issues and explain how the NTT Report's recommendations by way of land use restrictions, prohibitions, and withdrawals achieve the required balance in managing the public lands. If the recommendations found in the NTT are not implementable than the NTT Report itself lacks the requisite "usefulness" or utility pursuant the DQA.

The NTT Report recommends measures in direct conflict with the Mineral Leasing Act of 1920, Mining Law of 1872 (General Mining Law, 30 U.S.C. 21a et seq), Mining and Minerals Policy Act (MMPA, 30 U.S.C. §21(a)) , and the withdrawal regulations at 43 Code of Federal Regulations (CFR) Part 2300, respectively. The NTT Report cannot amend nor alter the agencies' statutory missions. Nor can it impact valid existing rights. The NTT Report also likely conflicts with the U.S. Forest Service Organic Act, and that agency's duties and responsibilities under the National Forest Management Act ("NFMA") (16 U.S.C. § 1600 et seq.) and the Multiple-Use Sustained-Yield Act of1960 (16 U.S.C. §§ 528-531).

J. NEPA

Pursuant to IM 2012-044 BLM initiated the NEPA process to evaluate the NTT conservation measures. IM 2012-044 requires the inclusion of one alternative that considers the conservation measures identified in the NTT Report. However, BLM has failed in its land use plan amendments to include the second directive of the IM, which is to consider *all applicable*

[227] BLM, News Release: *Federal Agencies Announce Initial Step to Incorporate Greater Sage-Grouse Conservation Measures into Land Management Plans*, http://www.blm.gov/wo/st/en/info/newsroom/2011/december/NR_12_08_2011.html.

conservation measures, not just those in the NTT Report, consistent with law. BLM in its Land Use Plan Amendments has not provided for compliance with applicable laws, standards, implementation plans, and BLM and Forest Service policies and regulations, and has failed to use the best available science and inappropriately targets secondary threats in its Land Use Plan Amendments. The NTT Report proposes habitat prescriptions, prohibitions, and withdrawals that are not scientifically supported (described above) as required by the regulations that implement NEPA at 40 C.F.R §1502.24:

> "Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements. They shall identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement. An agency may place discussion of methodology in an appendix."

The NTT Report and the principles underlying the NTT Report create policies that assume that GRSG conservation is the highest and best use of the land, while subordinating other interests, mineral exploration and development, without adequate analysis of the economic impacts these policies will have on stakeholders as recognized in internal emails between DOI employees who were involved with developing the NTT Report:

> "…Overall, the NTT Report conservation measures (planning prescriptions) are complete game-changers for any actions within the Priority Habitats where there are valid existing rights and showstoppers for those actions where there are no valid existing rights…"

For example, withdrawals of the magnitude proposed by the NTT through the NEPA process conflict with the FLPMA's multiple use mandate, § 22 of the General Mining Law, and the Mining and Minerals Policy Act; and cannot be implemented through the land use planning process. Withdrawal of this magnitude can only be made by an Act of Congress or by the Secretary pursuant to the requirements and procedures of FLPMA § 204(c) for a period not to exceed 20 years.

The Council on Environmental Quality (CEQ) regulation at 40 CFR § 1502.16(c) requires BLM to include discussion of "[p]ossible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies, and controls for the area concerned." Several of the habitat prescriptions, land use restrictions, and prohibitions proposed by the NTT and included in the NEPA analyses conflict with existing land use plan goals and objectives for minerals, BLM's own policies including those contained in Manual 6840, the Mining and Minerals Policy Act, the General Mining Law, and BLM's multiple-use mandate, which represents a fatal flaw rendering the Land Use Plan Amendments both inadequate and inconsistent with existing laws and policies, and thus, cannot be implemented, and fails to meet the standard of utility under the DQA.

The conflict between GRSG conservation and the prohibition through administrative fiat against mineral, oil and natural gas and other commodity development must not be ignored. Unfortunately, BLM fails to recognize and disclose this conflict in the various Land Use Plan Amendments. BLM has an obligation under existing law to comply with federal, state, and local policies, including but not limited to balancing resources and to recognize the nation's need for domestic mineral resources.

The NEPA process requires an agency to rigorously explore and objectively evaluate all reasonable alternatives so that decision-makers and the public are fully informed. NEPA documents are intended to be used as a tool during the planning and decision-making process (40 C.F.R. §§1502.14(a), 1502.14(b),(d)). Substantial case law exists regarding the range of alternatives that need to be included in an Environmental Impact Statement (EIS), and "[t]he

existence of a viable but unexamined alternative renders an environmental impact statement inadequate" (*Resources Ltd. v. Robertson*, 35 F.3d 1300, 1307 (9th Cir. 1993)).

BLM has consistently and uniformly failed in its Land Use Plan Amendments to provide a detailed evaluation of Manual 6840 and other BLM policies pertaining to GRSG conservation and is inconsistent with NEPA and the guidance in Section 6.6 of BLM's NEPA Handbook (H-1790-1):

> "The range of alternatives explores alternative means of meeting the purpose and need for the action…The broader the purpose and need statement, the broader the range of alternatives that must be analyzed. You must analyze those alternatives necessary to permit a reasoned choice (40 C.F.R 1502.14…In determining the alternative to be considered, the emphasis is on what is "reasonable"… Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense…" (BLM Handbook H-1790-1 at 49 – 50).

The discussion of alternatives required by NEPA is limited by an agency's statutory objectives and the "underlying purpose and need" to which the agency is responding in proposing alternatives.[228] The courts have excused federal agencies from considering alternatives that require legislative or administrative changes.[229] As the Second Circuit Court of Appeals stated, "[S]tatutory objectives provide a sensible compromise between unduly narrow objectives an agency might choose to identify to limit consideration of alternatives and hopelessly broad societal objectives that would unduly expand the range of relevant alternatives."[230] In this case, implementation of the NTT Report conflicts with valid existing rights granted under federal and state laws. The NTT Report, its adoption through a NEPA

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[228] *See, i.e. Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, 435 U.S. 519, 551-55 (1978) (Where the Court rejected a claim that the Nuclear Regulatory Commission should have reviewed energy conservation as an alternative to the licensing of a nuclear power plant); 40 CFR § 1502.13; 40 CFR § 1508(9)(b).

[229] *See Roosevelt Campobello International Park Commission v. EPA*, 684 F. 2d 1041, 1047 (1st Cir. 1982) (Where the court held federal agencies need only consider alternatives which are consistent with the purposes of a proposed project.).

[230] *City of New York v. United States Dep't of Transp.*, 715 F.2d 732, 743 (2d. Cir. 1983), appeal dismissed, 465 U.S. 1055 (1984).

process or even an ESA listing cannot amend or alter these laws.[231] Here, BLM has failed to cover a full spectrum[232] of alternatives to the land use restrictions and prohibitions to the NTT Report and failed to take the requisite "hard look"[233] at alternatives to the NTT Report's overly restrictive prescriptions.

Under NEPA, all federal agencies must evaluate the potential environmental consequences of any proposed "major Federal action[s] significantly affecting the quality of the human environment."[234] In this case, BLM has failed to meet this requirement. Among other issues, BLM has failed to adequately consider the effect of its proposed GRSG management on the human environment.[235] This is a key issue because there is nothing in the ESA or case law that elevates species protection over the health, welfare, and safety of humans.[236]

In the NTT Report, BLM has failed to adequately analyze different alternatives or their effect on the human environment and therefore fails to qualify as the "hard look" required by NEPA in proposing these radical restrictions. For example, it would be impossible for the disturbance cap to be implemented without affecting valid existing rights.

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[231] *See, i.e., Vermont Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc.*, 435 U.S. 519, 551-55 (1978) (Where the Court rejected a claim that the Nuclear Regulatory Commission should have reviewed energy conservation as an alternative to the licensing of a nuclear power plant); *City of New York v. United States Dep't of Transp.*, 715 F.2d 732, 743 (2d Cir. 1983), appeal dismissed, 465 U.S. 1055 (1984) (Where the court reasoned, "[S]tatutory objectives provide a sensible compromise between unduly narrow objectives an agency might choose to identify to limit consideration of alternatives and hopelessly broad societal objectives that would unduly expand the range of relevant alternatives."); *Roosevelt Campobello International Park Commission v. EPA*, 684 F. 2d 1041, 1047 (1st Cir. 1982) (Where the court held federal agencies need only consider alternatives which are consistent with the purposes of a proposed project); 40 CFR § 1502.13; 40 CFR § 1508(9)(b).

[232] *See Klamath-Siskiyou Wildlands Center v. U.S. Forest Service*, 373 F. Supp. 2d 1069, 1088-89 (E.D. Cal. 1994).

[233] *See, e.g. All Indian Pueblo Council v. United States*, 975 F.2d 1437, 1444-46 (10th Cir. 1992).

[234] 42 U.S.C.A. § 4332(C).

[235] *See In re Delta Smelt Consolidated Cases*, Order,Nos. 09-00407, - 00422, -00631, -00892, -00480 (E.D. Cal. Dec. 9, 2009).

[236] *Id.*

VI. The DQA Applies to the NTT Report

DOI issued its Guidelines to ensure high quality information is generated, used, and disseminated; and to comply with OMB's charge that each agency adopt the DQA Guidelines.[237] "The Department's methods for producing quality information will be made transparent, to the maximum extent practicable, through accurate documentation, use of appropriate internal and external review procedures, consultation with experts and users, and verification of its quality."[238] Information released by DOI will be reproducible to the extent possible and influential information shall be produced with "a high degree of transparency about data and methods."[239] "Analytic results shall generally require sufficient transparency about data and methodology that an independent reanalysis could be undertaken by a qualified member of the public resulting in substantially the same results."[240]

A. Information Dissemination Product

The OMB Guidelines define "Information Dissemination Product" as "any books, paper, map, machine-readable material, audiovisual production, or other documentary material, regardless of physical form or characteristic, an agency disseminates to the public. This definition includes any electronic document, CD-ROM, or web page."[241]

The NTT Report was disseminated electronically by BLM. Accordingly, it meets the definition of "information dissemination product." The intended users of this information include BLM, USFS, state and local governments, domestic energy producers, agricultural producers, public land managers, local and state governments, and the general public.

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[237] *See* DOI, *Information Quality Guidelines Pursuant to Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001*, https://www.doioig.gov/docs/InformationQualityGuidelines.pdf.
[238] *Id*. at page 1, Section II.
[239] *Id*.
[240] *Id.* at page 2.
[241] 67 Fed. Reg. 8452, 8460 (Feb. 22, 2002).

The OMB Guidelines define "[d]issemination" as "agency initiated or sponsored distribution of information to the public."[242] The NTT Report was disseminated by BLM. BLM created its National Technical Team in 2011, "to develop new or revised regulatory mechanisms, through RMPs, to conserve and restore the greater sage-grouse and its habitat on BLM-administered lands on a range-wide basis over the long term."[243] BLM has represented the NTT Report as, and used it in support of, an official position of the agency in such a way that the Guidelines apply.[244] Neither the authors of the NTT Report nor BLM have disclaimed that the NTT Report is not information subject to correction or retraction under the DQA. BLM has disseminated the NTT Report by, among others, publication on its website.[245]

B. Third-Party Information

To the extent BLM considers the NTT Report third-party information, the DQA and its Guidelines still apply. Certain third-party information that an agency makes public is also subject to the DQA and the Guidelines. "If third-party submissions are to be used and disseminated by Federal agencies, it is the responsibility of the Federal Government, under the [Data] Quality Act, to make sure that such information meets relevant information quality standards."[246]

The Guidelines state third-party information endorsed, adopted, disseminated or relied upon, must meet the quality, objectivity, utility and integrity standards required by the DQA and

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[242] 67 Fed. Reg. 8452, 8460 (Feb. 22, 2002).

[243] http://www.blm.gov/pgdata/etc/medialib/blm/co/programs/wildlife.Par.73607.File.dat/GrSG%20Tech%20Team%20Report.pdf.

[244] OMB, Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated, http://www.whitehouse.gov/omb/fedreg_reproducible.

[245] http://www.blm.gov/pgdata/etc/medialib/blm/co/programs/wildlife.Par.73607.File.dat/GrSG%20Tech%20Team%20Report.pdf; *see also* OMB Guidelines V(8).

[246] OMB, Information Quality: A Report to Congress, www.whitehouse.gov/sites/default/files/omb/inforeg/fy03_info_ quality_rpt.pdf (April 30, 2004).

should be subject to DQA correction. DOI Guidelines expressly apply to non-Departmental parties that develop scientific and technical information on its behalf.[247]

Here, BLM failed to issue disclaimers explaining that it would not use, rely upon, or endorse the disseminated information. In fact, BLM commissioned the NTT Report specifically to address and incorporate recommendations into its land use planning processes.[248] Many DOI and BLM employees contributed to the NTT Report. Consequently, the DQA and the Guidelines clearly apply.

C. The DQA Applies Notwithstanding Draft Land Use Plan Amendments

While some of the information disseminated relates to Land Use Plan Amendments that have been open for public comment, BLM is not excused from compliance with the DQA and the Guidelines. Information present in rulemaking records, both completed and ongoing, comprises much of the information disseminated by federal agencies. Neither the DQA itself nor OMB's Guidelines exclude rulemaking records from coverage. OMB, DOI and BLM Guidelines each require a timely process for correcting errors in all agency information made publicly available, including information used in rulemakings.

OMB Guidelines implement § 3504(d)(1) of the Paperwork Reduction Act ("PRA").[249] Section 3504 (d)(1) requires that "with respect to information dissemination, the [OMB] director shall develop and oversee the implementation of policies, principles, standards, and guidelines to apply to Federal agency dissemination of public information, regardless of the form or format in which such information is disseminated... ."[250]

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[247] DOI Guidelines II.4; DOI Guidelines V.
[248] http://www.blm.gov/pgdata/etc/medialib/blm/co/programs/wildlife.Par.73607.File.dat/GrSG%20Tech%20Team%20Report.pdf.
[249] 44 U.S.C. § 3516.
[250] 44 U.S.C. § 3504(d)(1).

Moreover, a DQA challenge may be undertaken separate from the challenger's comments in a rulemaking.[251] The agency has a duty to respond to comments under the Administrative Procedures Act ("APA")[252] and a duty to respond to challenges filed by any person under the DQA.[253] Challenges may arrive before, during, or after an agency disseminates the information.[254]

On September 5, 2002, OMB Memorandum further clarified that agencies should respond to DQA challenges sooner than provided in rulemakings.[255] Where information is disseminated before the final agency action, challenges may be brought under the DQA where a response would not unduly delay issuance of the agency action, so long as the complainant has shown a reasonable likelihood of suffering actual harm.[256]

In a rider to its Omnibus Appropriations Bill, Congress restricted DOI from issuing a final rule on GRSG in 2015.[257] Further, BLM has already announced delays in finalizing Land Use Plan Amendments for GRSG.[258] Accordingly, the retraction and correction of information requested by the Petitioners will not cause undue delay. As discussed at length herein, the NTT Report, if left uncorrected, will cause substantial actual harm to the Petitioners by implementing

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[251] James T. O'Reilly, The 411 on 515: *How OIRA's Expanded Information Roles in 2002 Will Impact Rulemaking and Agency Publicity Actions*, Section 54:2, Admin. L. Rev. 835 (2002).
[252] 5 U.S.C.A. § 551 *et. seq*. (1946).
[253] *Id.* at 836.
[254] *Id.* at 847.
[255] John D. Graham, OMB, *Memorandum for the President's Management Council on Agency Information Quality Guidelines*, www.whitehouse.gov/sites/default/files/omb/inforeg/pmcmemo.pdf (Sept. 5, 2002).
[256] Frederick R. Anderson, The National Law Journal, *Data Quality Act*, http://thecre.com/pdf/20130620_data_quality_act_anderson.pdf (October 18, 2002).
[257] *See* Sally Jewell, DOI, *Statement by Interior Secretary Sally Jewell on the Sage-Grouse Rider in the FY15 Omnibus Bil*l, http://www.doi.gov/news/pressreleases/statement-by-interior-secretary-sally-jewell-on-the-sage-grouse-rider-in-the-fy15-omnibus-bill.cfm; *see also* Robert Pear, N.Y. Times, *From Contribution Limits to the Sage Grouse: What is in the Spending Bill*, http://www.nytimes.com/2014/12/13/us/key-points-from-the-spending-bill.html?action=click&contentCollection=U.S.&module=RelatedCoverage&region=Marginalia&pgtype=article.
[258] *See* BLM, *Frequently Asked Questions: Timeline*, http://www.blm.gov/wo/st/en/prog/more/sagegrouse/frequently_asked_questions.html#timeline; *see also* BLM, *Haines Planning Area Draft RMP Amendment*, http://www.blm.gov/ak/st/en/prog/planning/ring_of_fire_plan/Haines_Block_Supp_EIS_Amend.html.

unduly restrictive regulatory measures, predominantly based upon irreproducible, biased and speculative reports and outdated science on public lands throughout 11 western states.

Reliance on undocumented or scientifically unreasonable error and uncertainties, biases, and misrepresentations in the NTT Report will dramatically alter the use of millions of acres of public lands[259] without offering protection to the GRSG. To avoid actual but unnecessary harm to the Petitioners, the western states, local governments, private landowners and stakeholders, BLM must timely respond to this DQA challenge, retract statements and conclusions based on undocumented or scientifically unreasonable error and uncertainties, biases, and misrepresentations in the disseminated information.

Where, as here, the Petitioners have provided "significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts," BLM should use existing mechanisms to remedy the situation "such as re-proposing a rule or supplementing a NEPA analysis."[260] The flaws contained in the NTT Report are so numerous and severe, corrective action in this case must include a retraction of the NTT Report and its proposed conservation measures, and their withdrawal from consideration in alternatives in Land Use Plan Amendments. In the alternative, BLM can issue a significantly modified NTT Report correcting the numerous errors and utilizing the best available information as discussed herein.

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[259] *See* BLM, *Mineral and Surface Acreage Managed by the BLM*, http://www.blm.gov/wo/st/en/info/About_BLM/subsurface.print.html; *see also* Congressional Research Service, Federal Land Ownership: Overview and Data, http://fas.org/sgp/crs/misc/R42346.pdf; BLM, News Release: *Federal Agencies Announce Initial Step to Incorporate Greater Sage-Grouse Conservation Measures into Land Management Plans*, http://www.blm.gov/wo/st/en/info/newsroom/2011/december/NR_12_08_2011.html ("Greater sage-grouse currently use as much as 47 million acres of land managed by the BLM, and about nine million acres of land managed by the USFS").

[260] DOI Guidelines III.

D. Highly Influential Information

The information disseminated here readily qualifies as influential information. As OMB states: "[T]he more important the information, the higher quality standards to which it should be held... ."[261] Ordinary information is distinguishable from "influential" information, which is scientific, financial and statistical information having a clear and substantial impact on important public policies or important private sector decisions. "Influential" information is subject to higher standards of quality and should be reproducible by qualified third parties. Information disseminated in the NTT Report is information of extreme importance to states, landowners, user groups, and local conservation efforts.

OMB Guidelines define "influential" requests for correction as those of a substantive nature, which sought "something more than a straightforward webpage or data fix." "Influential" also indicates "that the agency can reasonably determine that dissemination of the information will have or does have a clear and substantial impact on important public policies or important private sector decisions."[262]

The information disseminated in the NTT Report is information of extreme importance. It qualifies under the Guidelines as substantive notices, policy documents, studies and guidance relied upon by the agency to make decisions that could affect multiple federal and state agencies, local governments, tribes and private individuals in 11 western states, and on tens of millions of acres of public lands. The conservation measures in Land Use Plan Amendments were developed by the NTT which included staff and scientists from BLM, FWS, U.S. Geological Survey ("USGS"), Natural Resources Conservation Service, and state fish and game agencies.

[261] 67 Fed. Reg. 8452 (Feb. 22, 2002).
[262] Id. at 8455.

Their work culminated in the NTT Report. Many of the action alternatives in the 98 Land Use Plan Amendments were largely derived from the NTT Report.[263]

This information is clearly "influential scientific, financial, or statistical information" that crosses state and agency boundaries and affects private and public decisions under the DQA and the Guidelines. Specific to BLM Guidelines, the NTT Report is "expected to have a clear and substantial impact at the national level for major public and private policy decisions as they relate to Federal public lands and resource issues."[264]

Disseminated information is to be corrected upon consideration of the most recent or thorough information from stakeholders, the public and the scientific community.[265] This challenge constitutes the most recent and thorough information.

E. Petitioners are "Affected Persons" Qualified to Bring a DQA Challenge

OMB's Guidelines also require each agency to establish administrative mechanisms that allow "affected persons" to seek and obtain the correction of information that does not meet the OMB Guidelines.[266] OMB makes clear that the purpose of the administrative mechanism is to "facilitate public review" of agency compliance with the Guidelines.[267] OMB Guidelines concluded that "affected persons are people who may benefit or be harmed by the disseminated information. This includes persons who are seeking to address information about themselves as well as persons who use information."[268] Such a definition provides the public with a right to agency-disseminated information that meets high DQA standards; and with a right to correct any publicly disseminated information that does not meet these standards. BLM Guidelines provide

[263] http://www.blm.gov/wo/st/en/info/newsroom/2011/december/NR_12_08_2011.html
[264] *See* BLM Guidelines 2(b).
[265] *Id.*
[266] 67 Fed. Reg. at 8452.
[267] *Id.*
[268] 66 Fed. Reg. 49718, 49721 (Sept 28, 2001).

that any individual or person "who may use, be benefitted by, or be harmed by the disseminated information" is an "affected person."[269]

Petitioners are "affected persons" within the meaning of the Guidelines.[270] Petitioners and their members or constituents rely upon public and private lands within the range of the GRSG for the production of natural resources, agricultural goods and products, recreation, wildlife conservation, and for revenues distributed to the states and local governments.[271] Petitioners have a reasonable likelihood of suffering actual harm from dissemination of the NTT Report unless BLM resolves this complaint prior to the final agency actions and information products at issue herein.[272] There is no separate process or mechanism by which the Petitioners can raise these issues or seek redress regarding the fatal flaws and shortcomings of the NTT Report.[273]

The Petitioners have used, and will use, the information disseminated to better inform and guide their business decisions. Their members and/or constituents are similarly affected by information regarding GRSG numbers, dispersal, and distribution, as well as alleged threats to the species. Where the species is located, how it disperses, and where it is distributed could have strict regulatory consequences for producers of agricultural products, energy, and natural resources from implicated public lands. In addition, local governments rely upon continued access to public lands for natural resources, recreation, taxes and other revenue streams generated thereby. Accordingly, Petitioners could be "benefited by, or be harmed by" the faulty information at issue.

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[269] *See* BLM Guidelines 4(b).
[270] BLM Guidelines 4(b).
[271] BLM Guidelines 4(c).
[272] BLM Guidelines 4(f).
[273] BLM Guidelines 4(f).

Petitioners are involved in extensive conservation efforts across the West to conserve the GRSG while also preventing unfounded federal regulatory restrictions and a listing under the ESA, which would prove less effective than the state and local efforts underway. These conservation efforts include the collection of data and the compilation of ongoing state, local and private conservation efforts for the GRSG. Petitioners have established their interests in ensuring that their members and constituents, as well as the public at large, has the opportunity for open and robust debate regarding the information disseminated.

VII. The NTT Report Does Not Comply with Other Federal Standards

While scientific integrity and transparency in agency decision making are enumerated priorities for this administration, the NTT Report falls far short of these goals. *See* Exhibit A at 6-7 and 35.

A. The NTT Report is Contrary to Presidential Direction on Scientific Integrity and Transparency

On March 9, 2009, President Obama issued a Memorandum setting forth principles "for ensuring the highest level of integrity in all aspects of the executive branch's involvement with scientific and technological processes."[274] When scientific or technological information is considered in policy decisions, the information is to be subject to well-established scientific processes, including peer review where appropriate. Agencies are directed to appropriately and accurately reflect that information in complying with relevant statutory standards.[275]

President Obama committed to "an unprecedented level of openness in Government," by "work[ing] together to ensure the public trust and establish a system of transparency, public

[274] 74 Fed. Reg. 10671, 10671 (March 11, 2009).
[275] *Id.*

participation, and collaboration."[276] The president believes "[o]penness will strengthen our democracy and promote efficiency and effectiveness in Government."[277] "Transparency promotes accountability and provides information for citizens about what their Government is doing."[278]

President Obama reaffirmed his commitment to scientific integrity as part of his second term's scientific agenda in 2012.[279] More specifically, the President has "insisted that we be open and honest with the American people about the science behind our decisions."[280] Furthermore, "only by ensuring that scientific data is never distorted or concealed to serve a political agenda, making scientific decisions based on facts, not ideology, and including the public in our decision making process will we harness the power of science to achieve our goals – to preserve our environment and protect our national security; to create the jobs of the future, and live longer, healthier lives."[281]

In contravention to this presidential direction, the NTT Report presents a distorted and biased view of threats to the GRSG and mechanisms proposed to protect them. It is riddled with misrepresentation, misuse of citations, and reliance on opinion rather than the scientific method.

B. The NTT Report is Contrary to DOI Scientific Integrity Standards

The NTT Report runs afoul of DOI direction on scientific integrity. The DOI Manual that implemented secretarial order: Integrity of Scientific and Scholarly Activities (effective Jan. 28, 2011) defines "scientific and scholarly integrity" to mean, "[t]he condition resulting from adherence to professional values and practices, when conducting and applying the results of

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[276] Barack Obama, *Transparency and Open Government: Memorandum for the Heads of Executive Departments and Agencies*, http://www.whitehouse.gov/the_press_office/TransparencyandOpenGovernment.
[277] *Id*.
[278] *Id*. (emphasis added).
[279] *See* Barack Obama, Science Debate 2012, http://www.sciencedebate.org/debate12/ at No. 11 (Sept. 4, 2012).
[280] *Id*.
[281] *Id*.

science and scholarship, that ensures objectively, clarity, reproducibility, and utility."[282] On December 16, 2014, DOI updated and strengthened the policy to "ensure that all Interior employees and contractors uphold the principles of scientific integrity."[283] Interior Secretary Sally Jewell stated that "the Department must lead federal efforts to ensure robust scientific integrity policies because science is the very foundation of [their] mission."[284] Decision making: "must be robust, of the highest quality, and the result of as rigorous scientific and scholarly processes as can be achieved. Most importantly, it must be trustworthy."[285]

The NTT Report falls short of these standards. Contrary to the DOI Manual, its description of "science" makes no mention of hypothesis testing or potential falsification.[286] The NTT Report relies on a subjective interpretation of results which is a clear departure from the scientific method. It started with preferred conservation measures and then sought to justify them to reverse-engineer the recommendations. The NTT hardly qualifies as "rigorous scientific and scholarly process[es] as can be achieved." *See* Exhibit A at 22-23; *see also* Exhibit B at 10, 12-14, 16 and 31.

The NTT Report is also patently outdated.[287] It has been superseded by multiple DOI guidance documents, including the COT Report, BLM's Greater Sage-Grouse Baseline Report

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[282] DOI Manual, *Available at:* http://elips.doi.gov/elips/browse.aspx.

[283] U.S. Department of the Interior, *Press Release: Interior Department Announces Strengthened Scientific Integrity Policy for Employees and Contractors*, http://www.doi.gov/news/pressreleases/interior-department-announces-strengthened-scientific-integrity-policy-for-employees-and-contractors.cfm.

[284] DOI, *Integrity of Scientific and Scholarly Activities*, http://www.doi.gov/scientificintegrity/index.cfm?renderforprint=1&

[285] DOI, Departmental Manual: *305 DM 3*, http://www.fws.gov/science/pdf/DOIScientificIntegrityPolicyManual.pdf (January 28, 2011).

[286] 305 DM 3.5(N).

[287] FWS, Research Update: *Study Shows Taller Grass Benefits Nesting Sage-Grouse*, http://www.fws.gov/greatersagegrouse/documents/Research/20141219_Study_Grass%20Height%20Influences%20Nest%20Success.pdf (Dec. 22, 2014) (new information helps local, state and federal bodies manage the species effectively)

("BER"), and the Buffer guidance,[288] all of which categorically oppose one-size-fits-all management. GRSG science and understanding have evolved as well. Despite being outdated, the NTT report continues to be used as the basis of forthcoming Land Use Plan Amendments.

BLM has also failed to meet its charge in OMB Circular A-130, as "[a]gencies should inform the public as to the limitations inherent in the information dissemination product (e.g., possibility of errors, degree of reliability, and validity) so that users are fully aware of the quality and integrity of the information."[289]

C. Paperwork Reduction Act

We question whether BLM demonstrated in a Paperwork Reduction Act submission to OMB that the proposed collection of information in the NTT Report was collected, maintained and used consistent with the DQA Guidelines.[290]

VIII. Conclusion

The NTT Report is a highly influential document, as BLM and USFS are using it to make substantial land use decisions across nearly 60 million acres of public lands throughout 11 western states. As such, it must adhere to the standards of quality, integrity, objectivity and utility in the Data Quality Act as well as administration standards of scientific integrity and transparency. Unfortunately, the NTT Report fails to meet these requirements. Much of what the Report presents as "science" has no basis in scientific design or scientific evidence. And the most frequently cited sources in the Report are irreproducible, biased and speculative and outdated. *See* Exhibits A and B, *gen*. Opinions must not be represented as fact nor dictate decisions that are required to be based on scientific data.

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[288] *E.g.* BLM, *Greater Sage-Grouse Baseline Report* (BER), http://www.blm.gov/wo/st/en/prog/more/sagegrouse/ber_data_portal.html (last updated June 3, 2013).
[289] Alice Rivlin, OMB, Circular No. A-130: *Memorandum for Heads of Executive Departments and Establishments*, http://www.whitehouse.gov/omb/circulars_a130 (Feb. 8, 1996) (last visited Dec. 30, 2014 at 2:36 PM).
[290] DOI Guidelines VI.

The NTT Report violates the Data Quality Act, the Guidelines and the additional authorities cited herein as it is not presented in an accurate, reliable and unbiased manner. The NTT Report cherry-picked what scientific papers it wished to discuss, presented misleading information, presented much information out of context, and simply ignored large numbers of studies that refute many of its conclusions.

The NTT Report does not represent the best available science as required to meet the standards of quality, objectivity and integrity required in the DQA. Rather, the NTT Report is comprised of assumptions built upon assumptions. It fails to address the limitations of the underlying data and studies used to reach its conclusions and fails to acknowledge that circumstantial evidence rather than scientific evidence underlies most of the information presented.

BLM cannot rely on the biased opinions and selective presentation of information to support recommendations that are unsupported by data. The NTT not only violates BLM's multiple-use mandate, but elevates GRSG concerns above human health, safety, and scientific transparency.

Because the information disseminated in the NTT Report is not objective, it also fails to have any utility for those persons making management decisions regarding multiple uses of the public lands. As detailed in the text herein and in the Exhibits attached, the NTT Report failed to:

- Use sound analytical methods in carrying out scientific and analyses and in preparing risk assessments
- Use reasonably reliable and reasonably timely data and information (e.g., collected data such as from surveys, compiled information, and/or expert opinion)
- Ensure transparency in its dissemination by identifying known sources of error and limitations in the data

- Evaluate data quality and, where practicable, validate the data against other information when using or combining data from different sources

- Ensure transparency of the analysis, to the extent possible, consistent with confidentiality protections, by

    - Presenting a clear explanation of the analysis to the intended audience
    - Providing transparent documentation of data sources, methodology, assumptions, limitations, uncertainty, computations, and constraints
    - Explaining the rationale for using certain data over other data in the analyses
    - Presenting the model or analysis logically so that the conclusions and recommendations are well supported.

- Clearly identify sources of uncertainty affecting data quality

- Clearly state the uncertainty of final quantitative estimates

- Demonstrate that the data and data collection systems used are of sufficient quality and precision that uncertainty in the final estimates is appropriately reproducible

- Provide an explanation of the nature of uncertainty in its analysis.

The errors contained in the NTT Report are improperly influencing BLM's decision making about management of the public lands. Reliance on this biased and faulty information has and will continue to harm the Petitioners. In addition to the damage to the Petitioners, the public, GRSG and the economy will be negatively impacted based upon the errors in the NTT Report.

The Petitioners respectfully requests that BLM retract the NTT Report and all reliance thereon in existing and subsequent Land Use Plans Amendments, as well as decisions on permits and authorizations. Alternatively, BLM could, as required by the DQA and the Guidelines, issue an amended NTT Report that uses sound analytical methods and the best data available while ensuring transparency and objectivity. Any amended Report should incorporate all reliable information, not just the data supporting false hypotheses. It should also identify the limitations

of data used rather than stating assumptions as fact. Finally, any amended Report should use and include the best available data as discussed herein.

Respectfully submitted this 18th day of March, 2015.

Holsinger Law, LLC

Kent Holsinger
Attorney for Petitioners

Exhibit A:
The NTT Report Fails DQA Standards

A.1) The "science" behind the NTT report was designed to support conservation measures preferred by the NTT rather than review alternative conservation measures in an objective manner.

The opening paragraph of the December 6, 2011 NTT meeting notes states, "the purpose of the meeting was to strengthen the science behind the existing conservation measures." This and subsequent statements reveal that instead of using the objective, scientific method to evaluate and rank the effectiveness of alternative conservation actions, the NTT biased their recommendations by only seeking scientific support for "existing" conservation measures that were preferred by the NTT.

By seeking scientific justification for preferred, predetermined conclusions, the NTT biased approach was outside the realm of standard scientific practice, which is to objectively consider all potential alternatives (hypotheses) and all information available, including contrary data.

Documented discussions of the NTT team from meeting notes and e-mails reveal that virtually the entire focus of the team was discussion of policy, rather than scientific issues, and this deficiency was also noticed in the peer reviews of the report. NTT meeting notes do not contain and references to scientific papers, data, or measured discussion of alternative conservation measures. Instead, the discussions were focused almost entirely on justification of preferred conservation measures and finding the documentation to bolster these.

The following excerpt from a Dec 13, 2011 11:52 AM e-mail from Raul Morales (the NTT team leader for BLM) to the NTT illustrates how the NTT and the National Policy Team sought to bolster support for its preferred conservation measures rather than develop an objective evaluation of alternatives (underline added for emphasis):

> "I just wanted to update everyone on what has happened since my last email to you all. There was an NPT call shortly before Thanksgiving. I was not on this call but what the NPT [National Policy Team] charged me to do was to reconvene small team of NTT members (mainly scientist folks) and with the help of a WAFWA (Western Association of Fish and Wildlife Agencies) appointed scientist (former Colorado Division of Wildlife Director, Tom Remington) <u>they asked that we further strengthen the science underpinnings to our conservation measures.</u> Also, that this effort needed to be completed before the release of the NOI which happened last Friday."
>
> "In addition, comments had been received from other external reviewers, and reviewers suggested the measures needed to be grounded in the best available

> science to be defensible. In addition, the US Fish and Wildlife Service (USFWS) wanted to ensure the science is strong so the conservation measures could effectively inform policy negotiations at the National Policy Team level."
>
> "So, the National Policy Team agreed the next step was for the National Technical Team to reconvene and review how the conservation measures are supported by existing science."

The excerpt is contrary to the portrayal of the NTT report as an objective scientific review of alternatives. Instead, the NTT chose to rationalize pre-determined conclusions. Further, the NTT made selective use of published papers, reports, and opinion that supported their preferred conservation measures while ignoring other sources of information that did not. The NTT meeting notes and e-mails contain numerous instances where the scientific rationale for particular conservation measures or restrictions were based upon nothing more than subjective opinion of the NTT authors. As a result, the NTT does not represent "a summary of the best available scientific information for the conservation of Sage-Grouse" as stated by Secretary Salazar in his December 18, 2012 letter to Representative Hastings. Instead, the NTT report represents a partial presentation of scientific information to justify a narrow range of conservation measures that will be imposed as land use regulations by the BLM.

A.2) The NTT report represented a narrowing of policy and management alternatives.

Rather than address the specific underlying, and mitigatable cause and effect mechanisms that can result in population level impacts to GRSG, the NTT unnecessarily narrowed the range of policy alternatives by recommending one-size-fits-all policy and management solutions (i.e. blanket setback distances, NSO requirements, and seasonal restrictions.) The 3% threshold, a four-mile NSO around leks, and seasonal restrictions are unnecessarily restrictive in light of available scientific information (see Ramey, Brown, and Blackgoat 2011 for an extensive review) and recently released, data-driven scientific studies that focus on prioritized conservation efforts. *See* Coates et al. 2014; Kirol et al. 2014; Applegate and Owens 2014, Ramey, Thorley, and Ivey 2014.

In addition, the NTT fails to acknowledge that greater sage-grouse ("GRSG") populations naturally flucutate as a result of regional climate/weather patterns. The significance of this error of ommision is obvious: it is not possible to meet the condition that GRSG populations or any population of any species for that matter) are always stable or increasing for mitigation credit to be given. A more reasoned and scientifically defensible, data-driven approach would be to quantify using reproducible, statistical inference the influence of the primary drivers of GRSG populations including weather patterns, predation, hunter harvest, and habitat quality and avialbility, and then determine the degree of influuence that anthropogenetic disturbances have on the population against that background (their effect size and significance). This is a proven, data-driven approach (Bottrill et al. 2008, Boyd et al. 2014, Deriso et al. 2008, Dzialak et al. 2011,

Messmer et al. 2013, Fedy et al. 2014, Copeland et al. 2014) rather than the NTT approach which is not quantitative or reproducible but driven by surmise ands speculation.

A.3) If BLM is to develop a truly objective and effective conservation strategy for GRSG, the following alternatives need to be considered:

Conservation measures and best management practices ("BMPs") s must be organized around specific threats to GRSG and address their cause and effect mechanism(s).

A broader range of conservation alternatives and a greater diversity of choices needs to be available for decision-makers to implement conservation alternatives suitable to local conditions.

All scientific information and data, not just selective use of information, needs to be made available and considered by BLM in developing the science based conservation alternatives. The agency must employ a strong inference approach (hypothesis testing) rather than rely on subjective opinions and selective use of information as advocated in the NTT Report.

Rather than the NTT approach, BLM should formulate multiple, alternative hypotheses regarding the specific cause and effect mechanisms of each threat. Then the agency should deduce testable (e.g. potentially falsifiable) predictions, and establish thresholds for testing these against the available scientific data. This strategy of strong inference has the greatest potential for rapid advancement of scientifically informed decision making (Platt 1964; Rehme et al. 2011). This is especially important to adaptive management as proposed by the BLM.

a) Organize BMPs around threats so they address specific cause and effect mechanisms.

A more potentially effective strategy for developing conservation measures (including BMPs) is to organize them in such a way that they address the specific cause and effect mechanisms that underlie each threat that is potentially deleterious to GRSG. In this way, BMPs may be seen as a set of alternatives that can be used singly, or in combination, to address specific threats, as local circumstances require. An example of this rational, science-based approach is described in the text and Table 1 of Ramey, Brown, and Blackgoat (2011).

b) Site specific conditions must be taken into account

We hope that BLM will acknowledge the importance of site-specific conditions in determining the most effective and efficient mitigation that can be applied. For example, topography influences sound transmission, while the technology being employed at a production site affects all aspects of noise being generated, including time on site, staffing needed, and amount of truck traffic. Therefore, taking into account local conditions can increase the options available for effectively mitigating oil and gas development.

c) Tracking and testing effectiveness of BMPs
Establishing a single database for tracking and testing the effectiveness of previously required BMPs would provide a good starting point for the evaluation of any existing or newly proposed BMPs.

d) Compare the effectiveness of current versus proposed BMPs
Prior to new BMPs being imposed, it would be advisable for the BLM to describe why currently required BMPs are inadequate, as compared to new ones (such as those proposed in Appendix D), and how much of an improved response from GRSG populations can be expected from the new BMPs. This approach would provide a more defensible scientific and quanitative basis for any new BMPs. We emphasize here the importance

A.4) The NTT report is biased.

A.4.1) The NTT report presents a biased view of oil and gas development: "*that impacts are universally negative and typically severe."* The NTT report selectively presented information, while ignoring information contrary to their preferred conservation measures, including information that was presented to the NTT during its August 2011 meeting. As a result, three key assertions in the NTT report are both biased and in error.

> Those assertions include "The primary potential risks to GRSG from energy and mineral development are:
>
> 1) Direct disturbance, displacement, or mortality of grouse.
>
> 2) Direct loss of habitat, or loss of effective habitat through fragmentation and reduced habitat patch size and quality.
>
> 3) Cumulative landscape-level impacts (Bergquist et al. 2007, Walston et al. 2009, Naugle et al. 2011). There is strong evidence from the literature to support that surface disturbing energy or mineral development within priority GRSG habitats is not consistent with a goal to maintain or increase populations or distribution. None of the published science reports a positive influence of development on GRSG populations or habitats. Breeding populations are severely reduced at well pad densities commonly permitted (Holloran 2005, Walker et al. 2007a). Magnitude of losses varies from one field to another, but findings suggest that impacts are universally negative and typically severe."[1]

These statements are not supported by the data. Instead, they are based upon:

a) A subjective interpretation of results by the authors of the cited studies (i.e., where no hypothesis testing was used). In other words, the authors of the cited studies did not

[1] NTT Report at 18-19.

use the scientific method but instead, opined about their results, often in a manner that was confirmatory of particular interpretations, rather than using an objective, hypothesis-testing approach to falsify alternative hypotheses and explanations.

b) The frequently repeated but erroneous assumption that a temporary decrease in lek counts immediately adjacent to active wells is equivalent to a population decline. The alternative hypothesis, that displacement from affected leks is temporary or that birds, particularly juveniles, relocate elsewhere, was not considered[2]

The NTT report cannot cite statistically valid population estimates from multiple populations that show declines specifically due to oil and gas development because no such data exist.

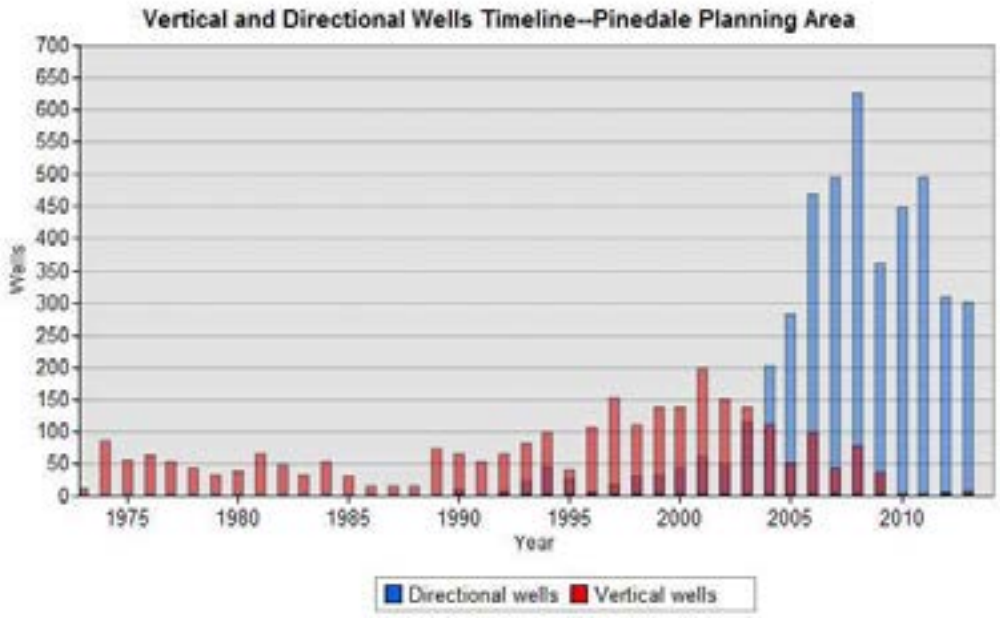
A.4.2) The NTT report does not present any credible description of the specific mechanisms that explain *why* GRSG could be affected to the point that population declines could occur. This is a key issue addressed in the scientific review published by Ramey, Brown, and Blackgoat 2011. In that paper, the authors articulate the specific cause and effect mechanisms that underlie each threat, as well as the experimental data required to test them, and the specific types of mitigation required to ameliorate them. The NTT report, in contrast, made unsupported blanket statements and regulatory prescriptions that did not address specific threats and their underlying mechanisms.

A.4.3) Contrary to assertions made in the NTT report, data and analyses from the State of Wyoming, which were (available to the NTT, show that population trends across the state synchronously fluctuate, showing peaks in male lek attendance in 2000 and 2007. Additionally, the most heavily developed region, the Upper Green River Basin (Pinedale Planning Area) has consistently been above state-wide trends in male lek attendance (Wyoming Game and Fish 2012). Additionally, the earliest study cited in support of the blanket approach (Holloran 2005) did not acknowledge that the BLM had intentionally waived stipulations on the Pinedale Anticline in order to facilitate research on impacts without these stipulations. Therefore, the impacts reported by Holloran (2005) do not correspond to impacts under stipulations required at the time, nor account for current and dramatically reduced impacts under more recent and stringent stipulations. And finally, Holloran's (2005) population scenarios and predictions of population decline have simply failed to come true (see additional discussion of this issue in Section 6 below), yet the NTT report continued to rely on the predictions of that study that have been falsified by new information. If conservation measures are to be science-based, all evidence must be taken into account, including contrary evidence. The NTT report has failed in this most basic requirement of science.

A.4.4) The NTT Report recommendations relied on research from past periods dominated by intense drilling in heavily developed areas (e.g. Pinedale), and where older, denser development (e.g. Jonah field) and more invasive technologies were used, along with little mitigation or no restoration (i.e. Lyon 2000; Lyon and Anderson 2003; Holloran 2005). Since that time, oil and natural gas operations have

[2] *See, e.g.* Ramey, Thurley and Ivey 2014.

changed dramatically. New technologies such as directional and horizontal drilling combined with advanced hydraulic fracturing have greatly reduced surface disturbance and hence, impacts to GRSG habitat have been reduced. Whereas in 2000, the majority of wells were vertical, today virtually all of the wells are horizontal or directional, which enables fewer wells and less surface disturbance.



In addition, multiple wells are drilled from a single well pad, with companies achieving up to 49 wells in the Pinedale area per pad. Companies are also clustering development, and using centralized facilities, all of which reduce surface disturbance and impacts to GRSG. Yet the NTT is relying on science from an era that no longer exists. Surely that is not the best available, relevant science as required by the DQA.

While GRSG have been found to avoid areas of intensive development, such avoidance is not uniform among locations, or among individual birds, especially when there is a lower density of development, or in older fields that have already been developed (Harju et al. 2010; Taylor et al. 2010; Ramey, Brown, and Blackgoat 2011; Applegate and Owens 2014). The impact of the oil and gas operations on GRSG is not as clear-cut, nor as negative, as the NTT report claims. Since the NTT persists in viewing operations as they existed fifteen or more years ago, it is viewing oil and natural gas in a biased manner not supported by reality or relevant science.

A.4.5) The NTT report did not cite either Taylor et al. 2010 or Ramey, Brown, and Blackgoat 2011 even though both of these papers were made available to the BLM as discussed herein.

A.4.6) The issue of independence and transparency was raised previously in public comment by the American Petroleum Institute but not subsequently addressed by BLM.

Neither of these documents employ a hypothesis testing approach or mention the term. The data used in several of the most influential monograph papers are not publicly available, which precludes an independent assessment and is contrary to the Data Quality Act, the Department of the Interior's information quality guidelines requiring that reproducibility "shall generally require sufficient transparency about data and methods that an independent reanalysis could be undertaken by a qualified member of the public," (Department of the Interior 2002)), as well as recent White House policy directives (Obama 2009; Holdren 2010, 2011).

The review standards established by the National Academies address these issues and may be found at http://www.nationalacademies.org/coi/index.html. By implementing these standards, National Academy of Sciences has sought to diversify its review panels with independent experts from diverse disciplines and backgrounds in order to "conceive new ways of thinking about a problem" and "to provide a balance of perspectives." The narrow and outdated viewpoints expressed in the NTT Report exemplify the consequences brought on by lack of independence that the National Academies have long sought to avoid in their reviews.

A.5) Comments by one of the most influential members of the NTT could be construed as having a less than objective viewpoint.

NTT e-mails written by a highly influential member of the NTT and GRSG program leader for the USFWS, Dr. Pat Diebert, were obtained from a FOIA request by the State of Idaho.

In the e-mails (below), Diebert expressed the following opinions that demonstrate a bias against non-federal conservation efforts and bias in favor of imposing scientifically unjustified regulations:

1) against regulatory assurances provided by instructional memoranda,
2) for greatly expanded buffers around priority habitat,
3) for greatly expanded buffers around leks,
4) for a requirement that off-site mitigation be required for existing leases (that would have been illegal if implemented),
5) for arbitrary addition of grazing restrictions, and
6) against non-lethal wild horse and burro management**.**

In the following passage (on page 1135), Diebert apparently did not consider Instructional Memoranda (IMs) to be enough of a regulatory mechanism for the conservation of GRSG, without addressing the specifics of these or whether they meet the standards of PECE policy.

> Comment [p6]: I think this was placed here as a reminder that the IM already calls for this. But, it shows up again later. <u>My only concern is again, that IMs are not enough for regulatory mechanisms.</u> If this reference is for more than a reminder/placeholder, policy is necessary. [Deibert].

Comment [UF&WS8]: This is added after discussions with folks regarding surface disturbance. It's a key point that should not be lost (although it might be better worded!)

In the following passage (page 1138), a recommendation was made for offsite mitigation on existing leases and purported to be "science-based" when no data or supporting scientific literature were cited:

> Route construction within priority habitat areas will be limited to realignments of existing designated routes to enhance other resources only if that realignment maintains or enhances sage grouse habitat. Use existing roads, or realignments as described above, to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then any new road constructed must be built to the absolute minimum standard necessary, and the surface disturbance added to the total disturbance in the priority area. If that disturbance exceeds 2.5 % for that area, then off-site mitigation is necessary (see discussion above). [Deibert] (~~subject to valid existing rights requiring access~~) [Deibert]– {science based} [Note: the text strike outs were inserted by Diebert.]

Note that earlier on this same page, there was a suggested arbitrary cap on route density based on so-called professional judgment that is nothing more than subjective opinion: "Reduce route density to a maximum of 2 mi/mi2) in priority sage-grouse habitat areas. (citation/professional judgment)"

In the following passage (page 1142 of FOIA response), Diebert apparently attempted to expand the NTT report recommendation to include a 12-mile radius buffer around leks (or a total of 452 square miles surrounding *each* lek). This proposed change was made without any sound scientific basis. If implemented, a 12 mile radius buffer would encompass an area nearly 400 times larger than that current 0.6 mile buffer and 9 times the land surface area of the NTT's final proposed 4 mile buffer.

> "Managing landscapes (12 mile radius around leks) of priority habitats for 70% sagebrush and 30% potential habitat approximates the amount of sagebrush habitat necessary for increased likelihood of habitat use, nest success, and population persistence (citations).Within priority sage-grouse habitat areas where current sage-grouse habitat is less than 70%, the conservation focus for habitat restoration should include an objective that achieves >70% of sage-grouse habitat in advanced structural stages and appropriate amounts of understory vegetation relative to site potential. (citation) The remaining 30% ~~could include areas of juniper encroachment, non-sagebrush shrublands that are~~ ~~periodically used by sage-grouse, annual grasslands, degraded native plant communities,~~ ~~and non-native perennial grasslands that potentially can be rehabilitated or enhanced and~~ ~~is capable of supporting sagebrush or currently helps to maintain sage-grouse~~**." [Deibert]**

Additionally, Diebert added llamas and alpacas to the grazing species that need to be managed for GRSG, even though there is no scientific research cited that suggests these species are an issue for GRSG (from page 1143). Poor scholarship was then exhibited by Diebert and the Team in citing Briske et al. 2011 in support of certain restrictions, when that paper makes no mention of horses, llamas, alpacas or goats as needing grazing regulation to protect GRSG. This is another example of how the poor scholarship in the NTT which simply sprinkled references into the text to support preferred conservation measures.

A.6) Voluntary conservation efforts on private land were treated as inferior to federal land acquisition and management by the NTT report. The NTT Report assumes that voluntary conservation measures on private land are inferior to federal land management, and requires a regulatory "command and control" approach, including the transfer of private lands into the federal domain (land tenure adjustment). Similarly, the NTT Report assumes that local and State GRSG plans are similarly inferior as there is no mention of these in the NTT Report and reference to appropriate regional plans and involvement of stakeholder groups was deleted from the draft cover letter on Instructional Memoranda as follows:

> "All RMPs containing Greater Sage-grouse occupied habitat must consider these measures, including when the plan is being revised, amended, or supplemented. ~~following regionally-appropriate, science based conservation measures shall be incorporated into BLM land use planning efforts, utilizing coordinated and cooperative stakeholder engagement."~~

[Note: this excerpt is from page 1,499-1,500 of the file, SG NTT Emails Fall 2011 Attachments_Redacted.pdf.]

The importance of voluntary conservation on private land and its contribution to species recovery has been recognized by numerous scholars of the Endangered Species Act, including the current Deputy Assistant Secretary of Fish and Wildlife and Parks, Michael Bean, who has authored multiple papers on the subject (i.e., Bean 1998, 1999, 2002).

The NTT report's bias against conservation on private land is contrary to the numerous published papers by ESA scholars for voluntary conservation incentives on private land, rather than typical federal regulatory "command and control" which has failed in large measure to recover species (Adler 2008, 2011; Baur et al. 2009; Bean 1998, 1999, 2002; Keystone Center 2006; Paulich 2010; and most recently, Ruhl 2012). In addition, there is a broad range of first and second generation conservation measures available to private landowners and cooperating agencies, beyond conservation easements. These are detailed below. None of these were discussed as viable alternatives to federal acquisition of private land or encumbering it in perpetuity with conservation easements as recommended in the NTT Report. The list below illustrates the broad range of incentive-based conservation alternatives available for private land but not considered in the NTT report:

> First Generation Incentive Mechanisms

1. Habitat Conservation Plans
2. Safe Harbor Agreements
3. Candidate Conservation Agreements
4. Candidate Conservation Agreements with Assurances
5. Fee simple acquisition

Second Generation Incentive Mechanisms
Conservation Easements:

6. Conservation Easements (in perpetuity, tax benefit)
7. Term conservation Easements (i.e., 20 to 30 years, no tax benefit))
8. Post development and restoration conservation easements (currently used on some reclaimed mine sites in Colorado)

Market-Based Approaches:

9. Subsidies/tax credits in exchange for specific conservation efforts
10. Conservation Banking
11. Tradable development rights
12. Conservation leasing

Information-Based Programs:

13. Technical assistance for private land conservation, mitigation, and habitat enhancement
14. Government-private quasi-partnerships and collaborative planning efforts

Performance-Based Programs:

15. Performance bonds (promotes innovation and is suited to local conditions rather than relying on one-size-fits-all restrictions)

A.6.1) This issue above was raised previously in public comment by the American Petroleum Institute but not subsequently addressed by BLM. This is also a key issue to many stakeholders because the NTT appears to be insensitive to private landowners who may not wish to encumber their land, but also the needs of local governments that seek to maintain their property tax base (rather than have private lands acquired by the federal government).

A.7) Errors of omission

A.7.1) The NTT Report did not acknowledge or make use of best available scientific and commercial data in its report, specifically that which shows the substantially lessened impacts of oil and gas operations on GRSG as a result of new technologies and BMPs that address specific threats.

A.7.2) The NTT omitted mention of information provided to them during their meetings. Most importantly, in Appendix 5 of the NTT meeting notes of August 2011, a powerpoint presentation titled: *Managing Oil and Natural Gas* was presented. This

presentation was included in the meeting notes that were released under FOIA. The presentation documented BLM's process for permitting drilling, as well as: 1) documentation of interim reclamation, 2) final reclamation and restoration, 3) fluid mineral conservation measures in priority GRSG habitat, 4) best management practices (BMPs) to minimize wildlife habitat fragmentation and loss on local and landscape levels, 5) reductions in pad size to minimize disturbance, 6) use of oak and plastic mats, 7) interim reclamation of well pads, 8) interim reclamation of roads, 9) development planning to reduce impacts, 10) use of directional drilling and multiple wells drilled from one pad, 11) one point of access for each well pad, 12) burial of water, gas, and electrical lines, 13) the use of liquids gathering systems to reduce truck traffic, noise, disruption of wildlife and the fragmentation of their habitat.

A.7.3) The NTT Report also failed to mention readily available technical information on modern oil and gas well technology and wildlife mitigation best management practices, including that which *had been compiled by the BLM* and released on its website:

http://www.blm.gov/bmp/technical info_pdfs_ppt_text/WO1_WildlifeMgmt_BMPs_Slideshow.pdf

http://www.blm.gov/bmp/Technical_Information.htm

Ignoring this information has created a situation where the NTT Report, and agencies such as the BLM that rely on the Report, are not considering actual operations as they exist today and thereby exagerating the impact from oil and natural gas development.

A7.4) BLM's strategy and subsequent revisions or amendments to RMPs should incorporate information and knowledge not only from experts in wildlife biology but also engineers and other industry specialists who develop and implement the types of technological innovations that improve the efficiency of oil and natural gas operations and reduce their environmental impacts.

A.7.5) The NTT Report did not cite or otherwise make use of a key scientific review paper by Ramey, Brown, and Blackgoat (2011) *"Oil and gas development and greater GRSG (Centrocercus urophasianus): a review of threats and mitigation measures"*, even though copies of this paper were personally handed to Director Abbey and Assistant Director Poole by the lead author on September 16, 2011. The paper, was published in 2011 in a refereed journal, *The Journal of Energy and Development* (Volume 35, Number 1, Pages 49-78).

A.7.6) The NTT Report virtually ignored one of the primary threats to GRSG: predation. Research has shown that predators of GRSG are generalists, meaning that they prey on other species as well, and in some cases their populations are subsidized by human sources of food. GRSG eggs are preyed upon by red foxes, coyotes, badgers, ravens, and black-billed magpies. Common predators of juvenile and adult GRSG include golden eagles, prairie falcons (as well as other raptors), coyotes, badgers, and bobcats.

Younger birds (especially broods) are preyed upon by ravens, red fox, northern harrier, ground squirrels, snakes, and weasels. However, of these predators, ravens, a major predator on GRSG eggs and broods, are the most abundant and have the greatest impact.

The NTT Report included an error of omission by ignoring a substantial body of literature about raven predation on GRSG (and other species), its deleterious effect on survivorship and recruitment, and the integrated management strategies that can reduce losses of GRSG. In fact, the word "raven" was mentioned only once in the NTT report (on page 63) and only in regards to suggesting that there be *"no tanks at well locations within priority areas (minimizes perching and nesting opportunities for ravens and raptors).*" Moreover, there were only two references to predation of any sort on GRSG. In contrast, the body of literature ignored by the NTT Report includes but is not limited to: Boarman 1993; Boarman 2003. Boarman et al. 1995; Boarman and Heinrich. 1999; Boarman et al. 2006; Bedrosian and Craighead 2010; Bui 2009; Cagney et al. 2010; Christiansen 2011; Coates 2007; Coates and Delehanty. 2004; Coates et al. 2008; Coates and Delehanty 2010; Conover et al. 2010; Cote and Sutherland 1997; DeLong 1995; Gregg et al. 1994; Heinrich et al. 1994; Moynahan et al. 2007; Preston 2005: Ramey, Brown, and Blackgoat 2011; Schroeder and Baydack. 2001; Snyder et al. 1986, Sovada et al. 1995; Watters et al. 2002; and Webb et al. 2009.

The NTT Report avoided mention of management of GRSG predators in areas of greatest risk of predation, and chose instead to treat this threat as a byproduct of human activities that can be regulated by such means as land health assessments and emphasizing vegetation cover as a means to measure and mitigate livestock use; or increasing landscape level habitat connectivity. Such passive control will do nothing to reduce the immediate and long-term threat of high raven populations.

In the same way, the NTT Report's recommended conservation measures fail to address the fundamental fact that predators, such as ravens, are heavily subsidized by humans, to the point where they exceed historic levels in some areas by as much as 1,500%. In such cases, management of some predator populations, especially where predators like ravens are abundant and GRSG mortality is high, is needed to ensure that GRSG populations are not depressed by a known and easily mitigated source of mortality.

This point is underscored by the fact that USDA-APHIS Animal Damage Control began controlling ravens in landfills across southern Wyoming in 2012 at the request of the Wyoming Game and Fish Dept., using the avicide DRC-1339 (Wyoming Game and Fish 2012, USDA/APHIS/Wildlife Services 2013). Large raven populations cause a variety of health and safety problems at landfills and industrial sites, and the food subsidy that ravens gain from these also results in a higher than natural population density of this species.

Ravens are clever and highly adaptable in their behavior, which allows them to opportunistically exploit food resources associated with humans, e.g. landfills, road kill, unattended food, and in some cases, livestock operations. As a result of these and other unintended food subsidies, raven populations have greatly expanded in the West. This, in

turn, has impacted many species, including desert tortoises, marbled murrelets, least terns, California condors, and GRSG (please refer to the list of studies ignored by the NTT Report above). While reducing subsidies available to predators is one approach, it is unlikely to be effective unless coupled with active / lethal control of raven populations (Coates and Delehanty 2010). Case in point, Coates and Delehanty (2004), reported a 73.6% nest success in GRSG following raven control compared to a mean expected nest success of 42.6% (based on 14 studies from 1941-1997).

BLM cannot rely on the selective use of information, nor should it ignore a major body of literature and experimental data on predator management.

A.7.7) Recommendations for management of priority habitat were made without any quantification of priority habitat or consistent definition of what constitutes an active lek. Under *Objectives*, the NTT Report fails to provide any quantifiable, biological basis for areas that are considered to be priority GRSG habitats that it proposes to protect from anthropogenic disturbance with recommended conservation measures. For at least one of the components of priority GRSG habitats, migration and connectivity corridors, the NTT Report admits on page 52 that it cannot be defined: "Almost no information is available regarding the distribution and characteristics of migration corridors for sage-grouse (Connelly et al. 2004)."

The significance of this data deficiency is clear and has far reaching implications:

- First, without a precise definition or clear cut criteria, there is potential for large areas that have a zero or near zero probability of GRSG use to be defined as essential to migration and connectivity, even though there may be no empirical data demonstrating their regular use by GRSG or their importance to population viability. This has the secondary effect of diverting resources away from higher priority habitat and threats of greater importance, while imposing unnecessary and scientifically indefensible regulatory burdens, as detailed in our analysis of the proposed 4-mile buffers and 3% NSOs.

- Second, data show that GRSG behavior can be affected by certain types of anthropogenic disturbance more than others, which can result in localized avoidance, but the effect of any of these disturbances or development on migration rates is unknown. However, data from Lyon (2000), Bush (2009), Tack et al. (2011), and more recent papers, all reveal that GRSG traverse (fly) over or around roads, agricultural areas, and oil and gas development, and distances up to 300 km from their natal lek.

- Third, experience with other ESA listings has shown that imprecisely defined characterizations of essential habitat, such as "priority habitat," have a strong likelihood of being re-designated as "critical habitat." This means that errors and flawed scientific analyses become institutionalized in regulatory decisions, regardless of their lack of accuracy. And once such designations are institutionalized, they are difficult to revise, even when new data become

available. Inevitably this results in litigation to correct the errors, such as the case of *Agua Caliente vs. Scarlett* (bighorn sheep critical habitat was reduced by nearly half because it was not scientifically or legally defensible).

A.8) In addition to the outdated information and perceptions regarding the oil and natural gas industry (identified above), and errors of omission (identified above), the NTT Report relied on outdated information and perceptions regarding the dispersal ability of GRSG, which have been grossly underestimated. Recent research, using genetics and GPS tracking devices, has revealed that GRSG disperse, and in some cases migrate, over much greater distances than previously thought. The implications of this increased dispersal ability for management of the birds are that: 1) there is greater genetic and demographic connectivity of populations than previously thought, and 2) that GRSG disperse over or around roads, rivers, agricultural fields, and oil and gas development. Collectively, this new information changes how populations are defined, namely that models previously relied upon (i.e. Knick and Hanser 2011), which underestimate this dispersal ability, are in error.

The following excerpt illustrates the emphasis on connectivity in the NTT Report, and reliance on Knick and Hanser (2011):

- Conserve, enhance or restore sage-grouse habitat and connectivity (Knick and Hanser 2011) to promote movement and genetic diversity, with emphasis on those habitats occupied by sage grouse.
- Assess general sage-grouse habitats to determine potential to replace lost priority habitat caused by perturbations and/or disturbances and provide connectivity (Knick and Hanser 2011) between priority areas.
- These habitats should be given some priority over other general sage-grouse habitats that provide marginal or substandard sage-grouse habitat.
- Restore historical habitat functionality to support sage-grouse populations guided by objectives to maintain or enhance connectivity. Total area and locations will be determined at the Land Use Plan level.
- Enhance general sage-grouse habitat such that population declines in one area are replaced elsewhere within the habitat.

A.8.1) GRSG dispersal occurs over greater distances than previously thought, and this has implications for the NTT's proposed conservation measures

We acknowledge that managing habitats to retain connectivity is an important long-term goal of conservation efforts for many species, including GRSG. However, it is clear that the dispersal abilities have been consistently underestimated in the development of habitat use and population persistence models (i.e. Garton et al. 2009, 2011; Knick and Hanser 2009, 2011; Makela and Major 2011). Therefore, it is important for the BLM and the NTT to acknowledge recent genetic data and results by

Bush (2009) and Bush et al. (2011) utilized assignment tests to identify the source population of GRSG that had dispersed, and isolation-by-distance measures to quantify the overall degree of genetic linkage among populations. Ongoing studies (including Tack et al. 2011) have employed satellite global positioning system transmitters to

reveal dispersal of GRSG over much greater distances (over 100km and some up to 300 km) and more frequently than previously thought. This requires a recalibration of assumptions used in habitat connectivity models (Lyon 2000; Bush 2009; Tack et al. 2011; Thompson 2012; Harju et al. 2010). Moreover, GRSG are able to disperse over and around areas of fragmented habitat and human development such that presumed movement corridors do not necessarily require the same high-level of protection as Priority Habitat and could be classified as General Habitat or as a third, less restrictive category that takes into account this new information.

Finally, Zink (2014) analyzed mitochondrial DNA and micrsatellite data and found that GRSG populations were not isolated or genetically botlenecked (with the exception of the Washingon state population). Extinction predictions that figured prominently in the ESA listing decision (Garton el al. 2009, 2011) were overestimated because long distance dispersal and gene flow (even when as low as one successful breeding migrant per generation among populations) will tend to maintain effective population sizes over time, as well as increase the potential for re-colonization should a population become locally extirpated. As API has commented in the Land Use Plan Amendment processes, these studies are highly significant. More recent studies that have utilized analyses of empirical data have revealed even greater connectivity of populations (i.e. Thompson 2012 and Zink 2014).

A.9) One size fits all neither benefits GRSG nor local communities.

A9.1) Conservation measures must be tailored to local circumstances. The NTT Report recommended numerous one-size-fits-all regulatory prescriptions such as four-mile buffers, 3% percent anthropogenic disturbance thresholds, and BMPs, and made no allowance for recommendations to include county-level GRSG conservation plans that tailor conservation measures to local conditions, including unique habitat and threats, and socio-economic conditions. Instead, the only "local" plans mentioned in the NTT Report are state-level plans.

The strategy of excluding local GRSG plans and locally-appropriate conservation measures from the implementation of the NTT Report can also be found in Secretary Salazar's response to Chairman Hastings**:** "The BLM believes that no single set of conservation objectives will apply across the entire multi-state range, or even within the area of a single state. Greater Sage-Grouse conservation efforts need to be defined at a local scale and be supported by the best available science." It is also inconsistent with DOI's response to question #12, " As noted in the NTT Report, in some cases conservation measures identified in the Report will need to be modified based on local ecological conditions or new information."

BLM violates its multiple use mandate if it follows the NTT' Report's one-size-fits-all recommendations, focusing entirely on GRSG and excluding local communities (as equals at the table) in developing locally appropriate conservation measures.

A.9.2) As proposed, the BMPs listed in Appendix D are unnecessarily restrictive, are not supported by scientific information, and do not address specific cause and effect mechanisms that are known to be deleterious to GRSG. Additionally, no comparative analysis is provided that demonstrates the inadequacy of currently required BMPs under local conditions with those proposed in Appendix D. There is currently no administrative mechanism at BLM that allows the agency to track and test the effectiveness of previously required BMPs. Establishing such a database and making it public would provide a good starting point for the evaluation of any newly proposed BMPs. It is arbitrary and capricious for BLM to require untested BMPs while imposing new ones and additional (untested) conservation measures.

As noted previously, BLM must organize BMPs around threats, and local, site-specific conditions must be taken into account to develop scientifically defensible conservation measures.

A.9.3) The NTT Report puts GRSG above people and other resources in proposing to defend sage brush stands against fire. For example, "On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in sage-grouse habitat areas." If implemented, this NTT Report recommendation would represent a violation of BLM's multiple-use mandate and a violation of the public trust in that agency to protect human life and property as its first priority. It is also inconsistent with Federal Wildland Fire Management Policy which states, "[F]irefighter and public safety is the first priority…." Federal Wildland Fire Management Policy at 8.

This issue of prioritizing GRSG for fire suppression above human life and property was previously identified by API in its March 23, 2012 comments to BLM.

The advocacy of single-minded GRSG experts in development of the NTT, under the banner of GRSG conservation, not only violates the BLM's multiple use mandate, but could result in the institutionalization of bias against human safety and property in favor of GRSG. The exclusion of local plans and local decision makers in the process further underscores this issue while undermining the BLM's mission: "To sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations."

A.10) Disturbance thresholds recommended by the NTT Report are arbitrary and do not have a sound scientific basis.

If conservation measures are to be science-based, all scientifically defensible alternatives must be weighed, all evidence must be taken into account (including contrary evidence), and the studies that recommendations are based upon must be reproducible. As demonstrated below, the NTT Report resoundingly failed to do this in its recommendations regarding:

- 3% surface disturbance thresholds
- 4-mile NSO (no surface occupancy) buffers,
- noise limited to less than 10 decibels above 20-24 dBA, and

- 70% sagebrush cover in priority habitat.

The scientific "support" for four-mile NSO buffers and 3% surface disturbance thresholds is based on the erroneous assumption that a temporary disturbance of GRSG from a local area under development equates to a population decline.

A.10.1) It is incorrect for the NTT Report to claim that the cited studies "present the most complete picture of cumulative impacts and provide a mechanistic explanation for declines in populations" when these studies never documented a population decline. *See* Exhibit B: Studies Cited in the NTT Report Fail to Meet DQA Standards.

A.10.2) The NTT Report omits any mention of the fact that more recent and stringent stipulations are found in the Pinedale Planning Area, along with:

1) more extensive mitigation and restoration efforts in the Pinedale Planning Area (see http://www.wy.blm.gov/jio-papo/index.htm for a list of mitigation projects and data on surface disturbance and reclamation efforts),

2) advances in technology and efficiency documented in Ramey et al. (2011) and BLM presentations to the NTT, "Managing Oil and Gas" and "Best Management Practices" (available in Appendix 5, pp 48-55 of the August 29 to September 2, 2011 meeting summary) have been implemented since Holloran's (2005) study was conducted (from 1997 to 2003).

A.10.3) The 3% anthropogenic disturbance threshold is based upon biased opinion and selective citation of information rather than data.
The "professional judgment" calling for a 3% anthropogenic disturbance threshold in priority habitats does not address specific threats, nor take into account the type of disturbance, local conditions, or mitigations that are to be used. This professional judgment is not the result of an independent quantitative assessment but is the opinion of a small number of collaborators who share a similar point of view.

A.10.4) The one well per section requirement lacks a sound scientific basis. NTT Report failed to mention that Holloran (2005) made very specific recommendations regarding one well per section that were not based upon his testing of that threshold in his analysis. *See* Exhibit B: Studies Cited in the NTT Report Fail to Meet DQA Standards. BLM cannot rely on unsupported opinion and irreproducible analyses as the basis for recommendations made in the NTT Report.

No mention is made in the NTT Report of the fact that five years after the original Holloran study was released (Holloran 2005), Holloran et al. (2010) did not document any population loss, only temporary displacement of GRSG. *See* Exhibit B: Studies Cited in the NTT Report Fail to Meet DQA Standards.

There has been no decline in the GRSG population in the Pinedale Planning Area (Upper

Green River Basin). Instead, data and analyses performed by the Wyoming Department of Game and Fish reveal that between 1990 and 2012 there has been a consistent increase in GRSG (measured in male lek attendance and male density per square mile; Wyoming Game and Fish 2012). The information relied upon by the NTT Report is simply wrong. *See* Exhibit B: Studies Cited in the NTT Report Fail to Meet DQA Standards.

A.10.5) The four-mile NSO does not have a sound scientific basis. The NTT Report portrays the cited studies as documenting the negative effects of oil and natural gas development with a great deal of scientific certainty but fails to mention any of the methodological issues with these studies (detailed in this Challenge), or the fact that none reported a population-level decline in GRSG (rather than a localized effect on rates of male lek attendance near the disturbance). *See* Exhibit B: Studies Cited in the NTT Report Fail to Meet DQA Standards.

Like previous studies, Tack (2009) did not report a population level effect. Instead, he compared probabilities of occurrence between males at small and large leks, with varying levels of human impact. As discussed previously, it is erroneous to assume that a local displacement of males from leks to other areas equates to a population-level negative impact.

The primary rationale presented by the NTT Report, that the majority of nests are located within four miles of a lek and therefore a NSO area is a minimally required conservation measure in priority habitat, is not sound. Yet, there are no data that show that a four-mile buffer addresses any specific threat to GRSG (e.g. predation, functional disturbance of leks from noise or activity), or that such a buffer would result in any quantifiable benefit to GRSG in terms of increased survivorship or reproduction. Instead, the presumed necessity of four-mile NSO buffers is solely based upon the subjective opinions expressed in the NTT Report and the citation of correlative studies regarding local lek counts, none of which can identify any causal mechanism for what was only shown to be a localized and transient effect, rather than a population wide permanent negative effect. The supposed population wide-effect is assumed by cited authors and the NTT Report but has never been demonstrated. The 4-mile NSO is not only indefensible, it diverts valuable conservation effort away from specific threats in specific circumstances, in favor of a one-size-fits all approach that does not address specific threats or their underlying mechanisms.

The presumed necessity of the four-mile buffer is clearly refuted by data from the Pinedale Planning Area (Wyoming Game and Fish 2012, and supporting Wyoming Game and Fish GRSG lek count data). These data clearly show a population increase, despite the fact that intensive energy development has occurred in the Jonah, Labarge, and Pinedale Anticline, and much of it in excess of a 3% disturbance threshold and within four miles of leks that remained active (see well data from the Wyoming Oil and Gas Conservation Commission, disturbance data from the PAPO JDMIS and PDMIS databases, and lek location and count data from Wyoming Game and Fish Department).

The NTT Report also presents a case that because a majority of GRSG hens captured at a

particular lek nest within four-miles of that lek, a blanket four-mile NSO is required around every lek. That requirement is regardless of the quality, extent, or actual occupancy of the habitat contained therein. Each such four-mile NSO buffer would result in over 50 square miles per lek of land that would be off-limits (50.24 square miles to be exact), even if there were only one or two male GRSG in attendance, and regardless of whether that attendance is continuous from year to year. The practical effect of such a restriction would be to "protect" vast areas of non-habitat and marginal habitat, with no demonstrable benefit to GRSG. And finally, the definition of an active lek is left by the NTT Report as arbitrarily vague and inconsistent. For the reasons detailed above, the four-mile NSO buffer recommended by the NTT Report is neither scientifically nor legally defensible under the DQA. *See also* Exhibit B: Studies Cited in the NTT Report Fail to Meet DQA Standards.

A.10.6) Noise limits recommended in the NTT Report are biased downward.
What is being proposed for noise thresholds is an "impossible to achieve" standard found in an idyllic wilderness setting, on quiet days when the wind does not blow, the leaves do not rustle, birds do not sing, humans are completely absent, streams are not close by, and no aircraft fly overhead. While this may be appropriate for management of anthropogenic sound in the wilderness areas of some national parks (Lynch et al. 2011), it is not appropriate and would be impossible to achieve on most of the BLM lands in the West that are administered for multiple uses.

There are no data to justify the minimum sound levels used as a basis in Blickley et al.'s (in press) recommendations, or the supposed "disruptive activities" that an increase of 10dbA above these would cause. There are no data to show that the minimum levels recommended by the NTT Report occur for extended periods of time in any of the GRSG core areas, including the Pinedale Planning Area.

The NTT Report, or cited studies, did not present the results of other studies of noise generated by the oil and natural gas industry (especially in the Pinedale Planning Area), even though those studies and data were available at the time the NTT Report was being prepared (i.e., Harvey 2009).

The cited studies were biased in a way to find a measurable impact, the speakers were increased from two to four during the course of the study, and the sound pressures measured in front of the speakers, and effect on GRSG, were made without regard to the increased sound gradient created by their close distance (i.e.due to the physics of sound attenuation over distances, also known as a the inverse square law, where sound decreases four times for every doubling of distance from its source) as compared to leks at the required BLM setback distances of 0.25 or 0.6 miles.

A scientifically defensible, alternative approach to studying the effects of noise on GRSG is outlined in laboratory and field experiments by Ramey, Brown, and Blackgoat (2011). Those approaches, when combined with sound modeling conducted by certified engineering firms, based on local environmental and land use conditions and professional standards, would provide a comprehensive approach to identifying and effectively

mitigating noise that would adversely affect GRSG populations. These would be based upon demonstrated cause and effect mechanisms of different noise characteristics (i.e., frequencies, duration, and sound pressure levels). Until such appropriate studies and modeling are done, BLM does not have sound data to support the noise restrictions in the NTT Report.

a) The noise thresholds proposed by the NTT Report represent a precautionary approach based on an undemonstrated assumption that there is a deleterious, population-level decline in GRSG as a result of noise associated with oil and gas operations. This is a clear violation of the DQA which required reproducible results based upon data, not presumed effects based upon potential effects.

b) The NTT Report promotes the arbitrary and capricious application of restrictions to one industry and not another.
Using the same rationale as proposed in the NTT Report (and supporting literature), BLM should establish "no-fly zones" for commercial, recreation, military, and research aircraft over or near GRSG core areas. Establishing "no-fly zones" would eliminate this source of anthropogenic noise that would exceed proposed limits. However, the lack of such restrictions underscores the fact that the NTT Report singled out and proposed limits only to the oil and natural gas industry, despite the fact that aircraft can produce noise levels that exceed the proposed thresholds (Wyle 2008; Barber et al. 2010); more than 50% of recordings in national parks document some form of aircraft noise (Fristrup et al. 2010); and the "Airport lek" in Wyoming is an active lek adjacent to the Jackson Airport (Wyoming Game and Fish lek location and count data). A similar argument could be made concerning noise from traffic unrelated to the oil and gas industry.

A.10.7) The NTT Report presents no scientific data that a one-size-fits-all goal of 70% sagebrush cover in Priority Habitat is scientifically defensible or achievable, would result in stable GRSG populations rather than addressing specific threats, and would not result in irreparable harm to other species (including candidate or sensitive species), and would not unnecessarily have a negative effect on local economies.

A.10.8) Conservation measures were developed based on guesswork.
The meeting summary from **Monday, August 29, 2011** clearly shows that the NTT was proposing conservation measures without the benefit of knowing how priority and general GRSG habitat were being mapped, nor what those maps would eventually look like [emphasis added]:

> "Raul Morales, Sage-Grouse National Technical Team Lead, welcomed everyone to the workshop and thanked them for coming. He said the first priority is to develop conservation measures for the important, high priority sage-grouse habitat areas. <u>Raul noted this group will not be developing the priority areas, which is a separate, ongoing effort, but this group should think about how the conservation measures will be applied to those areas.</u> Raul said the second priority for the week is to determine how to manage for those sage-grouse habitat areas

that fall outside of the priority areas."

"Raul noted that each day there would be a presentation on one of BLM's programs and then the group would work together to develop conservation measures related to that program. Raul said the measures should be based on science and that politics should be left out; politics will be addressed when the National Policy Team reviews the document. Raul said it is important to create a defensible document and annotate throughout the document when recommendations are based on science, inferred from science, or based on professional judgment."

NTT meeting notes from Tuesday, December 6, 2011 (page 6) state:

"The group discussed disturbance thresholds extensively. Key points and questions that emerged from discussion included:

There is a lot of research (at least 14 papers) related to disturbance impacts from oil and gas, and the take home message is that there are no positive benefits from disturbance and impacts are typically severe."

However, the NTT Report did not cite 14 papers in support of this assertion, nor do any of the papers on this subject use the language that "impacts are typically severe." If this were the case, then why has GRSG lek attendance and male density increased in the Pinedale Planning Area and been consistently above statewide averages since 1990?

The statements below underscore the fact that the NTT Report could cite no studies that actually demonstrate a measurable demographic impact on the study population(s). Therefore, proposed thresholds were arbitrary and based on opinion rather than upon rigorous testing of different thresholds against empirical demographic data.

"What is the correct metric to use to generate recommendations on disturbance thresholds?"

"Most studies on oil and gas disturbance impacts are correlative and observational. This presents an issue for this NTT effort because we are taking observational/correlative research and trying to extract thresholds to influence implementation on the ground."

"There are no studies that cite 5% cumulative impacts as acceptable. In addition, we know from a GIS modeling effort that 5% disturbance is too much."

The NTT Report cites no such GIS modeling effort. BLM cannot base restrictions upon data and studies that are not public. As shown below, if the "research" on

disturbance was based on pads per acre, then it is unacceptable for the NTT to convert that number (which is never stated) into an arbitrary 2.5 or 3 percent disturbance threshold.

> "There is no support for a 2.5% disturbance threshold in the literature. The science on disturbance is based on number of well pads/acre."

The statement below shows that the impacts of oil and gas development are limited, yet the NTT erroneously assumed that any "impact" to an individual or locally affected GRSG is unacceptable and leads to a population decline. From a demographic perspective, if yearlings move to nearby areas, with no associated density dependent mortality, then there will be no population decline. And if imprinted females remained in disturbed areas and presumably die at a higher rate, what matters most is that the affected proportion of the population must be large enough, and at a rate of mortality high enough, to have any detectable effect on rate of population growth. Neither of these have been demostrated by the cited studies in the NTT Report.

> "In general, disturbance causes two types of impacts: 1) yearlings move, and 2) imprinted females that stay die at higher rates."

The statement below underscores the arbitrary nature of the NTT Report's disturbance thresholds, which are based upon opinion:

> "What is the most appropriate metric to use? Acres disturbed or number of disturbances over a spatial extent?"

The NTT Report does not cite the "concept paper" below because it refutes the basis for 2.5 or 3% surface disturbance threshold(s). This is an example of selective citation of information in the NTT Report:

> "A concept paper in Casper, Wyoming on thresholds of energy development showed a 3% disturbance can be tolerated."

The NTT and the NTT Report cite Naugle's book chapter in support of disturbance thresholds but does not acknowledge that Naugle himself is an author on three chapters in this book, *Energy Development and Wildlife Conservation in Western North America*, which he is also the editor of. Also, three of Naugle's former graduate students were authors on four chapters: K. Doherty, B. Walker, and J. Tack. Therefore, in producing this book, Naugle was is a position of reviewing his own work as well as that of his former graduate students and close collaborators. Such a collection of chapters cannot be reasonably viewed as independent or unbiased.

> "Naugle's book chapter reviews the science on disturbance thresholds."

The statements below illustrates the arbitrary nature of the NTT Report's recommendation on disturbance thresholds. These were made without a sound scientific basis. There is no rigorous testing behind consideration of any of the surface disturbance thresholds (except a potential paper that was not cited in the NTT Report, the above mentioned concept paper). Additionally, the NTT was clearly was having issues with definitions, and in this case, wildfire was arbitrarily included in the 3% disturbance cap.

> "Should one additional well pad in each section (so a total of two well pads) trigger mitigation?"
>
> "Can we apply the oil and gas threshold (from existing scientific research) to all human disturbance?"
>
> "Should anthropogenic disturbances be in a separate category than natural disturbances? What constitutes an anthropogenic disturbance?"

The NTT meeting notes from Wednesday, December 7, 2011 (listed below) further indicate the arbitrary nature of recommended disturbance thresholds. In the final version of the NTT, just two weeks later, the NTT recommended a 3% disturbance cap and that disturbance include "diffuse disturbance", including the acreage in livestock grazing and that burned in wildfires. However, none of the cited literature actually tested for combinations of discrete and diffuse disturbance, therefore its utility is speculative. BLM cannot rely on speculation as a basis for its decision-making.

> "Whether the 2.5% disturbance threshold was meant to apply toward disturbances that could not be identified as 1 discrete disturbance."
>
> "Science exists to support the disturbance threshold of 1 disturbance/640 acres, but not necessarily for a 2.5% disturbance threshold."
>
> "Although solid literature exists to support the 1 well/640 acre threshold, this disturbance is not good."
>
> "Whether the disturbance objective should be restated to generally exclude large anthropogenic disturbances from priority habitats and manage other disturbances below 2.5%."
>
> "Whether the 2.5% threshold should be used as a trigger for mitigation."
>
> "Justifying the 2.5% threshold based on the best professional judgment that evolved based on the NTT's exhaustive review of literature."

Again, it must be emphasized that these are examples of the speculation that underly the NTT Report recommendations on disturbance thresholds. And the so-called "science" behind the 1 well/640 acres is merely opinion expressed in an unpublished dissertation

for which the underlying data are not publicly available (see A10.4 above and Exhibit B discussion of Holloran 2005's recommended disturbance threshold of 1 well per section/640 acres).

A.11) The presumption that peer review of the NTT Report was adequate is rebutted for the reasons listed below:

In the following excerpt from a December 18, 2012 letter from Secretary Salazar of the Department of the Interior to Representative Hastings, BLM gives a false impression that a rigorous peer review was conducted on the NTT.

> "Q: Was the NTT Report document peer reviewed according to the Department's Data Quality Act requirements? If yes, please provide copies of all peer review documents.
> R: The BLM followed the Department's Data Quality Act policy and sought a peer review commissioned by the Nevada Department of Wildlife Director, Mr. Ken Mayer. Mr. Mayer serves on the National Greater Sage-Grouse Planning Strategy National Policy Team. Mr. Mayer commissioned an outside review of the conservation measures in a draft version of the NTT Report by six scientists. A report of their comments is enclosed. A subset of the National Technical Team members met in Phoenix from December 6-8, 2011, to address many of these scientists' comments and further articulate and document the scientific basis for the recommended conservation measures. These were incorporated into the final NTT Report."

Contrary to the response above, there is no evidence that accepted standards for scientific peer review were followed in the supposedly scientific peer review of the NTT Report. As an initial matter, the "peer review" of the NTT Report was conducted by Ken Meyer of the Nevada Department of Game and Fish. In searching scientific journals, no evidence was found that: 1) Mr. Mayer has ever served as an editor or associate editor of a scientific journal, 2) has organized a scientific peer review previously using the accepted standards of scientific peer review, 3) served as a peer reviewer at a scientific journal, or 4) has himself ever published a peer reviewed scientific paper in a reputable scientific journal.

a) Most importantly, there is no evidence that each of the comments and issues raised by the "peer reviewers" of the NTT Report were either corrected or rebutted by the NTT, or that any responses by the NTT were ever submitted and subsequently reviewed by Mr. Mayer. If this supposed peer review was conducted properly, Mr. Mayer would have acted in the same role as an editor or associate editor of a scientific journal to accept or reject these responses, or require another round of review with a revised report. Instead, publicly available evidence points to the observation that peer reviewer comments were passed on to the NTT, and a select subset of the NTT subsequently decided amongst themselves which comments and issues they would address or not address. This is not how scientific peer review works. And it does a

disservice to the field of science to call such a casual solicitation and passing on of comments to the NTT a "peer review."

b) Evidence of the inadequacy of the supposed "peer review" of the NTT Report is further illustrated by the fact that substantive issues raised by some of the peer reviewers were never corrected in the NTT Report. To illustrate this deficiency, comments listed below were ignored or inadequately addressed in the final NTT Report (see below).

Peer review of the NTT Report was inadequate because each of the comments received were not incorporated, or rebutted, by the NTT in writing, as is the accepted practice in scientific peer review.

According to the December 18, 2012 letter from Interior Secretary Salazar to Representative Hastings: a scientific peer review of the NTT Report was conducted by six scientists who were organized by Ken Mayer of the National Greater Sage-Grouse Planning Strategy National Policy Team and Nevada Department of Fish and Game.

According to the notes from the NTT meeting on December 6-8, 2011 in Phoenix, the NTT discussed and addressed only a very limited number of comments raised by these reviewers and there is no evidence that the NTT addressed or rebutted specific reviewer comments, or that Ken Meyer, the organizer of the NTT Report's "peer review," had referred the comments, corrections, and rebuttals received.

According to NTT meeting notes provided by Secretary Salazar letter in his letter to Representative Hastings (page 10), only two issues were considered to be key: "Key comments received from reviewers include 1) prohibiting fuels management in known winter ranges is too restrictive, and 2) potential irrelevance of the conservation measure suggesting site potential will be lower than 15%."

However, the following 39 reviewer comments (those available in Secretary Salazar's letter) were not addressed by the NTT and remain valid issues that rebut the scientific accuracy of the NTT Report and the validity of the supposed "peer review" process. Only two out of 41 reviewer issues were addressed by the supposed “peer review" process, whereas a rigorous peer review process would require that all issues raised by peer reviewers be addressed.

1) "There is no discussion of the seasonal requirements of sage-grouse to provide managers a context for their actions. There are limited references to the state-level sage-grouse plans. A good deal of effort went into these plans and they contain valuable information that should be incorporated into the planning process."

2) "There seems to be no focus on identifying the limiting habitats as a first step. How can managers be expected to prioritize their efforts if there is no analysis of which habitats are most limiting?"

3) "If we are to maintain sage-grouse habitat it will be critical to identify and understand the risks to each particular habitat type. There seems to be limited discussion of risk analysis in the sections I reviewed."

4) "If the document is to be applied across the sage-grouse range it does not make sense to use specific numbers (15% sagebrush cover or 12 inches of precipitation) on plant communities that vary tremendously over even small distances. Use concepts that make ecological sense (site potential or risk factor), rather than trying to simplify our complex landscapes."

5) "They develop a list of conservation strategies that apply to priority habitat and don't define it?? The definition they gave could be changed to "to be determined." The devil is completely in that detail. Even using core area is inadequate, in that many "cores" are based only on leks, and may or may not include other important seasonal habitat. I understand the need and desire to have a flexible definition to accommodate variation across the range, but far better to have a base definition to which states can append other criteria as necessary, than to defer the definition."

6) "The document is an odd mix of scientific citations and policy decisions, with no real tie between the two. I expected a science document that reviewed the literature, laid out what is known about program area impacts to GRSG, and where the uncertainties lie. The science review would lead to a range of numbers and alternative approaches, which would then segue into a policy document that described the approach chosen. The science team would develop the science document, the program managers the policy outcome emanating from it. This seems a strange blend of policy loosely backed by citations, with no analysis of the science. Because there is no iteration of the rational scientific basis for the very prescriptive strategies, 1 would anticipate strong blowback by Industry and by Environmental groups, the former finding it over-reaching and the latter inadequate."

7) "All activity plans should explicitly address PECE considerations, i.e., the certainty of implementation and certainty of effectiveness. Given the budget situation for the foreseeable future, plan projections of rosy success are often nothing more than happy bullroar. I've seen it too many times before."

8) "Space and time (1) A central premise in ecology is the notion that ecological processes unfold in both space and time. Lack of consideration of space, and particularly (in this document) time is a critical mistake that, to me, renders this document problematic, if not dangerous. Let’s consider both dimensions and how they might influence the current document...The point of all this is that in ecological systems that operate in both space and time, we cannot categorize either disturbance or management actions in the absence of considering the temporal component."

9) "Overlooking the temporal aspects of ecological disturbances such as fire promotes a species-centric focus in which disturbance effects are characterized using the intellectually pedestrian notions of “good” or “bad” without consideration of the

specific temporal context within which these disturbances unfold. This, in turn, reinforces a focus on sage-grouse, rather than a focus on the ecology of the ecosystems to which the integrity of sage-grouse habitat is subservient."

10) "Thus, the appropriate management actions, and in this case the order of appropriate management actions, is strongly tied to ecological site. This concept needs to be specifically addressed to avoid on-the-ground problems for BLM. I would recommend either 1) sufficiently vague language to allow for flexibility at more local scales, 2) explicitly recognizing the need for reliance on ESDs, or, ideally, 3) both."

11) "The document also misses the mark when it comes to larger scale variation associated with inter and intraregional variation in plant community ecology. This is a serious omission."

12) "If this document is to be effective in defining conservation measures on a range-wide basis, it must take into account the considerable large-scale variation in plant community ecology present within the range of sage-grouse. Otherwise, we are faced with species-centric generalizations of the effects of ecological processes that may or may not represent ecological reality."

13) "I would suggest that language directing managers to consider future climate change in determining seeded species be taken out. Present knowledge of climate change is not at the stage (i.e. accurate enough) where we can predict future climate to the extent that we are designing seed mixes based on those predictions and we have enough problems to worry about with restoration success in the present climate."

14) "What happens when potential of the ecological site is at odds with stated sage-grouse habitat requirements? This could be clarified by specifically incorporating Ecological Site Descriptions and not using cut-off values such as 15% sagebrush canopy cover."

15) "The notion that grazing privileges in sage-grouse areas should be retired when base property is transferred or a current operator is willing to retire such privileges assumes grazing is automatically a problem and can't be used as a tool for habitat management. It also assumes that grouse are the highest and best use of the land...this HAS to be addressed before these guidelines become policy or serious problems will arise. What about FLPMA...where does it fit into the picture?"

16) "The notion that no treatments will be allowed in known winter range seems a bit draconian. What if winter habitat is also breeding habitat? Dave Dahlgren's research has demonstrated how small patch-scale sagebrush reduction treatments can be used to create beta diversity that improves grouse habitat while retaining sagebrush dominance at large scales. Again, the issue of spatial scale."

17) "Document suggests not using fire to treat sagebrush in less than 12-inch precipitation zones. **I** generally agree with this, but at the same time **I** have a problem

with making these broad generalizations about ecosystems, the properties of which vary strongly across sites and over time."

18) "Almost all of the emphasis is on preventing additional habitat loss or degradation on BLM land, with relatively little effort spent on strategies to improve existing habitat."

19) "The document suffers from a 1-size fits all approach that lacks context. Lumping all sage grouse seasonal habitats in all locations across the range regardless of population size or relative importance of the population into either “priority sage grouse habitats” or “general sage grouse habitats” strikes me as tremendously over simplistic. When combined with very prescriptive direction, it may lead to strong opposition, which may lead to weak application of the IM. The definition for priority habitat is circular, in that “highest conservation value to maintain sustainable Greater sage grouse populations” is also not defined. There are as many definitions for core areas as there are states, most at present are lek-based and therefore don’t consider brood rearing or winter habitats unless they occur within whatever buffer is used. The definition for general habitat is occupied habitat, so in that case why not just use occupied habitat? I would expand that however to include ‘unoccupied but potentially suitable habitat.”

20) "Priority habitat must be defined before this document goes out for wider review, rather than kicking that can down the road. The elements that must be included would be lek/nesting habitat (rather than using arbitrary buffers may want to include proportions of nesting hens included and let the buffer vary with habitat quality and local characteristics), late brood- rearing habitats, and winter concentration areas. It would be far preferable to have a base definition that is amended locally, than to have no definition and allow each state and potentially Field Office to develop their own."

21) "There is no performance aspect or adaptive management component. The document begins by stating that the following conservation measures are designed to achieve population and habitat objectives stated in this report, yet that is the only time population and habitat objectives are mentioned. What happens if the conservation measures don’t achieve population and habitat objectives? Some type of rigorous adaptive management must be the final conservation strategy, where the effectiveness of these measures, and the degree to which sage grouse habitat and populations are conserved by these measures (in the face of other threats), are constantly evaluated and reassessed. There is a sentence on monitoring that says a monitoring strategy for sage-grouse and sagebrush will be developed for adaptive management purposes, but this ignores the critical feedback aspect of adaptive management, where data collections feed back to change management strategies where necessary."

22) "Structural range improvements, including fencing, corrals, livestock handling structures etc., are prohibited within priority habitats unless they conserve, enhance or restore sage grouse habitat. It is impossible to determine whether they conserve, enhance or restore sage grouse habitat or not without some explicit criteria as to when

they do and when they don't that is context and scale relevant."

23) "I have always had a problem with this "Rangeland Health" thing. I understand it to a point, but the reality is that the health is in the eye of the beholder. Is a big sagebrush/bunchgrass habitat with 10% sagebrush cover and good perennial grass densities less healthier than 20% sagebrush cover and less perennial grasses? Remember, good long-lived perennial grass densities are the best way to suppress cheatgrass fuel loads that is critical in protecting sage grouse habitats. The 20% big sagebrush cover may very well be suppressing the much needed long-lived perennial grasses. Also, plant measurements taken by numerous individuals, even with a strict protocol, have high error, so in many cases the data you analyze does not represent on-the-ground situations. You risk not achieving stated goals and objectives due to this disconnect between data collected and on-the-ground realities."

24) "It is very difficult to modify grazing systems in the arid west. With such variations in forage productions the climate does not offer annual predictions, therefore livestock are put out on the range during drought years in the same manner as during rare wet years. Our rangelands simply do not provide the flexibility to accommodate the livestock producer without some kind of financial hardship. Most livestock producers are lacking winter allotments and have to feed or supplement their stock at a high cost, therefore they are chewing at the bit to get their livestock back on the range early and keep them out their as long as possible. One of the best ways to manage livestock is to get the cowboy back on the horse and to focus on the distribution part of the management."

25) "You want this effort to be achievable then be careful when placing the livestock industry on the defensive, the only ones that make out are the lawyers. I once had a livestock operator in Colorado tell me that it was "hard to swallow someone coming in and decreasing his equity in such a closed minded fashion, how would they like it if I came in and took out a bedroom and bathroom out of their home". He ended up selling his property to a developer. If this mentality is consistent out there, wildlife in general could pay a price."

26) "How many of these wet meadows are private? How does this affect the ability to meet these management goals? Here they are discussing building fences, earlier they discussed removing fencing. Is fencing harmful to sage grouse? Again, simply placing a cowboy back on the range will reduce hot season grazing! Building a fence around so many riparian areas will only increase maintenance and repair which may add disturbances to the overall area and in most cases place the livestock producer in a position where they are spending time repairing fence on top of farming/mechanic duties rather than moving and actively managing livestock. Don't these fences just add perches for predators?"

27) "Is the Federal Government going to go into the business of managing their own livestock? In the part about retiring grazing permits I have this question: Only about 7% of Nevada is considered mountain brush habitat, whereas Wyoming big sagebrush

is the major plant community. Where is the fuels management? The removal of livestock will most likely result in increased bunchgrasses/fuel loads in the mountain brush habitats. These fuel loads will probably result in increased wildfires in these habitats that will burn critical sagebrush communities. In the Wyoming big sagebrush communities, the perennial bunchgrasses are largely gone and cheatgrass is now the dominant herbaceous vegetation. Whether cheatgrass is 1" high or 12" high it will still produce seed and build seed banks. Even though wildfires occur with the presence of livestock, the reduction of such grazing would result in extreme build-ups of fuel loads. Again, resulting in further loss of critical shrub communities. The simple removal of livestock will not result in the return of healthy big sagebrush/bunchgrass communities, especially in Wyoming big sagebrush communities."

28) "Seems like the first thing to do [Retirement of Grazing Privileges] is to assess the effects of retiring the grazing. If the result of no grazing is increased risk of fire, then it might be worth reconsidering."

29) "Woefully inadequate measures [for Wild Horse and Burros Management]. While managing wild horses and burros to AML levels in priority sage grouse habitats would be a good start, the AML levels themselves must be re-evaluated and in almost all cases lowered to conserve sage grouse habitat."

30) "Pretty short addressing of the horses/burros issue. If you are going to mention fencing, water hole dispersal etc., with livestock then even with a proper management level of horses you need to address hot season use and the degradation of these water holes by horses and burros."

31) "I do think some additional flexibility is called for [in section on Minerals]. The exceptions to the NSO state that if the entire lease is within 3.1 miles of a lek or a winter concentration area (which will not be uncommon), then the pad must be placed in the "most distal" part of the lease. Depending on topography and other habitat aspects, the most distal portion of the lease may or may not be the best place to put the pad from a sage grouse perspective, and some exception that is demonstrably beneficial to sage grouse should be allowed."

32) "I generally support the BMPs as mandatory conditions of approval, but the process needs to recognize that Industry frequently finds better ways to do things more quickly than BMPs are modified, so any mandatory aspect needs to allow for better approaches to be approved."

33) "Prioritizing off-site mitigation to priority habitat areas, and to the population impacted makes sense, but the whole question of when mitigation is required, to what degree, and even what constitutes mitigation needs a great deal more development. This document is silent on that, which leaves it entirely to field discretion. The currency of mitigation needs to be developed, with credit given for mitigation over and above that required."

34) "Prohibiting Fuels Management treatments in known winter range is too restrictive. There may be situations where the fuels treatment is small enough or in higher precipitation zones with ample forage where treatments will be beneficial (i.e., where winter range is also brood habitat). Similarly, excluding fire in areas with less than 12-inches of annual precipitation is also too restrictive, as size of treatment definitely matters."

35) "Clarify/define the terms "native seeds" and "non-native seeds". Does this mean locally collected seeds, the same species of seeds collected from anywhere (BLM has had problems in the past with, for example, sagebrush seed being planted that was collected hundreds of miles away from where it was collected. Not good.), or truly exotic species?"

As the accepted practices in scientific peer review were not followed by the NTT (i.e. authors must accept comments by incorporating them into a revised report and provide a rebuttal to each of the review comments that they disagree with, stating the reasons for the disagreement) the BLM must correct the record by stating that the NTT Report was not peer reviewed.

36) From the NTT Report draft, section on Emergency Stabilization and Rehabilitation, the reviewer comment was made regarding the following statement in the NTT Report: "Consider potential changes in climate when proposing post-fire seedings using native plants. Selecting native plants adapted to a warmer climate with more variable precipitation should be considered given the longevity of native plants."

"Reviewer comment: There is no basis for this suggestion. To date there is no research I am aware of showing that plant species are changing their ranges. And the movements are likely to be so slow that managers will be able to adapt without introducing new species (in other words those species will have become part of the system by the time we need to actively consider them in seeding mixes). We have enough trouble establishing the existing native species on most sites. I know Interior is under pressure to "respond " to climate change, so if you must, put in a statement to the effect that species mixes will be adjusted as information on changes in species ranges becomes available."

[The final language in the NTT Report did not address this issue with their minor changes: "Consider potential changes in climate (Miller at al. 2011) when proposing post-fire seedings using native plants. Consider seed collections from the warmer component within a species' current range for selection of native seed. (Kramer and Havens 2009)."]

37) "It is very theoretical to suggest using species that are more adapted to warmer or drier climates (assisted succession) in a management plan. Are you suggesting seeding Wyoming big sagebrush in a mountain big sagebrush zone? This approach,

which we have worked with for 10+ years, suggests that it works. Do you really want to make management decisions of this magnitude off of a theory? ... Far too often seed mixes are put together under what looks good on paper or someone's ecological site description, rather than what are the chances we can get this species established and help prevent further degradation! After all, this effort is to protect and enhance sage grouse habitat, right?"

38) "In the effort to restore sagebrush densities, it should be noted that there are levels of big sagebrush which are detrimental to big sagebrush itself. Once the big sagebrush reaches higher percent covers, long-lived perennial grasses will decrease, cheatgrass will then be the void and fire will follow. It always amazes me how many folks miss the point that cheatgrass starts under the shrub, excellent safe-site with litter and moisture, and then mines the site out into the interspaces. Sagebrush does not suppress cheatgrass."

39) "Sagebrush over-stories should be more defined and managed by the local resource managers specific to the site since it is of "highest priority". I truly see the concern because we are not very good at restoring or protecting sagebrush, but sitting back and hoping that the sagebrush community is not destroyed has not worked. We aged big sagebrush communities (both mountain and Wyoming) and found the ages from 20-75 yrs of age. Mountain big sagebrush built small numbers of seed banks but really not enough to sustain itself without some type of outside help. No seed banks were recorded from Wyoming big sagebrush communities. The return of Wyoming big sagebrush on our 28 yr old plots is absent, yet the mountain big sagebrush community had various return rates from 15% cover in 10 years to only 8% cover in 15 yrs at another site. These goals and objectives need to be flexible and more lenient or they will never be achieved for some habitats. The reality is that in many of these habitats we would be ecstatic to have 10% sagebrush cover!!!"

A.12) The recommendations in the NTT Report were tailored to be consistent with ongoing settlement negotiations with environmental litigants. A Dec 13, 2011 11:52 AM, e-mail with the Subject: The latest on the NTT Report from Raul Morales (<rmorales@blm.gov>), the NTT team lead for BLM, provides evidence that the NTT Report recommendations were influenced by ongoing settlement negotiations with environmental litigants over land use plans, rather than an unbiased assessment of conservation alternatives:

> This small team met last week in Phoenix for 2 1⁄2 days and we are currently in the process of formatting and updating the NTT report to reflect the efforts of the science team last week. Our timeframe is to complete the "updated" draft NTT report by COB tomorrow so I can ship it back to DC. Due to concerns by solicitors in DC the NTT report will look different. However the content is generally the same and due to the science review we did make changes to the Goals and Objectives section, some conservation measure in fluid minerals have been updated (i.e. 2.5% has been changed to 3% with rationale). The Policy recommendation change has undergone significant

clarification again based on solicitor concerns in DC. The solicitor concerns with the Policy recommendation piece stems from ongoing litigation discussions they currently having with litigants over BLM's recently completed LUPs. Once I have the updated NTT report I will ship out this new report to everyone. WO is planning to soon issue (after the receive the newest NTT report) a BLM-wide IM that will explain how to use the conservation measures in planning.

A.13) Use of strong inference is absent from the NTT Report.

A.13.1) A truly scientific approach, (the scientific method or "strong inference approach" i.e. Platt 1964) is needed to address threats to GRSG or much effort will be wasted, to the detriment of GRSG, as well as collateral economic damage to affected communities and economic activity. The NTT Report is touted as a scientific review document and includes an appendix on "Scientific Inference." However, there is no mention of the term "hypotheses" or "hypothesis testing" in Appendix B or anywhere else in the NTT Report, or potential falsification of hypotheses which are central to the scientific method. The NTT Report mentions the scientific method in one sentence but clearly misrepresents its definition and application. Instead, the primary papers cited in support of NTT Report recommendations rely on a subjective interpretation of results or blind acceptance of model selection results.

A.13.2) The NTT Report fails to mention the most basic requirement of scientific inference: that the cited studies, whether published or not, be *reproducible*, and that requires that the data be publicly available. The approach emphasized in the NTT Report is to rely on so-called "quality" published, peer-reviewed studies, and when these do not exist, "managers have to resort to best professional judgment (opinion) and/or unpublished studies." However, none of the data sets used in the studies cited in the NTT Report to justify the four-mile buffer, 3% disturbance cap, or noise levels, are in the public domain.

A.13.3) As noted earlier in this document, BLM needs to correct its description of science in the NTT Report and utilize the scientific method.

Specifically, the BLM needs to revise the NTT Report by formulating multiple, alternative hypotheses regarding the specific cause and effect mechanisms of each threat identified by the FWS in its 2010 listing decision. Then the agency could deduce testable and potentially falsifiable predictions from those hypotheses, and establish thresholds for testing these against the available data. This strategy of strong inference has the greatest potential for rapid advancement of scientifically-informed decision making (Platt 1964; Rehme et al. 2011). This is especially important to adaptive management as proposed by the BLM. Furthermore, the BLM must disclose the scientific uncertainty that is present concerning specific cause and effect mechanisms affecting GRSG persistence in its Land Use Plan amendments.

A.13.4) In order to implement sound, scientific investigations and their use by BLM, it is essential that the proper data be gathered and used in a well-defined and effective adaptive management strategy.

The solution the NTT proposes is for the Western Association of Fish and Wildlife Agencies (WAFWA) to convene a technical group to develop ways to better estimate GRSG distribution and abundance. We find this recommendation to be an abdication of responsibility by the NTT. According to the National Strategy, the NTT is a group of GRSG scientific experts chartered as a scientific and technical forum to:

- Understand current scientific knowledge related to the greater sage-grouse.
- Provide specialized sources of expertise not otherwise available.
- Provide innovative scientific perspectives concerning management approaches for the greater sage-grouse.
- Provide assurance that relevant science is considered, reasonably interpreted, and accurately presented; and that uncertainties and risks are acknowledged and documented.
- Provide science and technical assistance to the RMT and Regional Interdisciplinary Team, on request.
- Articulate conservation objectives for the greater sage-grouse in measurable terms to guide overall planning.
- Identify science-based management considerations for the greater sage-grouse (e.g., conservation measures) that are necessary to promote sustainable sage-grouse populations, and which focus on the threats in each of the management zones.

We further note that a fundamental bias with WAFWA is that it is comprised primarily of career state and federal biologists, and therefore, is not independent of the NTT (or the BLM and USFWS). If BLM continues to rely on such conflicted and non-independent sources of information, confirmation bias is assured to continue in its decision-making process, just as it has in the development of the NTT Report. Confirmation bias is a phenomenon that is frequently found in the interpretation of scientific research (MacCoun 1998; Nickerson 1998; Moore et al. 2010).

A.13.5) The NTT Report's description of adaptive management exhibits a divergence from established guidelines that were designed to foster transparency and accountability in adaptive management.

A.14) BLM is being set up for failure by the NTT Report.

A.14.1) E-mail exchanges among NTT members and BLM staff reveal that there were valid complaints raised by BLM staff about unrealistic goals being set in the NTT Report that BLM could not achieve. This included the immediate effect of shutting down any minor development and potential operations in areas that have a surface disturbance in excess of 3%. Furthermore, Jim Perry of BLM pointed out an important internal inconsistency in the NTT Report that makes it subject to legal

challenge: if 50-70% of the acreage needs to be in sagebrush cover for long-term sage-grouse persistence, then 30-50% non-sagebrush will not cause harm to the birds. However, the fact that NTT added a 3% disturbance cap is not consistent with the 10-16 fold increase allowed under a 50-70% sagebrush requirement where 30-50% is allowed to be in non-sagebrush.

A14.1.1) The following e-mail communications from Jim Perry to the NTT points out this issue and also illustrating why the NTT needed to drop its arbitrary <3% disturbance and 50-70% sagebrush thresholds.

From: Perry, Jim
To: Morales, Raul; Fielder, Dwight
Cc: Kniola, Benjamin E; Bargsten, Travis D; Perry, Jim; Wells, Steven
Subject: RE: NTT Report and Transmittal Letter
Date: Thursday, December 22, 2011 6:28:14 AM
Attachments: 2011_1221_Final_NTT_Report [edits made by NTT].docx
Raul and Dwight,
Thanks for making those edits and for mentioning NSO in the Transmittal memo to the NPT!
I'm confused why the "**Locatable** Minerals" BMPs did not get changed to "**Solid** Minerals" in the Appendix?!?
Last night's edits opens a new, very serious question…. It may be too late to address this in the report, but it is one we will need to address in our outreach to the field….
It appears to me the BLM is being unnecessarily set up for immediate failure across the priority habitats. Nearly all contain roads, pipelines, power lines, homes, farms, well pads, etc…. Science says 30 – 50% in **non-**sagebrush cover is okay (see quote below), but the NTT Report says 3% in anthropogenic features is the NTT recommended maximum (see quote below).
Am I missing something, is it worded poorly, or is this a misapplication of professional judgment and science?
The report now makes this scientifically-based assertion:
Within priority **habitat,** a minimum range of **50-70% of the acreage in sagebrush cover** is required for long-term sage-grouse persistence (Aldridge et al. 2008, Doherty et al. 2010, Wisdom et al. 2011).
That leaves an allowance of **30 - 50%** in **non-**sage-brush cover. So how was the 3% maximum cap on surface anthropogenic features derived based on "professional judgment"? (see footnote) **3% is a long way from 30 – 50%**
Manage priority sage-grouse habitats so that discrete **anthropogenic disturbances cover less than 3%** of the total sage-grouse habitat **regardless of ownership**. Anthropogenic features include but are not limited to paved highways, graded gravel roads, transmission lines, substations,
wind turbines, oil and gas wells, geothermal wells and associated facilities, pipelines, landfills, homes, and mines. iii
iii Professional judgment as derived from Holloran 2005, Walker et al. 2007, Doherty et al. 2008, Doherty et al. 2011, Naugle et al.
2011a,b.

o In priority habitats **where the 3% disturbance threshold is already exceeded from any source, no further anthropogenic disturbances will be permitted by BLM** until enough habitat has been restored to maintain the area under this threshold (subject to valid existing rights).
Jim

A14.1.2) Dave Naugle's response to Jim Perry's question is below. There are no studies that show 50-70 sagebrush cover is needed for population persistence. In fact, numerous populations fall short of that, especially in the southern part of the range, e.g. the Parachute - Piceance - Roan (PPR) population, which has approximately 12% sagebrush cover and is naturally fragmented by topography, aspen stands, and conifer stands. Additionally, Schroeder et al. (2004) documented numerous historic sightings of GRSG well outside the areas dominated by sagebrush.

From: Dave Naugle
To: Morales, Raul
Subject: RE: NTT Report and Transmittal Letter
Date: Thursday, December 22, 2011 9:52:44 AM
Raul,
You have it right…the 50-70% is a minimum acreage of sagebrush habitat necessary over broad scales to maintain a population. I'm not a big fan of setting "minimums" because that is then the number everybody tries to achieve. In reality, many cores surpass this 50-70% minimum because they were delineated around the best remaining habitats.

The non-sagebrush sites within cores may be naturally fragmented or the result of past anthropogenic impacts. Regardless, we cannot further litter the cores with additional anthropogenic impacts without expecting impacts to populations.

We got off track on the NSO and drainage issue because some view non-sagebrush habitat inside cores as a throw away developable area. But additional impacts anywhere inside cores increases cumulative impacts beyond the site of the new well pad. Thus the limit of 1 pad per square mile and a 3% cap on additional footprint.

We've progressed in our thinking past individual lek buffers to now delineate whole cores at appropriately large scales that encompass all seasonal habitats necessary to support a population. We will still see impacts from 1 pad per square mile and a 3% cap on new anthropogenic disturbances.

I hope these end up being acceptable losses that still respect valid existing rights. I suspect the NTT Team would be very leery of endorsing any additional impacts inside cores.

The NPT can determine if existing laws or other issues preclude NTT recommendations; but that is a policy issue not a technical one.

Happy holidays Raul,
Dave

From: Morales, Raul [mailto:rmorales@blm.gov]
Sent: Thursday, December 22, 2011 8:18 AM
To: Dave Naugle
Subject: Fw: NTT Report and Transmittal Letter
Dave, see Jim's comments below regarding 50-70% sagebrush cover and 3% anthropogenic disturbance.

Let me make sure I can explain this and see if I have it right.

Anthropogenic feature are being limited to 3% to limit direct impacts to sagebrush habitat loss but more importantly impacts to sage grouse (direct or indirect) as a result of these features on the landscape.

The 50-70% sagebrush cover is really a minimum range for healthy habitats and that if the remaining habitat were all anthropogenic then the 50-70% would not be effective to sustainable SG populations. If the remaining 30-50% was in some other plant seral stage (recent burn or annual grassland) at least there is still habitat to be reclaimed or evolve over time back to a sage brush ecosystem.

Do I have this right? Anything you would add so I can be prepared for questions like this in the future?

14.1.3) The final exchange between Naugle and Perry indicate that these issues remain unresolved. However, two additional issues stand out clearly: 1) if the 3% disturbance cap is implemented along with the goal of 50-70% sagebrush cover, then the non-essential remaining 30-50 percent should not be regulated as if it were essential - otherwise the BLM will find itself in a legal challenge; and 2) without having developed its priority habitat and sage brush cover maps first, the NTT Report included guesswork as to the percentages of sagebrush and anthropogentic disturbance.

From: Dave Naugle
To: Morales, Raul
Subject: RE: NTT Report and Transmittal Letter
Date: Thursday, December 22, 2011 12:27:39 PM
Yeah…this is what I'm afraid of, we're cutting individual words and losing context out of email transmissions, never a wise thing to do on big decisions. I'm happy to talk with you all on the phone but this is a poor way to do this. Plus I feel like I'm speaking for the entire NTT which is way out of line. Dave
From: Morales, Raul [mailto:rmorales@blm.gov]
Sent: Thursday, December 22, 2011 1:19 PM
To: Dave Naugle
Subject: Fw: NTT Report and Transmittal Letter

Does what Jim says make sense to you?
From: Perry, Jim
Sent: Thursday, December 22, 2011 12:37 PM
To: Morales, Raul; Fielder, Dwight
Cc: Kniola, Benjamin E; Bargsten, Travis D; Wells, Steven; Perry, Jim
Subject: RE: NTT Report and Transmittal Letter
Raul,
Here are two main points from Dave…. and both statements make sense and are fine with me**.** But my question is not answered and my concerns remain. Is the NTT report in error? Please see my recommendation at the bottom.
Dave said…..
"You have it right…the 50-70% is a minimum acreage of sagebrush habitat necessary over broad scales to maintain a population. "
"Thus the limit of 1 pad per square mile and a 3% cap on additional footprint."
The key words from Dave are "additional footprint"
But here is what the NTT Report actually says in the quotes below. (Rather than 50%-70% in sagebrush habitat (the minimum needed on a broad scale to maintain a population based on Science), the priority habitat must already, today, have over 97% in sagebrush habitat or else no development is permitted.) 100% - 3% = 97%
• Manage priority sage-grouse habitats so that discrete anthropogenic disturbances cover less than 3% of the total sage-grouse habitat regardless of ownership…..
o "In priority habitats where the 3% disturbance threshold is already exceeded from any source, no further anthropogenic disturbances will be permitted by BLM until enough habitat has been restored to maintain the area under this threshold (subject to valid existing rights)."
o In this instance, an additional objective will be designated for the priority area to prioritize and reclaim/restore anthropogenic disturbances so that 3% or less of the total priority habitat area is disturbed within 10 years.
I do not understand the logic in this….at least not the way it is worded in the NTT report.
RECOMMENDATION:
The report should say something like, …"the amount of sagebrush habitat in the priority habitat areas, as of the date of this plan amendment, is a baseline, and additional anthropogenic surface disturbances must not increase the anthropogenic surface footprint by more than 3% "
The NTT bullet points above need to be removed from the report as it conflicts with science.
Jim

Exhibit B: Studies Cited in the NTT and COT Reports Fail DQA Standards

Aldridge et al. 2008.[1] This study is cited three times between the COT Report and NTT Report in support of the flawed presumption that disturbance leads to extirpation. This study is also mis-cited in support of the 50-70% sagebrush threshold in the NTT Report. The NTT Report claims 50-70% of the range must be adequate in order for GRSG to persist. Aldridge et al. 2008 suggests that "preferably" 65% is necessary, but the results of this study give measurements related to range persistence and anecdotally how that might correlate to extirpation. For example, if occupied habitat was converted to a crop field, the population closest to the converted area was less likely to persist than populations located in suitable habitat farther away from the field. These results do not indicate that 70% or even 65% of the habitat must be suitable--only that fringe populations are more likely to be extirpated. Logistic regression, as used in this study, examines combinations of continuous variables to predict a positive or negative outcome. In this case, that was the presence or absence of GRSG at each point on a 5 km grid. However, the predictions of what affects the presence/absence of points on the grid can be completely unrelated to population persistence where the authors have not examined the totality of population response.

Aldridge, C. L., and M. S. Boyce. 2007.[2] The NTT and COT Reports cite this study for the flawed proposition that limited source habitats appear to be the main reason for poor nest success (39%) and low chick survival (12%). It is questionable that this study of GRSG in Alberta can have utility outside of that limited study area at the northern periphery of the species range. The Alberta population is small and has minimal suitable habitat available irrespective of human influence. Rather, ecology and geologic formations are the primary limiting factors in Alberta. Therefore, any impact on this population will appear heightened compared to other populations.

The authors claim many GRSG populations are at risk of extirpation. (page 509.) However, the authors proffer no citations nor authority for that proposition. In their modeling, the authors chose a subjective suite of variables related to habitat or human disturbance that they <u>felt</u> may be important. Id at 510. Such an analysis is readily subject to bias.

Further, they used a one-km^2 window which may be so large as to be meaningless as it is over 33 times larger than the 30m grid size used by the 2001 National Land Cover Data (NLCD 2001, http://www.epa.gov/mrlc/nlcd-2001.html). The 30m grid size has long been in use to develop qualitative models for endangered species critical habitat because it is the resolution of many digital elevation models (e.g. Turner et al. 2004). Some conservation GAP analyses use data with a resolution of 10m. While data resolution may limit analyses in some regions, a more focused evaluation of sage grouse core areas that

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[1] Aldridge, C.L., S.E. Nielsen, H.L. Beyer, M.S. Boyce, J.W. Connelly, S.T. Knick, and M.A. Schroeder. 2008. Range-wide patterns of greater sage-grouse persistence. Diversity and Distributions 14:983–994.

[2] Linking occurrence and fitness to persistence: habitat based approach for endangered Greater Sage-Grouse. Ecological Applications 17:508–526.

utilizes a more informative grid size (e.g. industry standards of 90, 30, or 10 m) would be a more appropriate basis for policy decisions and conservation measures than that offered in this paper.

The authors grossly assume that roads and power lines affect productivity and chick survival saying little more than the generalization that "mortality associated with power lines and roads occurs year-round." The authors cite absolutely no support for this assertion. *See* Messmer Tall Structure Synthesis at 10. This is clearly inappropriate to extrapolate to nest success and chick survival and the NTT reliance upon this proposition should be withdrawn. *See* NTT at 19. Moreover, citations to Aldridge and Boyce 2007 are inappropriate for the proposition that energy development leads to population declines because non actually quantified a population-level demographic response. See NTT at 19.

> "Habitat fragmentation, largely a result of human activities, can result in reductions in lek persistence, lek attendance, population recruitment, yearling and adult annual survival, female nest site selection, nest initiation, and complete loss of leks and winter habitat (Holloran 2005; Aldridge and Boyce 2007; Walker *et al.* 2007; Doherty *et al*. 2008)." COT at 9.

All of the studies cited in support of this were conducted in heavily developed energy fields utilizing older industry technology, thus, these studies are representative only of heavily developed energy fields in Wyoming and Alberta developed several years ago and not more broadly representative of various "human activities," as claimed in the studies. , The study also represents a very small fraction of the range of GRSG, none of which are representative of the Great Basin birds. It can also be argued that the study area/population used by Aldridge and Boyce is not representative of GRSG rangewide. The Alberta population is small and has minimal suitable habitat available irrespective of human influence, but is a result of ecology and geologic formations. Therefore, any impact on this population will appear heightened, then what might happen to a stronghold.

Interestingly, the data in Aldridge and Boyce 2007 suggest the majority of the late brood rearing habitat is already on land that is regulated by BLM.

Blickley et al. (in press). This study reported a population decline in lek attendance when projected sound from recordings at the edges of leks, which were as high as the noise levels occurring within 200m of a busy freeway (as measured across an open field with traffic loads of greater than 50,000 cars per day, or 55-70 decibels as shown in Figure 2 of Reijnen et al. 1995). The subsequent avoidance was then assumed to lead to have a negative effect on the population (i.e. contribute to their decline). Below, is a relevant excerpt from Blickley et al. (in press):

> Drilling-noise recordings were broadcast on experimental leks at an equivalent sound level (L_{eq}) of 71.4±1.7 dBF (unweighted decibels) SPL re 20 µPa (56.1±0.5 dBA [A-weighted decibels]) as measured at 16 meters; on road-noise leks, where

> the amplitude of the noise varied with the simulated passing of vehicles, noise was broadcast at an L_{max} (maximum RMS amplitude) of 67.6±2.0 dBF SPL (51.7±0.8 dBA).

The fact that authors broadcast such high levels of noise in such close proximity to leks biased the results, an error of omission by the authors and the NTT Report that cites them and proposed regulations based upon their recommendations.

The NTT Report cannot have it both ways, claiming a negative effect on sage grouse populations but admitting that there was "low statistical support for a cumulative effect of noise over time" in the study by Blickley et al. (in press). As noted above, there are no data showing a long-term cumulative decline in the sage grouse population in the Pinedale Planning Area.

The cited research was an amateurish attempt to reproduce the sounds of oil and gas development using substandard equipment that was wholly unsuited to the task of accurately recording and playing back traffic and sounds from oil and gas operations. Deficiencies in Blickley et al.'s equipment are detailed below.

Microphone: According to the manufacturer (http://en-us.sennheiser.com/k6-microphone-system), "the ME 62 [microphone used by Blickley et al.] is an omni-directional microphone head suitable for K6 and K6P powering modules. It can be used for reporting, discussions and interviews. The ME 62 is particularly suitable for good reproduction of 'room' ambience and 'spaced omni' stereo recording. Matt black, anodized, scratch-resistant finish."

Recorder: The Marantz model PMD670 used by Blickley et al. does not offer high-resolution (88.2 or 96 KS/s) sampling rates, its metering characteristics are unknown, and it is limited to 16/48 recording and thus is not considered a high-resolution recorder. It retails online for $700.

Playback speakers: The speakers used in the study were standard outdoor speakers camouflaged as rocks and designed for background music playing in home, hotel, and amusement park applications. They were not designed for accurately reproducing industrial sounds. The specifications for the speakers may be found on the manufacturer's website: http://www.ticcorp.com/specifications_tfs14.pdf.

The speakers were powered by 12 volt car batteries rather than 120 volt AC power and a car stereo amplifier of unknown make and model was used to boost the output. Packed into each simulated rock speaker housing was a 10" woofer with an injection molded cone, a 5.5" midrange cone, and 2" soft dome tweeter. The size and quality of the speakers, and the small speaker housing, severely limits the physical capability of the system to accurately reproduce either low or high frequency sound produced by oil and gas operations or traffic.

As a result of substandard equipment and lack of expertise in sound recording and reproduction, Blickley et al. (in press) resorted to placing their speakers at the edge of leks and to playing their systems at high levels in order to elicit a behavioral response. This is a biased approach to obtain a preferred result. The BLM cannot rely on biased research in its decision-making.

The recommended noise levels are not based upon any standardized, repeatable data collection, or accepted methods of sound measurement. The methods used by Blickley et al. (in press), and reported results did not contain any credible, professional analysis of local ambient sound levels or oil and gas noise (e.g. the type, duration, frequencies, sound pressure levels, and power of sound produced by different oil and gas drilling or production operations; equipment being recorded); or employ the use of professionally accepted standards, such as International Organization for Standardization (ISO) standards for quantifying industrial and traffic noise (http://www.iso.org/iso/home/standards.htm).

The standards not followed by the cited studies include, but are not limited to: ISO 1996-1:2003 Acoustics -- Description, measurement and assessment of environmental noise -- Part 1: Basic quantities and assessment procedures; ISO 9613-2:1996 Acoustics -- Attenuation of sound during propagation outdoors -- Part 2: General method of calculation; ISO 4871:1996 Acoustics -- Declaration and verification of noise emission values of machinery and equipment; ISO 532:1975 Acoustics -- Method for calculating loudness level; ISO 7196:1995. Acoustics -- Frequency-weighting characteristic for infrasound measurements; ISO 8297:1994 Acoustics -- Determination of sound power levels of multisource industrial plants for evaluation of sound pressure levels in the environment -- Engineering method; and IEC 61672-1:2002(E) - Electroacoustics, Sound level meters -- Part 1: Specifications).

Blickley et al. did not employ any sound propagation models in their study to quantify the confounding effect of temperature, relative humidity, topography, ground cover and surface porosity, wind direction, the direction noise was generated from, the geographic extent of the noise, its duration, frequency of occurrence, or permanence, (Attenborough 2007). Nor did they provide any correlation of their playbacks compared to the industrial and traffic sources they had attempted to duplicate. Furthermore, no graphic equalizer was used which would have allowed for the adjustment of sound pressures in different frequency ranges (at standardized 1/3 octave band frequencies), and no measurement of sound pressure levels was taken in front of playback speakers, which together would have allowed for the accurate reproduction of the sound at the same frequencies and sound pressure levels as the original noise. Therefore, BLM cannot base regulations upon no data and results based upon arbitrary methods that are not compliant with accepted professional standards in the noise control industry (i.e. Bies and Hansen 2009; ISO).

Carpenter, et al. 2010.[3] This study was cited four times in the NTT Report for the proposition that energy development and disturbance cause negative impacts to GRSG

[3] Carpenter, J., C. Aldridge, and M.S. Boyce. 2010. Sage-grouse habitat selection during winter in Alberta. Journal of Wildlife Management -74:1806-1814.

through avoidance behavior i.e. loss of functional habitat. The NTT Report incorrectly cites this paper in support of no surface occupancy ("NSOs") and four-mile buffers even though such concepts were not discussed therein, and the maximum distance discussed is well short of four miles. While the authors discussed distances from 328 feet to 1.2 miles and ultimately recommended 1.2 miles, this is far from the excessive four-mile buffers recommended in the NTT Report. Despite the representation in the NTT Report, this paper does not support the proposition that disturbance equals population declines. NTT Report at 19. The NTT Report also recommends, "[D]o not allow new surface occupancy on federal leases within priority habitats, this includes winter concentration areas (Doherty et al. 2008, Carpenter et al. 2010) during any time of the year." NTT at 23. The NSO is not supported. First the recommendations of this study are limited to the population in Alberta, and the authors recommend a 1.2 mile buffer, not a categorical prohibition of development.

An important limitation of this study is that it does not differentiate between habitats that were previously used and those that GRSG now avoid. It assumes subjective factors such as moderate sagebrush cover will always lead to use by GRSG even if there is no evidence that GSG ever used these locations. The authors provide no evidence of ground-truthing for their assertions. They assume that GRSG would use this otherwise suitable habitat but for energy development and anthropogenic features. The authors state that "*…winter habitats may be of greater importance in declining populations*" based upon opinion and conjecture. What little evidence they provide, i.e. Swenson 1987 and Beck 1977, is completely outdated. Moreover, GRSG survival is consistently highest over winter, so any population level impact is likely limited by other variables. Other citations used in the study, such as Doherty et al. 2008, are refuted herein.

The authors admit that they merely assumed GRSG avoid landscapes with anthropogenic disturbances. Further, the authors fail to explain how capture sites were chosen and whether ease of winter access may have impacted their results or why they chose 2003 as a model year. In their modeling exercise, they subjectively chose some 86 variables for input. Table 1. Such a model is only as good as the data entered. This study relies on the quality of the techniques used by Aldridge and Boyce 2007--studies with their own serious shortcomings as critiqued and referenced herein. The statement, "[T]hreats such as oil and gas development or cultivation of native habitats could reduce connectivity and disrupt migratory patterns, possibly causing bottlenecks between seasonal ranges or populations" was not adequately assessed in the paper and seems to be based purely on opinion. The results of this study might inform management in Alberta, but not in other parts of the range. Moreover, this study as well as Aldridge and Boyce, and Doherty et al. 2008 all included study areas that were heavily developed, and not representative of conditions range-wide. Furthermore, as discussed herein, more recent studies have shown that the effects of energy development today are much different and much smaller than the dated scenarios for oil and gas development used by the authors.

Cassaza et al. 2010.[4] This study is mis-cited in the COT Report in support of the proposition that pinon juniper needs to be reduced to no more than 5 percent of the landscape. Given the authors considered brood-rearing habitat, it is inappropriate to rely upon this study for the COT Report's recommendation that this proposed pinon juniper threshold be applied across all GRSG habitat.

Doherty et al. 2008.[5] This paper is cited six times in the NTT Report for support of surface use restrictions. This paper is largely based upon professional judgment rather than hypothesis testing. Even then, the NTT Report mischaracterizes the study as support for its recommended 3% disturbance threshold, four-mile buffers and prohibition on leasing in priority habitat. With regard to the proposed four-mile buffer, Doherty et al. 2008 did not test whether four-mile buffers are necessary, or whether GRSG would respond positively to a four-mile buffer. The authors do say that current management is insufficient to protect winter habitat (i.e. 0.5 mi lek buffer.), but do not suggest a wholesale prohibition on leasing. This study did not look at population trends; rather it examined habitat selection and variables impacting it.

The study examined 24 predictor variables over two years to predict female GRSG winter habitat selection. Table 1. For variables that were strongly correlated the authors chose to keep variables they "felt" were strong predictors, and dismissed the others. After deciding on a habitat model the authors conducted a bootstrap analysis (n=5,000) to quantify change in odds of use with the introduction of coalbed methane (CBM) wells. The bootstrap analysis was repeated to quantify how the amount of sagebrush (four square km) affected the odds of use with or without wells. However, instead of conducting analysis with varying degrees of development, the authors assumed full build out at 12.3 wells/km square versus 0 wells/km square. This only provides insight into a worst-case scenario which is not representative of actual conditions or variables across the vast range of GRSG, or newer technologies undertaken in later phased (POD) developments. Topography and sagebrush cover were the best predictors of GRSG use. Ultimately, the authors found that female sage-grouse are more likely to avoid winter habitats with intensive (full build out) CBM development.

While it is well known that GRSG are positively correlated with the amount of sagebrush cover, and Doherty et al. 2008 found that percent cover was a good predictor of occurrence at a coarse (4km sq) scale, the authors improperly state "[C]onversion of sagebrush negatively influences sage-grouse populations" without supporting data. *Id.* at 193. The negative influence that the authors found was avoidance by GRSG. However, the presumption that avoidance leads to population level impacts has not yet been proven, as discussed elsewhere in this challenge.

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[4] Cassaza M.L., P.S. Coates, and C.T. Overton. 2010. Linking habitat selection to brood success in greater sage-grouse, Pp. 151-167 *in* B.K. Sandercock, K.Martin and G. Segelbacher (eds.). Ecology, conservation and management of grouse. Studies in Avian Biology (no.39). University of California Press, Berkeley, CA.

[5] Doherty, K.E., D.E. Naugle, B.L. Walker, and J.M. Graham. 2008. Greater sage-grouse winter habitat selection and energy development. Journal of Wildlife Management 72:187-195.

Importantly, the authors state "Examination of ecological processes at the landscape scale does not eliminate the need to understand habitat relationships at local scales; rather, it will likely require a combination of scales to completely understand how sage-grouse respond to their environment." *Id.* at 194. This statement undermines the NTT's broad one-size-fits-all landscape approach to the exclusion of local data.

Doherty et al. 2010.[6] NTT Report cited Doherty et al. 2010 twice in support of a 50-70% sagebrush landscape cover. However, the Literature Cited section lists two Doherty et al. 2010 studies and fails to differentiate which one stands for the proposition alleged. Neither Doherty et al. 2010a or Doherty et al. 2010b stand for this proposition. Doherty et al. 2010a developed nesting habitat selection models at multiple scales to evaluate the "relative importance and interpretation of local, landscape, and multiscale models." Doherty et al. 2010a did not test what minimum range is necessary for GRSG to persist. Ultimately, Doherty et al. 2010a found that multiscale models were more predictive than local or landscape scale models alone. They also found that both local and landscape scale features influence nesting site selection and that sagebrush cover alone was not predictive of use. Doherty et al. 2010b used lek count data and bird abundance at varying levels of energy development to develop a method for evaluating offsets. Doherty et al. 2010b found that as energy development increased (ie. density of wells) the likelihood of lek loss increased and bird abundance decreased. Like many similar studies, Doherty et al. 2010b does not account for movement of GRSG away from disturbance.

Fedy et al. 2012.[7] This study is cited two times in the COT Report, once in support that areas outside priority areas of conservation ("PACS") may need to be maintained. This is another example of the mistaken assumption that GRSG are unable to bypass unsuitable habitat during migration or other seasonal movements.

Garton et al. 2011.[8] This study is cited 15 times in the COT Report to allegedly demonstrate population declines, existing conditions, and expected persistence. There are significant issues with this study as discussed in detail in Exhibit A to the Petitioner's DQA Challenge on the NTT Report.

Hagen et al. 2007.[9] This study was cited nine times in the NTT Report in support of the proposition that sagebrush cover must meet certain thresholds (15%) and for reclamation

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[6] Doherty, K.E., D.E. Naugle, and B.L. Walker. 2010a. Greater sage-grouse nesting habitat: The importance of managing at multiple scales. Journal of Wildlife Management 74:1544-1553; or Doherty, K.E., D.E. Naugle, and J.S. Evans. 2010b. A currency for offsetting energy development impacts: Horse-trading sage-grouse on the open market. PLoS One 5:e10339. Accessed 19 September 2011.

[7] Fedy B.C., C.L. Aldridge, K.E Doherty, M. O'Donnell, J.L. Beck, B. Bedrosian, M.J. Holloran,G.D. Johnson, N.W. Kaczor, C.P. Kirol, C.A. Mandich, D. Marshall, G. McKee, C. Olson, C.C. Swanson, and B.L. Walker. 2012. Interseasonal movements of Greater sage-grouse, migratory behavior, and an assessment of the core regions concept in Wyoming. Journal of Wildlife Management 76:1062-1071

[8] Garton, E.O., J.W. Connelly, J.S. Horne, C.A. Hagen, A. Moser, and M. Schroeder. 2011. Greater sage-grouse population dynamics and probability of persistence. Pp. 293-382 *in* S.T. Knick and J.W. Connelly (eds). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38). University of California Press, Berkeley, CA.

[9] Hagen et al 2007 A meta-analysis of greater sage-grouse Centrocercus urophasianus nesting and brood-rearing habitats. Wildl. Biol. 13 (Suppl. 1): 42-50.

bonds, brood-rearing characteristics, habitat parameters and fire treatments. Most of the citations in the NTT Report appear to mischaracterize this study. For example, the NTT fails to distinguish between seasonal habitats or recognize that Hagen et al. 2007 only applied these numbers to nesting habitat. The authors support, "[I]n general, a range of 15-25% sagebrush, 10% forb, 15 % grass canopy cover and, a herbaceous height of 18 cm are needed for **breeding habitats** of greater sage-grouse." (Emphasis added). Hagen et al. 2007 at 43 citing Connelly. However, we know based on other work that these parameters are not applicable across seasonal habitats or range-wide, particularly in the Great Basin, discussed in detail below. Moreover, even the authors recognize that many question, "…the applicability of management guidelines (Connelly et al. 2000) across the range of the greater sage-grouse, as well as the techniques used to derive the earlier estimates of vegetative cover and height." *Id.* citing Bates et al. 2004, Schultz 2004)."

Incredibly, the authors later ignore their own statements on the inapplicability range wide and conclude that they apply "throughout the geographic range of [GRSG]". *Id citing* Connelly and Braun 1977. Not surprisingly, the NTT Report seizes on this improper conclusion in the study to support its flawed one-size-fits-all approach. However, we know based on other studies that "other" shrub cover in some management zones and populations plays a more critical role than sagebrush in nesting habitat, thus the conclusion is wrong.

The authors conducted a meta-analysis of vegetation characteristics at 24 nest sites and 8 brood habitats to determine if there was an overall effect of habitat selection and to estimate average canopy cover of sagebrush grass and forbs and height of grass at nest sites and brood-rearing areas, but these results are quite limited. For example, several researchers[10] have conducted significant work in the Great Basin documenting the characteristics of nesting habitats. These studies conflict with the conclusions of Hagen et al. 2007 that more sagebrush cover is required for nest success. Moreover, the sample size used for this study is very small and could be questioned.

While the authors recognize total shrub cover had a larger effect size than sagebrush only for nesting habitat, their conclusion is directly contrary to this finding. The authors note that methods to measure vegetation characteristics have not always been consistent, which is very important because it diminishes the reliability of older studies, and it also makes it difficult to compare data across studies. Five of the studies analyzed in this study did not differentiate between sagebrush and other shrubs which can bias the results in favor of higher sagebrush cover. However, in a later study, Kolada[11] found in the Bi-

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[10] Kolada, E. J., Sedinger, J. S. and Cassaza, M. L. (2009), Nest Site Selection by Greater Sage-Grouse in Mono County, California. The Journal of Wildlife Management, 73: 1333–1340. doi: 10.2193/2008-338; Gregg, M., Crawford, M., Drut, M., & DeLong, A. (1994). Vegetational Cover and Predation of Sage-grouse Nests in Oregon. Journal of Wildlife Management, 58:162-166; Coates, P., & Delehanty, D. (2010). Nest Predation of Greater Sage-grouse in Relation to 10 Microhabitat Factors and Predators. Journal of Wildlife Management, 74:240-11 248, Lockyer, Z.B. 2012. Greater sage grouse *(Centrocercus urophasianus)* nest predators, nest survival, and nesting habitat at multiple spatial scales. M.S. thesis. Depratment of Biological Sciences, Idaho State University, Pocatello, ID.

[11] Kolada E.J., J.S. Sedinger, M.L. Casazza. 2009. Ecological Factors Influencing Nest Survival of Greater Sage-Grouse in Mono County, California. The Wildlife Society. DOI: 10.2193/2008-339 See also,

State area that the limiting factor for nesting habitat was not sagebrush cover but rather "other" shrub cover. Hagen et al. 2007 differentiates between early and late brood rearing, and some of the studies analyzed did not, which again can impact the result. For studies that did not differentiate, the authors of this study pooled the effect size.

There are numerous misrepresentations of Hagen et al 2007 in the NTT Report. For example:

"Riparian Areas and Wet Meadows… Within priority and general sage-grouse habitats, manage wet meadows to maintain a component of perennial forbs with diverse species richness relative to site potential (e.g., reference state) to facilitate brood rearing. *Also conserve or enhance these wet meadow complexes to maintain or increase amount of edge and cover within that edge to minimize elevated mortality during the late brood rearing period* (Hagen et al. 2007, Kolada et al. 2009, Atamian et al. 2010)." NTT at 16

- Hagen et al. does not readily support the statement in italics. While the authors report that "[D]uring brood rearing, sagebrush cover decreased from early to late periods, forb cover increased, whereas grass cover and height did not change appreciably," they did not test whether these parameters decreased mortality.

"Within priority sage-grouse habitat, reduce hot season grazing on riparian and meadow complexes to promote recovery or maintenance of appropriate vegetation and water quality. Utilize fencing/herding techniques or seasonal use or livestock distribution changes to reduce pressure on riparian or wet meadow vegetation used by sage-grouse in the hot season (summer) (Aldridge and Brigham 2002, Crawford et al. 2004, Hagen et al. 2007)." *Id.*

- Hagen et al. 2007 does not support the NTT's assertion. This study only looked at selection and vegetative characteristics- other parameters like presence of grazing or other potential pressures were not included in determining use or selection by GRSG.

"Require a full reclamation bond specific to the site. Insure bonds are sufficient for costs relative to reclamation (Connelly et al. 2000, Hagen et al. 2007) that would result in full restoration." *Id.* at 23

- This is clearly not supported by the Hagen et al. study. Perhaps they meant to say restoration to the habitat characteristics described in Connelly and Hagen, but how this sentence is structured implies that the studies support the need for full reclamation, which they do not.

"Fuels treatments…Do not reduce sagebrush canopy cover to less than 15% (Connelly et al. 2000, Hagen et al.2007)" *Id.* at 26.

Kolada E.J., J.S. Sedinger, M.L. Casazza. 2009. Nest site selection by greater sage-grouse in Mono County, California. Management and Conservation Article. DOI: 10.2193/2008-338

- This is only generally supported by Hagen but ONLY for nesting/brooding habitat, not across seasonal habitats.

"Fuels treatments… Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species; Connelly et al. 2000, Hagen et al. 2007, Beck et al. 2009)." *Id.*

- This is not supported by Hagen et al 2007. The NTT completely misrepresents this study.

Appendix B states, "[B]ecause sage-grouse research has been on-going for over 60 years, managers have access to published literature from several studies (metareplication (Johnson 2002)) that includes different years, study areas, methods, and investigators (Johnson 2002) which leads to more certainty in conclusions (for example see Hagen et al. 2007)." *Id.* at 57.

- However, the authors concede they used different methods than earlier studies and fail to explain how the quality of the data they utilized might influence results. The quality of the lek count and location data used is suspect because those data have been collected by different individuals and agencies using different methods for decades without proper data quality checks and/or data migration and curation. Furthermore, the data are not public and therefore the results are not reproducible. That means that purported "confidence" in the results is without a sound scientific basis.

Holloran 2005.[12] This study is cited 14 times between the two reports (NTT/12. COT/2) in support of several flawed propositions and conservation measures, including alleged population declines associated with energy development and the allegation that fragmentation impacts use and ultimately persistence. Holloran 2005 did not acknowledge that the BLM had intentionally waived stipulations on the Pinedale Anticline in order to facilitate research on impacts without these stipulations. This does not correspond to impacts under stipulations required at the time, nor account for current (and dramatically reduced) impacts under more recent and stringent stipulations. Finally, Holloran's (2005) population scenarios and predictions of population decline have simply failed to come true.

As an initial matter, Holloran 2005 was an unpublished dissertation that did not employ any hypothesis testing. Instead, Holloran 2005 used subjective interpretations of his results, or the equivalent of creating "just so stories" to explain results in light of a particular viewpoint. That is not science, it is subjective opinion. Additionally, the following data quality issues are identified in the study by Holloran 2005 that are relevant to BLM's continued reliance on it as a basis for decision making:

[12] Holloran, M.J. 2005. Greater sage-grouse (Centrocercus urophasianus) population response to natural gas field development in western Wyoming. Dissertation, Department of Zoology and Physiology, University of Wyoming, Laramie, Wyoming.

Holloran 2005 only speculated on potential causal mechanisms of population decline, as his data and study design were focused only on localized effects. Additionally, Holloran admitted that, *"Identifying causes of population declines has remained elusive."* And the "displacement theory" favored by Holloran (2005) does not provide any test of the hypothesis that local, temporary displacement of yearling sage grouse from areas under intensive development has led to population-level declines.

Holloran 2005 does not provide any data that population declines have occurred, or that density-dependent effects have occurred in nearby areas, only that the results suggest that these *might* occur or have the *potential* to occur. He wrote,

> The results from this study suggest that dispersal from developed areas could be contributing to population declines. Although the proportion of potentially displaced adult and yearling males and yearling females breeding and nesting in areas removed from gas field infrastructure is unknown, offsite populations could be artificially enhanced by gas development. Because of potential density-dependent influences on breeding and nesting success probabilities (LaMontagne et al. 2002, Holloran and Anderson 2005), maintenance of these enhanced populations could require increasing the carrying capacity of offsite habitats.

The author also stated,

> Adult male displacement and low juvenile male recruitment appear to contribute to declines in the number of breeding males on impacted leks. Additionally, avoidance of gas field development by predators could be responsible for decreased male survival probabilities on leks situated near the edges of developing fields (i.e., lightly impacted leks). Although site-tenacious adult females did not engage in breeding dispersal in response to increased levels of gas development, subsequent generations avoided gas fields, as suggested by the temporal shift in nesting habitat selection and differences in habitat selection by yearling and adult females. This suggests that the nesting population response is delayed avoidance of natural gas development. The results suggest that male and female greater sage-grouse displacement from developing natural gas fields contributes to breeding population declines.

As one can readily see, this "strong science" depends upon speculation, hypothetical worst-case scenarios coming true, and creating just-so-stories to explain results. It does not rely on hypothesis testing.

Holloran (2005, page 82, Table 2) actually reported that the probability of survival was predicted to be *higher* (61.5 +6.4%) in disturbed areas than in less impacted areas (29.6 +18.1%) or control areas (48.5 +14.4%). This result is contrary to Holloran's (2005) own assertions regarding supposed population impacts.

Moreover, the author’s predicted population declines (-8.7 to -24-4% annually) have simply failed to come true. Recent analysis of male lek-attendance trends by the State of

Wyoming has instead found that the GRSG population has been increasing since 1990. It is the litmus test of science that when such predictions fail to come true, the hypotheses/theories they are based upon are simply wrong (Platt 1964). BLM cannot rely on studies cited that have been so clearly falsified.

Holloran 2005 did not provide any data that show consistently lower level of fitness for birds that nested father from roads. Further, the author made very specific recommendations regarding one well per section that were not based upon testing of that threshold in the analysis. Holloran wrote, "[M]aintaining well densities of ≤1 well per 283 ha (approximately 1 well per section) within 2 mi of a lek could reduce the negative consequences of gas field development." However, the author did not test impacts at this density versus other well densities. Instead, he reported on leks affected by different numbers of impacts in each of four quadrants in the cardinal directions and predictions based upon correlations at a scale of 3 km. Data, significance tests, and scatterplots of those correlative analyses were not reported, making the scientific rationale for his one-well-per-section not reproducible. BLM cannot rely on unsupported opinion and irreproducible analyses as the basis for recommendations made in the NTT Report.

Five years after the original Holloran study was released (Holloran 2005), Holloran et al. (2010) did not document any population loss--only temporary displacement of sage grouse. We emphasize, even Holloran et al. did not support their own earlier study, yet the NTT Report uses it uncritically. Holloran et al. (2010) wrote the following about their results,

> "Leks that recruited more than the expected number of males were significantly farther from drilling rigs, producing well pads, and main haul roads compared to leks that recruited fewer males than expected (Table 1). Additionally, leks that recruited more males than expected were significantly farther from main haul roads than leks that recruited the same number of males as expected."

In other words, only leks near the drilling rigs were affected and males from those leks tended to move to leks farther from active development. These missing males did not die off and the population did not crash, no negative demographic effect on the population was found. BLM cannot rely on studies that purport to document a negative effect (i.e. Holloran 2005), yet consistently fail to do produce data that show such a negative effect.

There has been no decline in the GRSG population in the Pinedale Planning Area (Upper Green River Basin). Instead, data and analyses performed by the Wyoming Department of Game and Fish reveal that between 1990 and 2012 there has been a consistent increase as measured by male lek attendance and male density per square mile. Wyoming Game and Fish 2012. The information relied upon by the NTT Report is simply wrong.

Holloran et al. 2010.[13] This study is cited four times in the NTT Report for the proposition that avoidance leads to population declines. As discussed extensively above, local avoidance does not, as the authors speculate, equate to population declines.

Johnson et al. 2011.[14] This study is cited three times in the NTT Report in the context of negative impacts being measured great distance from leks, suggesting support of four-mile buffers, and 3 percent disturbance threshold.

Regarding professional judgment and the 3% anthropogenic disturbance threshold, the cited studies (Johnson et al. 2011, and Naugle et al. 2011a, b) are not as definitive as claimed in the NTT Report with regards to susceptibility of sage grouse to either discrete or diffuse disturbance. First, Johnson et al. 2011 utilized extremely weak statistical inference and there are simply not enough years of data to reliably support inferences with single variables, much less multiple variables analyses produced by Johnson et al. 2011 are not reliable statistical inferences and it is hard to imagine that such a weak paper was ever published. The authors examined 62 different predictor variables, using only 11 years of lek count data for the response variable, in seven different sage grouse management zones. Reliability was further compounded by the fact that 37% of the lek counts used by Johnson et al. (2011), had *only four years of data* associated with them. As a result, Johnson et al. 2011 is an example of an extremely weak approach to statistical inference and a poorly planned "data-fishing expedition."

There are simply not enough years of data to support inferences with single variables, much less several variables, and certainly not the 62 variables studied by Johnson et al. (2011). The study only reported Pearson correlation coefficients (r), rather than r2 and its significance, which is not common practice and illustrates the lack of meaningful signal in the data. The scatterplot figures illustrate the main result: that there are no significant correlations between predictor and response variables. Instead, there were random clouds of points. The authors resorted to LOESS smoothing in an attempt to identify potential patterns in the data that did not otherwise have any statistical significance. LOESS smoothing allows one to portray a pattern or trend, where none exists.

Despite the obvious issues (discussed above), the authors reported on "trends" and discussed the potential importance of these. The fact that Johnson is employed by the USGS raises questions about the independence of this paper. Two of the NTT members (D. Naugle and S. Knick) were also authors on USGS GRSGS Monograph (where this study was published) and S. Knick was one of its editors. This raises issues about the lack of independence of the NTT Report and the validity of the scientific information relied upon to formulate its recommendations.

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[13] Holloran, M.J., R.C. Kaiser, and W.A. Hubert. 2010. Yearling greater sage-grouse response to energy development in Wyoming. Journal of Wildlife Management 74:65–72.

[14] Johnson, D.H., M.J. Holloran, J.W. Connelly, S.E. Hanser, C.L. Amundson, and S.T. Knick. 2011. Influences of environmental and anthropogenic features on greater sage-grouse populations. Pages 407-450 in S.T. Knick and J.W. Connelly, editors. Greater sage-grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology 38. University of California Press, Berkeley, California, USA.

Kaiser 2006.[15] This study is cited four times between the two reports (NTT/3, COT/1). The NTT Report cites this study in the context that birds avoid habitat that might otherwise be suitable and this thus could lead to lek abandonment. The COT Report wrongly concludes this study proves populations decline as a result of oil fields. Lek avoidance does not equate to population declines.[16] For example, Tack et al. 2011 used satellite global positioning system transmitters to reveal dispersal of GRSG over much greater distances (over 100km and some up to 300 km) and more frequently than previously thought. Accordingly, GRSG may fly over or around areas of disturbance.

Kiesecker et al. 2011.[17] The COT Report incorrectly cites this study. While Kiesecker et al. mention that ecological zoning is an admission that conservation of all habitat is improbable (See p. 167), this is not what the study is about. Kiesecker et al. propose what they believe to be a better way to implement, track, assess the mitigation hierarchy, which they assert will be more effective at conserving key habitat, while "allowing" continued energy development.

The authors propose that offsets (mitigation) are ecologically equivalent to impacts resulting in net neutral or positive outcomes, but fail to suggest how this would be measured. In addition, the authors fail to recognize the many uncertainties and variables within GRSG habitat. The authors proposed strategy for accounting for offsets will punish those who seek offsets in restoration activities as opposed to protective offsets, by making the cost of restorative offsets more costly. Obviously, this deters any incentive to restore habitat, but it also forces an increase in areas that would be off limits to future development.

As part of the accounting approach when deciding on the appropriate ratio, the probability of success must be determined, as seems reasonable. However, if for example the scientific literature is lacking or uncertain on restoration activities/success, then the cost of offsets will increase. In other words, if a given restoration practice is only marginally successful, this would be favored in the calculation over newer innovative technology because the new methods success odds are not yet proven. This will stifle technological advances in restoration and ultimately would harm habitat by preventing any incentive to try and improve it.

Knick et al. 2003.[18] The very title of this piece evidences extreme bias, "Teetering on the edge or too late?...." This study is cited 15 times between the two reports (NTT/1,

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[15] Kaiser, R.C. 2006. Recruitment by greater sage-grouse in association with natural gas development in western Wyoming. M.S. Thesis, University of Wyoming, Laramie, WY. 102pp.

[16] *See* Ramey, Thurley and Ivey 2014.

[17] Kiesecker J.M., H.E. Copeland, B.A. McKenney, A. Pocewicz and K.E. Doherty. 2011. Energy by design: Making mitigation work for conservation and development. Pp. 159-181 *in* D.E. Naugle (ed). Energy Development and Wildlife Conservation in Western North America. Island Press, Washington, D.C. This paper was note cited in the NTT or COT Reports, but has fundamental flaws which weigh against agency reliance upon it in Land Use Plan Amendments or otherwise.

[18] Knick, S.T., D.S. Dobkin, J.T. Rotenberry, M.A. Schroeder, W.M. Vander Haegen, and C. Van Riper III. 2003. Teetering on the edge or too late? Conservation and research issues for avifauna of sagebrush habitats. Condor 105:611-634

COT/14). Both the NTT and COT Reports cite this paper in support of the proposition that sagebrush ecosystems are beyond recovery thresholds and the amount of habitat lost or degraded as a result of human settlement. There is a likely conflict of interest as Schroeder, a co-author is a COT team member, and Knick is an NTT member. While reflected in the NTT and COT Reports for mistaken propositions on hindrances to restoration, this paper represents the opinions of the authors and is not based on actual data or hypothesis testing.

The authors provide no evidence for their assertion that "disruption" leads to the inability to restore habitats, and does not present data to support its assertions that restoration could take decades or centuries. Knick et al.do not indicate whether their assertions are based on passive or active restoration, and most importantly fails to recognize that there are many factors that impact resilience and thus restoration of habitats. Numerous publications suggest that restoration is possible, but it takes active as opposed to passive management.

Furthermore, even if it does take decades or longer to fully recover sagebrush habitats Knick et al. 2003 assumes that GRSG require climax communities in all life stages and seasons, and also assumes that after loss of a patch there is none available for GRSG to disperse to. GRSG can walk and fly and bypass unsuitable habitats for suitable habitat.

Knick et al. 2003 continues to espouse and assume that because not all sagebrush can be effectively restored this equates to an overall lack of effectiveness of restoration efforts. This notion is false. The authors have not quantified the amount of habitat that has reached a change in state that precludes effective restoration, which may be small. There have been numerous studies published as part of the Sagebrush Steppe Treatment Evaluation Project (SageSTEP) that have demonstrated how proper management, and different restoration methods can positively influence resilience in a cost-effective manner.[19] For instance, transplanting sagebrush is significantly more effective and is also

[19] *See* David A. Pyke, Scott E. Shaff, Andrew I. Lindgren, Eugene W. Schupp, Paul S. Doescher, Jeanne C. Chambers, Jeffrey S. Burnham, and Manuela M. Huso (*2014*) Region-Wide Ecological Responses of Arid Wyoming Big Sagebrush Communities to Fuel Treatments. Rangeland Ecology & Management: September 2014, Vol. 67, No. 5, pp. 455-467; Richard F. Miller, Jaime Ratchford, Bruce A. Roundy, Robin J. Tausch, April Hulet, and Jeanne Chambers (*2014*) Response of Conifer-Encroached Shrublands in the Great Basin to Prescribed Fire and Mechanical Treatments. Rangeland Ecology & Management: September 2014, Vol. 67, No. 5, pp. 468-481; Bruce A. Roundy, Richard F. Miller, Robin J. Tausch, Kert Young, April Hulet, Ben Rau, Brad Jessop, Jeanne C. Chambers, and Dennis Eggett (*2014*) Understory Cover Responses to Piñon–Juniper Treatments Across Tree Dominance Gradients in the Great Basin. Rangeland Ecology & Management: September 2014, Vol. 67, No. 5, pp. 482-494; Bruce A. Roundy, Kert Young, Nathan Cline, April Hulet, Richard F. Miller, Robin J. Tausch, Jeanne C. Chambers, and Ben Rau (*2014*) Piñon–Juniper Reduction Increases Soil Water Availability of the Resource Growth Pool. Rangeland Ecology & Management: September 2014, Vol. 67, No. 5, pp. 495-505; Benjamin M. Rau, Jeanne C. Chambers, David A. Pyke, Bruce A. Roundy, Eugene W. Schupp, Paul Doescher, and Todd G. Caldwell (*2014*) Soil Resources Influence Vegetation and Response to Fire and Fire-Surrogate Treatments in Sagebrush-Steppe Ecosystems. Rangeland Ecology & Management: September 2014, Vol. 67, No. 5, pp. 506-521; Richard F. Miller, Jaime Ratchford, Bruce A. Roundy, Robin J. Tausch, April Hulet, and Jeanne Chambers (*2014*) Response of Conifer-Encroached Shrublands in the Great Basin to Prescribed Fire and Mechanical Treatments. Rangeland Ecology & Management: September 2014, Vol.

significantly cheaper than seeding. Others have shown that if seeding is chosen then it is significantly more effective if it is covered with organic matter, and has shown that by seeding with herbs after a fire or pinyon juniper treatment, it can suppress the spread and establishment of cheatgrass.

This paper lacks any useful scientific findings and seems basically a biased call to arms for environmental groups. For example, the authors complain about a lack of political agenda and advocate that public lands be "Protect[ed] from economic use." Other incredibly biased statements include,

> "[O]ur primary challenge, presented over a quarter of a century ago (Braun et al. 1976), may be to convince our society of the intrinsic value of sagebrush ecosystems and their unique biodiversity. This change in mindset will have to be followed by a firm commitment by federal and state agencies to provide the resources necessary to resolve issues presented in this paper. Only with this concerted effort and commitment can we afford to be optimistic about the future of sagebrush ecosystems and their avifauna."

Further, the purpose of this study is said to be to "emphasize the urgency for conservation and research actions, and synthesize existing information…" It is clear that this study was not designed objectively, and it is truly an opinion paper of where the authors perceive there to be gaps in research. There is no hypothesis testing, and no real data presented.

Because this is a review of existing conditions in 2003, the information is outdated. Significant work and conservation efforts have taken place since the publication of this paper which have reduced threats. Throughout the paper the authors make the assertion that habitat has been disturbed or disrupted *"beyond a threshold at which natural recovery is unlikely*" a bold and biased statement which is not supported by data but reflects the opinions of the authors and those they cite, many of which are also outdated.

The authors cite anthropogenic disturbances like mining, grazing, oil and natural gas, and infrastructure as fragmenting and degrading habitat. West and Young 2000 (advocates of listing Gunnison sage) are frequently cited in support of the amount of habitat lost since pre-European settlement and that most of the range is beyond what can be restored. The authors then go on to cite Braun 1997, 1998, a paid consultant to listing proponents and a biased advocate of listing Gunnison and GRSG, as well as Connelly, and Schroeder et al. 2000, in support of their mistaken view of long-term population declines:

- "numbers of sage-grouse (*Centrocercus* spp.) have continued to decline throughout their range (Connelly and Braun 1997, Braun 1998, Connelly, Schroeder, et al. 2000) and individual populations have become increasingly separated (Schroeder,

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67, No. 5, pp. 468-481; Herriman, Kayla R. 2009. Wyoming big sagebrush: Efforts towards development of target plants for restoration. Moscow, ID: University of Idaho. 63 p. Thesis.

Hays, Livingston, et al. 2000, Beck et al. 2003)." This evidences bias and has been refuted by Zink 2014.

- "In addition to the challenge of understanding shrub-steppe bird-habitat dynamics, *conservation of sagebrush landscapes depends on our ability to recognize and communicate their intrinsic value and on our resolve to conserve them*." This shows serious lack of objectivity.

Knick et al. 2011.[20] This lengthy 162-page paper presents another cumulative effects analysis that covers nearly every conceivable deleterious human activity on sagebrush and sage grouse. This study is cited a total of eight times between the two reports (NTT/6, COT/2). The NTT's use of this study in support of the proposition that various anthropogenic disturbances results in population declines is the most problematic. The NTT Report cites it in support of withdrawals, and suggests draconian restrictions are necessary because increased development on private lands is not subject to mitigation and thus there is "greater need for conservation of sage-grouse and sagebrush on public lands (Knick et al. 2011)." NTT Report at 12.

Notably absent from this one-sided analysis is any mention of the effects of hunting harvest, even though this is a major, documented source of sage grouse mortality with 207,430 grouse killed just between 2001 and 2007, and higher annual take in the preceding years. Instead, the authors devote pages of attention to a number of hypothetical effects:

> "Even activities, such as hiking and mountain biking, which often are perceived as low impact or benign, have an influence wildlife (Miller et al. 1998, Taylor and Knight 2003). Any human activity of high frequency along established roads or corridors, whether motorized or non-motorized, can affect wildlife habitats and species negatively through habitat loss and fragmentation, facilitation of exotic plant spread, population displacement or avoidance, establishment of population barriers, or increased human-wildlife encounters that increase wildlife mortality (Gaines et al. 2003). These effects appear to be common across a variety of habitats and species that span the full range of forested to arid terrestrial environments (Gaines et al. 2003, Ouren et al. 2007)."

However, when one looks closely at the cited literature, these supposed population-level effects are speculative. The omission of documented sources of mortality and inclusion of speculative sources, indicate a less than objective analysis.

To quantify the influence of human activities on patterns and processes of sagebrush habitats and sage-grouse populations, the authors rely on the previously designated Sage-Grouse Conservation Area or the pre-settlement distribution of sage-grouse buffered by 50 km (Connelly et al. 200; Schroeder et al. 2004). As noted below in the discussion of

[20] Knick S.T., S.E. Hanser, R.F. Miller, D.A. Pyke, M.J. Wisdom, S.P. Finn, E.T. Rinkes and C.J. Henny. 2011. Ecological Influence and Pathways of Land Use in Sagebrush. Pp. 203-251 in S.T. Knick and J.C. Connelly (editors), Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkley, CA.

Schroeder et al. (2004), the pre-settlement distribution was a subjective assessment of pre-European GRSG distribution that included both habitat and non-habitat, and selectively excluded some areas of documented occupancy. The widening of the pre-settlement range by a 50km "buffer" (by Knick et al.) inflates the size of the area affected by human activities, even though GRSG may have never occurred there.

As with other disturbances in sage grouse habitat, Knick et al. quantify the "effect area" that surrounds any kind of development based on other studies. In the case of oil and natural gas wells, the effect area includes a 3km buffer around each well pad, and the affected area of a pipeline was 3km in total width because of presumed spread of invasive plants (although Table 16 shows in many cases the authors used a higher figure). A 3km effect area was also applied to all transmission lines. These effect areas were applied across the study area, substantially inflating the effects of these activities, even if mitigation, such as conservation offsets, had been implemented. However, the cited paper for oil and natural gas construction (Lyon and Anderson 2003) made no such 3km recommendations. They simply recommended that the BLM regulations in place at the time be "reexamined." Knick also misrepresented cited studies regarding the affected area of roads, pipelines, and transmission lines. For example, the following studies do not support the one-size-fits-all approach as Knick avers:

1) Lyon and Anderson (2003) also reported observations contrary to the one-size-fits-all effect areas used by Knick et al. For example, Lyon and Anderson (2003) (discussed in detail below) reported that:

> "On the Pinedale Mesa, potential disturbances associated with natural gas development were restricted to vehicular traffic on the pre-existing main haul road. All males from the 3 disturbed leks in our study strutted either on or within 15 m of this road. However, the mean number of vehicles using the mesa road in a 24-hour period during spring and summer of 1998 and 1999 was <12."

2) Instead of reporting a 3km effect area, Bradley and Mustard (2006) reported limited effects from roads and transmission lines:

> "In 2001, cheatgrass was 20% more likely to be found within 3 km of cultivation, 13% more likely to be found within 700 m of a road, and 15% more likely to be found within 1 km of a power line."

3) Similarly, instead of finding a 3km effect area, Gelbard and Belnap (2003) reported:

> "…we observed anecdotally that sites isolated (1000 m) from roads tended to contain fewer exotic species than sites near (50 m from) road… We found a significant effect of road improvement on both exotic and native species richness in interior communities 50 m beyond the edge of the road cut, suggesting that road improvement influences the distribution of both exotic and native species in lands beyond the influence of roadside disturbance. Exotic species richness tended to be greater and native species richness tended to be lower next to more improved roads,

although we caution that our measurements of richness were a snapshot."

Knick et al. stated that, "We used an ecological rationale for estimating the area around points, lines, or polygons from which land use potentially influenced land cover or sage-grouse populations. Estimates for effect sizes into surrounding areas were based on foraging movements of human-subsidized predators, distance of exotic plant species spread, or on distribution data relative to land use." However, because of the misrepresentations detailed above, the other "effect sizes" and "ecological rationale" used by Knick et al. should be closely reexamined.

According to Knick et al. "All nonproprietary and nonsensitive spatial data sets used in our analysis are available for download on the SAGEMAP website http://sagemap.wr.usgs.gov; United States Department of the Interior 2001a). Each data set is accompanied by a metadata record documenting original source and GIS procedures." It is presently unknown how much of the data are proprietary or sensitive.

Further, the NTT cited Knick for the proposition that:

> "Human land use, including tillage agriculture, historic grazing management, energy development, roads and power line infrastructure, and even recreation have contributed both individually and cumulatively to lower numbers of sage grouse across the range (75 FR 13910, Knick et al. 2011)." NTT at 6.

While the above land uses "may" impact GRSG numbers, Knick et al.2011 quantified alleged effects—not population numbers. The NTT Report misrepresents the findings of the study and attempts to tie effect size to population decline which was not tested. Knick et al. do attempt to tie effect size to distribution of GRSG, however, the assumed historical distribution is based on flawed studies which subjectively calculate historic distribution. Other issues include:

- Travel and transportation: "Within the sage grouse range, 95% of the mapped sagebrush habitats are within 2.5 km (1.55 miles) of a mapped road; density of secondary roads exceeds 5 km/km2 (3.1 miles/247 acres) in some regions (Knick et al. 2011)... The effect of roads can be expressed directly through changes in habitat and sage-grouse populations and indirectly through avoidance behavior because of noise created by vehicle traffic (Lyon and Anderson 2003, 75 FR 13910)." NTT at 11. However, the effect size reported/calculated by Knick et al. 2011, is flawed, partially due to their misrepresentation of previous studies.

- Lands and Realty: "In addition, land acquisitions and withdrawals may be important conservation strategies because increased development on private lands, which is not subject to mitigation, will focus greater needs for conservation of sage-grouse and sagebrush on public lands (Knick et al. 2011)." NTT at 12. This is an opinion and is not a tested hypothesis. In addition, it is not accurate to broadly assert private lands are not subject to mitigation. Any activity on private

land, for example split-estate lands, or those requiring a Federal permit or approval would be subject to mitigation.

- ROWs: "Sage-grouse may avoid power lines because of increased predation risk (Steenhof et al. 1993, Lammers and Collopy 2007). Power lines effectively influence (direct physical area plus estimated area of effect due to predator movements) at least 39% of the sage-grouse range (Knick et al. 2011)." NTT at 13. However, Knick et al. conceded 50% of GRSG conservation areas are already impacted by power lines. Knick et al. at 213.

- Livestock: "Treatments used to manipulate vegetation ultimately may have far greater effect on sage-grouse through long-term habitat changes rather than direct impacts of grazing itself (Freilich et al. 2003, Knick et al. 2011)." NTT at 14. This is only loosely supported. See discussion at 228-230.

- Urbanization: "Conversion of sagebrush habitats for agriculture, the expanding human populations in the western United States and the resulting urban development in sagebrush habitats." NTT at 14. Neither Knick nor the NTT provide evidence that urbanization impacts but a small fraction of sagebrush habitat nor that it is a current issue.

Knick, S.T. and S.E. Hanser. 2011.[21] This study is cited a total of 14 times between the two documents (NTT/6, COT/8). The NTT cites this study in the context of the importance of connectivity, which wrongly assumes that sage-grouse cannot bypass unsuitable habitat, but rather habitat must be expansive and connected. This notion has been refuted by Tack et al. 2011 and Ramey, Thurley and Ivey 2014. This study wrongly assumes disturbance equates to declines in population persistence.

A fundamental problem with the Knick and Hanser analysis is that lek persistence data are used in lieu of actual population data, and the analysis rests on the critical assumption that population persistence and lek persistence are strongly correlated. For example, if leks had simply moved because of disturbance (e.g. fire) then the analysis would treat the lek as extirpated when the subpopulation birds that comprise it were not extirpated.

Although the data were originally at a 30m resolution, the authors resampled at a 540m resolution, claiming that they "were able to detect relatively fine-scale patterns at this resolution when considered at the spatial extent of the SGCA **[sage grouse conservation area]**." The authors do not acknowledge that this rescaling could be expected to inflate the effects of disturbance.

The authors' belief that "little is known about the connectivity and ability for spatially

[21] Connecting pattern and process in greater sage-grouse populations and sagebrush landscapes. Pp. 383-406 *in* S.T. Knick and J.W. Connelly (eds). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38). University of California Press, Berkeley, CA

structured populations to exchange individuals," is contrary to the abundant field and genetic data showing ongoing long distance dispersal (>18km). (This aspect is discussed extensively in the reviews of Chapter 16 of this monograph, Garton et al.)

The authors were "unable to identify a specific source of human disturbance because the score represented a summed influence of all anthropogenic features." Thus, they concluded that "the cumulative effect of human activities may have a greater influence on persistence of sage-grouse populations than single land uses." This ignores the relative influence (effect size) of specific types of disturbance on sage grouse populations and assumes that they all contribute to sage grouse decline, when in fact some do not. This is not a sound epistemological basis for informed management decisions.

A more robust analysis would include a logistic regression approach to model population presence/absence. If lek presence/absence data were substituted, then the analysis could only refer to factors leading to the extirpation of leks, and that would best be done at a more limited, regional scale (e.g. sage grouse management zone). Results would be compared to a range wide analysis. Ideally, the variables selected for analysis should be winnowed down on the basis of plausible cause and effect mechanisms, and those likely to have the largest effect sizes. In that way, variables can be treated as testable hypotheses.

Leu and Hanser 2011.[22] This study is cited three times in the COT Report in support that fragmentation is the primary cause of population declines/primary threat, and that sage-grouse avoid anthropogenic disturbances opposed to natural disturbances. This is something that Knick 2013 (the study which claims disturbance should be limited to less than 3%) wrongly suggests.

This paper utilizes a complex spatial analysis to predict impact of the "human footprint" on sagebrush habitat (termed "sagebrush landscape" by the authors). This is the same approach used previously to describe the "human footprint" across the west, by two of the same authors as Leu et al. (2008). The third author of Leu et al. (2008), is Knick, also an editor and frequent contributor to this sage grouse monograph.

The paper contains considerable jargon, making a comprehensive read a time-consuming task.

The model used to study the "human footprint" is dependent upon the inputs of other models, but the error associated with these inputs, and their effect on results, were not addressed by Leu and Hanser. Use of the terms "error," "uncertainty," and "confidence interval" are absent from this paper. The authors did not appear to us statistical methods that deal with stochastic variation to estimate the magnitude of the error variance and propagate it through to the confidence intervals.

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[22]Leu, M. and S.E. Hanser Influences of the human footprint on the sagebrush landscape patterns: implications for sage-grouse conservation. Pp. 253-272 *in* S.T. Knick and J.W. Connelly (eds). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38). University of California Press, Berkeley, CA.

The significance of this paper lies in its likely utilization by the USFWS for a range wide or regional "cumulative effects analysis" of various human land uses and activities on sage grouse. Therefore, a more in-depth review of this paper may be desirable. The authors describe their approach as: "The cumulative effects of human actions on landscapes, the human footprint, can be delineated as the physical and/or ecological human footprint."

In this paper, as with Leu et al. (2008) no hypotheses are tested. Instead, the authors rely on a *post hoc* interpretation of results and make recommendations derived from their complex spatial analysis. That paper interprets the results using a descriptive, story-telling approach. The authors recommend that certain landscapes in a given human footprint class be "carefully evaluated," although the criteria by which such an evaluation would be objectively conducted is not described. The results are deemed supportive of those obtained by other authors in the monograph, however no criteria were provided that would potentially falsify previous conclusions. The authors believe raven control to be ineffective and suggest that all future transmission lines follow existing high impact corridors, an expensive proposition to be based on surmise.

The size of the affected area surrounding each type of land use was developed from one or few studies, and applied across the range of sage grouse. This is a questionable one-size-fits-all approach to quantifying potential disturbance. For example, the corvid (e.g. raven, crow, and magpie) and domestic cat and dog predator risk models (regressions of probability of occurrance vs. distance from human habitations) were based on extremely limited data (4, 2, and 3 data points respectively) and with no tests of significance or confidence intervals. Such poorly supported inferences cannot be viewed as reliable. (The impact of oil and gas wells is treated as a disturbance area around fixed points and their supporting infrastructure (roads and transmission lines) is quantified separately.) The authors provided a handful of citations including an unpublished masters thesis in support of data used to develop input models.

The authors analysis rests on the use of fractals (as opposed to Euclidean geometry) and modeled artificial landscapes, to summarize aspects of habitat fragmentation, including patch shape, edge, and size in terms of *lacunarity*. A concise definition of *lacunarity* used in ecology may be found in Halley et al. (2004):

> In general terms, however, lacunarity is an index of texture or heterogeneity [of a fractal object]. Highly lacunar objects possess large gaps or low-density holes, while low-lacunarity objects appear homogeneous. Thus, for example, in observations of vegetation cover using quadrats, lacunarity is low if we find very similar levels of cover in every quadrat (Plotnick et al. 1993). More precise definition of lacunarity has been problematic.

Leu and Hanser's rationale for using this method is as follows:

> We analyzed artificial landscapes due to the lack of previous research evaluating

lacunarity in natural landscapes demarcated by convoluted patch boundaries and to aid interpretation of lacunarity analyses from natural landscapes (Elkie and Rempel 2001).

Lacunarity has several advantages over other more common fixed-scale landscape metrics because it consists of a single metric evaluated at multiple scales, is not influenced by edge effects, nor restricted to landscapes with high occurrence of habitat of interest (Plotnick et al. 1993). Lacunarity metrics can also be used to assess degree of relative fragmentation across diverse landscapes (Wu et al. 2000).

Despite its ease in calculation, l<u>acunarity analyses have been rarely used to study patterns of natural landscapes</u> (but see Wu et al. 2000, Derner and Wu 2001, Elkie and Rempel 2001) perhaps, because interpretation of lacunarity curves can be difficult. However, we found that using lacunarity analyses of simulated landscapes, where degree of fragmentation and proportion of land cover reflect the range of values of landscapes studied, greatly aids in the interpretation of lacunarity functions of landscape patterns.

Other authors have raised issues as to whether these models accurately represent real-world situations, and the conditions under which its use may be questionable. The uses and abuses of fractals in ecology are thoroughly discussed in Halley et al. (2004).

The original paper (Leu et al. 2008), a general description of the approach used in this paper, and data appendicies may be found at the following websites:

- http://www.esapubs.org/archive/appl/A018/039/default.htm

http://sagemap.wr.usgs.gov/HumanFootprint.aspx

Lyon and Anderson 2003.[23] This study is cited seven times in the NTT Report in alleged support of four-mile NSO buffers and 3% surface disturbance thresholds based on the erroneous assumption that a temporary disturbance of sage grouse from a local area under development equates to a population decline.

Lyon and Anderson's (2003) data were inadequate for: 1) achieving statistical significance in comparisons of nest initiation and nest success in disturbed versus undisturbed areas, and 2) demonstrating a population decline. Instead, the presumed biological significance of their statistically insignificant results were based upon belief, as the following excerpt from Lyon and Anderson (2003) shows:

> "Finally, even though nest initiation between disturbed and undisturbed hens was not statistically significant, we believe lower initiation rates for disturbed hens were biologically significant and could result in lower overall sage grouse productivity."

[23] Lyon, A.G. and S.H. Anderson. 2003. Potential gas development impacts on sage grouse nest initiation and movement. Wildlife Society Bulletin 31: 486-491.

Lyon and Anderson (2003) also stated that,

> "Hens captured on disturbed leks demonstrated greater movements from capture lek to nest than hens from undisturbed leks. Hens from disturbed leks nested approximately twice as far from capture leks as did hens from undisturbed leks. Our random nest vegetation analysis indicated no significant differences in nesting habitat between disturbed and undisturbed areas, suggesting that nest habitat was not influencing sage grouse hen movements."

This is expected, as animals that are disturbed by human activity will sometimes move away from it. However, it does not mean that the result will be a population decline.

Naugle et al. 2011a.[24] This study is one of twelve chapters found in the publication, "Energy development and wildlife conservation in western North America" (Island Press, hereinafter Naugle's Book). This chapter is cited three times in the NTT Report and once in the COT Report for the proposition that cumulative impacts of mineral development leads to landscape level impacts on GRSG. Naugle acted as the editor of his own book and authored or co-authored three of the chapters.

Correspondence between Naugle and BLM official and NTT Team Leader Raul Morales obtained via FOIA also evidence a lack of objectivity on the part of Naugle. Further evidence of bias comes from the introductory chapter of Naugle's book itself: "Everyone has a stake in the future of the West. The *world* expects the historical West to retain its wildness and wildlife, even if only a fraction of those people ever come to see it. The mere knowledge of its existence is a comfort." Naugle and Copland (2011) at 6.[25]

This quote is representative of the uniform and continued bias of the main contributors to the book, whom are also frequently cited in both the NTT and COT Reports. Their personal bias against land use and oil and natural gas has adversely influenced the design, interpretation, and ultimately the conclusions resulting in a lack of objectivity. Moreover, the fact that the BLM is the primary funding source not only for the entire book but specifically for this paper, and the primary author and editor, Naugle, is an NTT member, shows a clear conflict of interest.

The authors conclude: "[F]oregoing development in priority landscapes is the obvious approach to conserve large populations." *Id.* at 70. This notion is legally impossible without an Act of Congress given the multiple-use mandates of BLM and the US Forest Service. Moreover, this policy conclusion is based on opinion rather than science or data. These facts alone should disqualify this incredibly biased and one-sided work.

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[24] Naugle, D.E., K.E. Doherty, B.L. Walker, H.E. Copeland, M.J. Holloran, and J.D. Tack. 2011a. Sage-grouse and cumulative impacts of energy development. Pages 55-70 in D.E. Naugle, editor. Energy development and wildlife conservation in western North America. Island Press, Washington, D.C., USA.

[25] Naugle and Copland. 2011. Introduction to Energy Development in the West. Pp. 3-6 *in* D.E. Naugle (ed). Energy Development and Wildlife Conservation in Western North America. Island Press, Washington, D.C.

Incredibly, the NTT Report appears to adopt pages of this chapter verbatim on pp. 19-21 without any attribution or citation.

This study cherry-picks studies and interprets them to support the authors' pre-ordained conclusions. The authors selectively reviewed and reinterpreted studies, many of which were authored by co-authors on this publication, that they "feel" are important while blatantly excluding others, such as Ramey, Brown and Blackgoat 2011.[26] Their premise that impacts from energy development are "universally negative and typically severe" and cause population declines is fundamentally and deeply flawed.

In this study, the authors wildly surmise that "world demand" for energy will lead to "unprecedented pressure" on wildlife in the western U.S. The authors assume inappropriately that conservation must be equal to the amount of development, which is not based on data or tested to determine if it is reasonable, achievable, or necessary. Instead it is based on the opinion of the authors, not based in science.

Here, the authors "synthesized" 14 studies which looked at the effects of energy development on GRSG using various methods described in Naugle et al 2011b[27] in the GRSG Monograph. This chapter is really just another publishing of the Naugle et al. 2011b. The authors of this paper are the same authors of 2011b monograph chapter with the exception of Tack.

The authors did not conduct an objective review of the literature. Eleven of the studies were conducted either in the Pinedale Anticline, Powder River Basin, or Alberta. None of these study areas are representative of conditions range-wide, and instead represent studies with areas of intensive energy development using technology of yesteryear. Recent publications such as Ramey, Brown and Blackgoat 2011, Kirol et al. in preparation,[28] and Applegate and Owens 2014[29] demonstrate that with improved technological advances, resource management, and best management practices, sage-grouse have responded positively to mitigation and other conservation efforts. Further, eight of the 14 papers are journal articles, dissertations, and theses of the chapter's authors. Of the remaining studies, there appears to be significant misrepresentation.

Of the studies included in this chapter, only eight had data for six or more years. Kaiser 2006 for example had just one year of data and an extremely small sample size. This leads to limited confidence in the findings of this study, such as lack of trend data, discussed elsewhere in this challenge.

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[26] Ramey, R.R., L. Brown, F. Blackgoat 2011.

[27] Naugle, D.E., K.E. Doherty, B.L. Walker, M.J. Holloran, and H.E. Copeland. 2011b. Energy development and greater sage-grouse. Pages. 489-503 in S.T. Knick and J.W. Connelly, editors. Greater sage-grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology 38. University of California Press, Berkeley, California, USA.

[28] Kirol C.P., A.L. Sutphin, L. Bond, M.R. Fuller, T.L. Maechtle. Mitigation effectiveness for improving productivity of greater sage-grouse nesting in natural gas development areas. International Sage-Grouse Forum, Salt Lake City, Utah (November 13-14, 2014).

[29] Applegate D., N. Owens. 2014. Oil and gas impacts on Wyoming's sagegrouse: summarizing the past and predicting the foreseeable future. Human–Wildlife Interactions 8(2):284–290

A key objective of the study is to provide landscape-level recommendations. The authors state, "the size of sage-grouse breeding populations is often used as an indicator of the overall health of sagebrush ecosystems." Naugle et al. 2011a at 56 citing Hanser and Knick 2011. The results of Hanser and Knick 2011 appear to be misrepresented in Naugle et al 2011a. Hanser and Knick evaluated whether treating GRSG as an umbrella species would benefit other species that use sagebrush to varying degrees. They did not estimate whether the GRSG would be an effective umbrella for the other 95% of the species that use sagebrush environments. Thus, to surmise that GRSG health is an indicator of ecosystem health is an overly narrow view in light of the remaining 95% of species present in the sagebrush biome.

One of the most egregious conclusions of this study is the false assumption that "sage-grouse populations decline when birds avoid infrastructure in one or more seasons." *Id.* at 61, *citing* Doherty et al 2008; Carpenter et al 2010. Among other issues, the findings of these studies were misrepresented in Naugle et al 2011a. Doherty and Carpenter examined impacts on winter habitat selection. They did not model or collect data on population decline/persistence. The negative impacts that the authors report are based on the assumption that avoidance leads to population declines. This mistaken concept has never been tested or proven; it is purely speculative.

The authors also assume that loss of a lek near energy development equates to a population decline and that the birds then cease to reproduce all together. Instead it could be hypothesized that the birds simply relocate/move to other leks or a new lek might form somewhere else. *See* Tack et al. 2011. Lek data obtained from Wyoming Game and Fish indicates that populations are stable to increasing, which refutes the notion that GRSG are undergoing population decline as a result of avoidance to energy infrastructure.

Citations for the false assumption of population declines of Holloran and Anderson 2005, Aldridge and Boyce 2007 and Holloran et al. 2010 are misplaced as described elsewhere herein. *Id.* at 62. And the notion that site fidelity combined with disturbance leads to declines based upon Yoder et al. 2004 is also suspect. The Yoder study was conducted on ruffed grouse and addressed how predation is a function of movement or dispersal. Reliance on Holloran 2005 at pp. 62-63 is also misplaced. As discussed herein, the alarmist population predictions made in Holloran 2005 failed to come true.

Notwithstanding the above, at least the authors recognize, "[T]ools to manage sage-grouse populations will vary across the species range with biotic and abiotic characteristics of different landscapes and local constraints to populations." *Id.* at 68. This statement undermines the NTT and COT Reports' one-size-fits-all approach.

Patricelli et al. 2010. This study was one of the first of its kind in attempting to discern potential effects of noise on GRSG. However, it was fraught with errors in documentation of methods, lack of data, assumptions, and erroneous interpretation of results. Clearly lacking was any involvement by professional acousticians, or use of professional data collection and reporting standards in the industry. As a result, the study

cannot be viewed as anything more than preliminary and cannot be used as the basis of regulations.

The cited studies provided no evidence of GRSG population declines as the result of anthropogenic sound produced by the oil and gas industry.

Only a transient period of disturbance to GRSG at leks where the playbacks occurred was observed. There was no data reported that the levels of fecal corticosteroid metabolites in male GRSG at the affected leks had resulted in reduced fitness (e.g. decreased reproductive capabilities and/or decreased survivorship that have led to any detectable population decline in the study area). Rather, population trends in male lek attendance and density in the study area (Upper Green River Basin portion of the Wyoming basin population) have been consistently above state average and increasing since 1990 (data from Wyoming Game and Fish 2013).

The data used are not public and results are not reproducible. No data were reported from: 1) objectively-measured noise generated during various phases of drilling activities, 2) noise generated during production, 3) road noise, or 4) the occurrence of these over a 24 hour period. No data were reported on the environmental parameters under which any data were collected, or the ambient sound levels in the study area based upon professional standards (which include wind). Instead, the authors cited "unpublished data" and speculation about the accuracy of their playback noise levels, in support of their claims (emphasis in **bold** below):

> "We played drilling noise and road noise on leks at 70 dB(F) sound pressure level (unweighted decibels) measured 16 m directly in front of the speakers (Fig. 1 & Supporting Information). **This is similar to** noise levels measured approximately 400 m from drilling rigs and main access roads in Pinedale, Wyoming (J.L.B and G.L.P., **unpublished data**).
>
> "To minimize disturbance, we took propagation measurements during the day. Daytime ambient noise levels are typically 5-10 dBA higher than those in the early morning (J.L.B and G.L.P., **unpublished data**) and **are likely higher** than those heard by birds at a lek."
>
> "For leks treated with drilling noise, recordings from 3 drilling sites were spliced into a 13-minute mp3 file that played on continuous repeat. On leks treated with road noise we randomly interspersed mp3 recordings of 56 semi trailers and 61 light trucks with 170 30-second silent files to simulate average levels of traffic on an access road (Holloran 2005). Noise playback on experimental leks continued throughout April in 2006, from mid February or early March through late April in 2007, and from late February through late April in 2008. **We played back noise on leks 24 hours/day because noise from deep natural-gas drilling and vehicular traffic is present at all times."**

(emphasis added). There was no data presented that the playback sound was an accurate rendition of actual frequencies and sound pressure levels from oil and gas operations as measured at set-back distances required by the BLM, or that it occurred at the same levels 24 hours a day. Instead, the authors relied upon "unpublished data" or speculation.

While a 0.25 mile buffer has been the minimum set back distance required by the BLM, most oil and gas operations are found at far greater distances from leks (Wyoming Oil and Gas Conservation Commission well data and Wyoming Game and Fish lek count and location data). Thus, the reported effects on GRSG were biased in the cited studies to achieve a negative response rather than measure responses from sound pressure levels as they would occur at the required set back distances.

Pyke, D.A. 2011.[30] This study is cited four times in the NTT Report and five times in the COT Report. The use of this study is more concerning in the COT Report as the COT Report mis-cites Pyke for the misplaced assumption that restoration is very difficult across the landscape and that 4,000ha are required to sustain a population. The mistaken notion that restoration is too difficult and thus habitat should be left undisturbed is addressed elsewhere herein.

Pyke discusses both the pros and cons of grazing, and discusses when grazing might be a benefit and when reduction or removal would be better. Pyke discusses appropriately that grazing is not black and white and that appropriate grazing during certain times of the year may maximize the benefits in reducing invasive species. Pyke 2011 at 538-539.

Pyke is quite clear that several factors must be considered prior to making any decision on how or whether to restore/rehabilitate. To make the above assertion is premature. Pyke also indicates that depending on the habitat component that needs restoring, it may only take 3-5 years, in some instances.

There is extensive research being conducted on restoration and treatment of degraded sagebrush habitats.[31] Several factors influence the efficacy of restoration including soil moisture, elevation, seed mix, type pre-treatment/disturbance conditions, distance between stands, to name a few. To say that restoration is impossible is inaccurate because there is very little long-term data available on sites where active restoration activities exceeded the typical three year emergency stabilization and rehabilitation (ES&R) policies of land management agencies. Moreover, it has been common practice to defer to passive management if the first re-seeding event failed. Moreover, GRSG habitat parameters at these older ES&R sites were not necessarily considered. Thus, what long-term data is available is not representative of newer restoration techniques and technologies.[32] On the other hand, short-term studies show that with the right

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[30] Restoring and rehabilitating sagebrush habitats. Pp. 531-548 *in* S.T. Knick and J.W. Connelly (eds). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38). University of California Press, Berkeley, CA.

[31] *See* footnote 25, *infra*.

[32] *Id*.

type/mixture of management of habitats, tailored to the specific needs of the plot undergoing restoration, habitats do respond positively.[33]

Finally, with regards to restoration generally and after fire, Pyke describes the reason for difficulty seems to be land manager choices in seed mix. It follows that it is inaccurate to claim that restoration is impossible as suggested in the COT Report. The primary recommendation made in Pyke is that native seed mixes should be used whenever possible, with the use of non-native seeds when there is limited native seed mix available. If land managers simply shifted their seed mixture to that of natives implemented known BMPs that increases seed establishment, and the land was managed to control invasives, then it could be hypothesized that the restoration would be more successful. The conclusion to draw from Pyke is that current restoration practices are flawed, not that restoration is not possible and therefore, habitat must be left undisturbed.

Schroeder et al. 2004.[34] This study was cited once in the NTT Report, six (6) times in the COT Report and 18 times in the FWS' 2010 listing decision. Contrary to the position presented in Schroder et al. 2004, the pre-European distribution of GRSG is far more uncertain—particularly where the historic record is an incomplete estimate at best. The author's estimate of the potential habitat of sage grouse from pre-European settlement through the present based on historic distribution maps, museum records, published accounts, and other information was neither well explained nor objective. Beyond the limitations of an incomplete historic record, GRSG have a much broader habitat tolerance than asserted in this study. GRSG can and have lived in riparian meadows, agricultural land, steppe dominated by native grasses and forbs, shrub willow, and sagebrush habitat with conifer and aspen trees. This study subjectively excludes observations and specimens outside of sagebrush habitat to claim that GRSG are confined to and wholly dependent on sagebrush territory. The author failed to acknowledge the inherent uncertainty associated with such blanket statements after reviewing limited data along with a fragmented and questionable historic record. These serious flaws make reproducibility nearly impossible.

The pre-settlement habitat extends from 1400 to 1850 A.D., and encompasses the Little Ice Age (which averaged .5-.9 degrees Celsius lower than current temperatures). Since the weather was colder, and more arid, vegetation and climate were simply different than in modern times. Natural fluctuations in climate have a profound impact on sagebrush habitat.

Reliance on Kuchler's (1964) PNV for historic climate estimates is similarly problematic as they are qualitative, generalized descriptions of vegetations communities which are not suitable for extrapolation. Kuchler's PNV models could be characterized as "informed guesswork," and a summary of prevalent opinion as to the likely ecological status of many different types of American vegetation, but not as "a reliable predictive tool." Schroder also failed to account for the effect of Native Americans on sage grouse and their habitat prior to 1800. Native American populations are estimated between 40 and

[33]Arkle et al. 2014.
[34]Schroeder et al. 2004, Distribution of sage-grouse in North America, Condor 106:363-376.

112 million people prior to European contact, most of whom lived in temperate regions. Native Americans hunted sage-grouse, and started range fires to improve edible forage and game. These and other highly disruptive activities had an unquantifiable but assured impact on GRSG populations.

Walker, et al. 2007.[35] This paper is cited eight times in the NTT Report and two times in the COT Report in support of lek buffers, impacts to habitat selection, and the proposition that energy development leads to declines in population numbers. However, neither the NTT nor the COT Report mentions the methodological issues with these studies or the fact that none reported a population-level decline in sage grouse rather than a localized effect on rates of male lek attendance near the disturbance.[36]

The authors concede speculation as the premise for their alleged conclusions even in the abstract of the paper. The paper suffers from subjective interpretation of results where no hypothesis testing was used. Avoidance of disturbance is not uniform among locations as the authors suggest. Rather, it can be site-dependent for factors such as density of development and age of the oil and natural gas field impact of oil and natural gas operations on GRSG is not as clear-cut nor as negative as the authors of this paper and the NTT report claims.[37]

In addition, data show that GRSG behavior can be affected by certain types of anthropogenic disturbance more than others, which can result in localized avoidance, but the effect of any of these disturbances or development on migration rates is unknown. Data from Lyon (2000), Bush (2009), Tack et al. (2011), and more recent papers, all reveal that GRSG traverse (fly) over or around roads, agricultural areas, and oil and natural gas development, at distances up to 300 km from their natal leks.

However, the author advocates for disturbance caps, yet the authors did not <u>test</u> any percent disturbance caps. Instead they modeled response in lek attendance in terms of <u>distance(s)</u> from potential sources of disturbance. Therefore, Walker et al.'s (2007) support for a 3% disturbance cap, represents nothing more than the opinions of the authors.

While citing this paper for support for its proposed four-mile buffers and 3% disturbance caps, the NTT Report fails to recognize any of the methodological issues with Walker et al, or the fact that none reported a population-level decline in GRSG rather than a localized effect on rates of male lek attendance near the disturbance.
Walker et al. (2007) used model selection procedures that were not statistically reliable because they used nine predictor variables, with just nine years of data, to compare 19 models, in an attempt to identify combinations of predictor variables that would potentially explain patterns in the data. However, for model selection to work properly,

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[35] Greater sage-grouse population response to energy development and habitat loss. Journal of Wildlife Management 71:2644-2654**.**
[36] *See* Ramey, Thurley and Ivey 2014.
[37] *See* Harju et al. 2010; Taylor et al. 2010; Ramey, Brown and Blackgoat 2011.

the number of predictor variables must be smaller in comparison to the number of observations, in this case, the number of years of data.

Additionally, for model selection to be scientifically defensible, the predictor variables are best narrowed down in advance based on plausible cause and effect mechanisms and tests for independence among variables, procedures that Walker et al. (2007) did not employ. Finally, the results of Walker et al. (2007) were confounded by the obvious location of at least nout of 35 inactive leks immediately adjacent to Highway 14, Highway16, and Interstate 90. Walker et al. (2007) is not a scientifically sound basis for precise predictions about GRSG population responses.

Exhibit C: Studies that Were Not Included in the NTT and COT Reports

I. Tall Structures

The NTT and COT Reports do not reflect the current understanding of the impacts of tall structures to GRSG. The studies cited below are those which either should have been considered or have changed the understanding of impacts to GRSG.

A. Studies Ignored

Messmer, T. A., R. Hasenyager, and J. Burruss. 2010. Contemporary Knowledge and Research Needs Regarding the Effects of Tall Structures on Sage-grouse (*Centrocercus urophasianus* and *C. minimus*). Utah Wildlife in Need Foundation. Salt Lake City, Utah.

Messmer, T.A. 2011. Protocols for Investigating the Effects of Tall Structure on Sage-grouse (*Centrocercus urophasianus*). Utah Wildlife in Need Foundation. Salt Lake City, Utah.

Utah Wildlife in Need (UWIN). 2010. Contemporary Knowledge and Research Needs Regarding the Potential Effects of Tall Structures on Sage-grouse (*Centrocercus urophasianus and C. minimus*). http://www.utahcbcp.org/htm/tall-structure-info

B. Additional Studies that Must be Considered

LeBeau, C.W. 2012. Evaluation of Greater Sage-Grouse Reproductive Habitat and Response to Wind Energy Development in south-Central Wyoming, MS Thesis, Department of Ecosystem Science and Management, University of Wyoming. August 2012.

Messmer, T., A., R. Hasenyager, J. Burruss, and S. Liguori. 2013. Stakeholder contemporary knowledge needs regarding the potential effects of tall structures on sage-grouse. *Human-Wildlife Interactions* 7(2):273-298.

Nonne, D., E. Blomberg, and J. Sedinger. 2013. Dynamics of Greater Sage-grouse (*Centrocercus urophasianus*) populations in response to transmission lines in central Nevada. Progress Report: Year 10. February 2013. Department of Natural Resources and Environmental Sciences, University of Nevada, Reno. 75pp.

Walters, K., K. Kosciuch, and J. Jones. 2014. Can the effect of tall structures on birds be isolated from other aspects of development? *Wildlife Society Bulletin* doi: 10.1002/wsb.394.

II. Habitat Components

The NTT and COT Reports do not adequately address the variance of habitat components between seasons or across the range of the GRSG. The following studies are those that, if they had been used, would reflect a more accurate picture of the habitat conditions across the range of

the GRSG and the differences in GRSG occupancy and use of those habitats within populations, which would better inform management of the habitats and the species.

A. Studies Ignored

Baxter, R.J., J.T. Flinders, and D.L. Mitchell. 2008. Survival, movements, and reproduction of translocated Greater Sage-Grouse in Strawberry Valley, Utah. *Journal of Wildlife Management* 72(1):179-186.

Chambers J.C., B.A. Roundy, R. R. Blank, S.E. Meyer, and A. Whittaker. 2007. What makes great basin sagebrush ecosystems invasible by *Bromus tectorum*? *Ecological Monographs* 77:117–145. http://dx.doi.org/10.1890/05-1991.

Dzialak MR, C.V. Olson, S.M .Harju, S.L .Webb, J.P Mudd. 2011. Identifying and Prioritizing Greater Sage-Grouse Nesting and Brood-Rearing Habitat for Conservation in Human-Modified Landscapes. *PLoS ONE* 6(10): e26273. doi:10.1371/journal.pone.0026273.

Dahlgren D. K., R. Chi, and T. A Messmer. 2006. Greater Sage-Grouse Response to Sagebrush Management in Utah. *Wildlife Society Bulletin* 34:975–985. doi: 10.2193/0091-7648(2006)34[975:GSRTSM]2.0.CO;2.

Gregg, M. A. and J. A. Crawford. 2009. Survival of Greater Sage-Grouse Chicks and Broods in the Northern Great Basin. *The Journal of Wildlife Management* 73: 904–913. doi: 10.2193/2007-410.

Gregg M.A., J. K. Barnett, and J.A. Crawford . 2008. Temporal Variation in Diet and Nutrition of Pre-incubating Greater Sage-Grouse. *Rangeland Ecology & Management* 61(5):535-542.

Guttery M.R. 2010. Ecology and Management of a High Elevation Southern Range Greater Sage-Grouse Population: Vegetation Manipulation, Early Chick Survival, and Hunter Motivations. *All Graduate Theses and Dissertations.* Paper 842. http://digitalcommons.usu.edu/etd/842

Schultz, B. 2004: Analysis of studies used to develop herbaceous height and cover guidelines for sage grouse nesting habitat. - Cooperative Extension Special Publication SP-04-11, University of Nevada, Reno,USA, 25 pp.

B. Additional Studies that Must be Considered

Fedy B.C., K.E. Doherty, C.L. Aldridge, M. O'Donnell, J.L. Beck, B. Bedrosian, D. Gummer, M.J. Holloran, G.D. Johnson, N.W. Kaczor, C.P. Kirol, C.A. Mandich, D. Marshall, G. McKee, C. Olson, A.C. Pratt, C.C. Swanson, and B.L. Walker. 2015. Habitat prioritization across large landscapes, multiple seasons, and novel areas: An example using Greater Sage-Grouse in Wyoming. *Wildlife Monographs* 190(1): 1-39.

III. Population Trends

The NTT and COT Report do not adequately address the variance in population trends or the cause of those population trends. The following studies are those that, if they had been used, would reflect a more accurate picture of the cause and effect mechanisms impacting populations.

A. Additional Studies that Must be Considered

Fedy B.C., K.E. Doherty, C.L. Aldridge, M. O'Donnell, J.L. Beck, B. Bedrosian, D. Gummer, M.J. Holloran, G.D. Johnson, N.W. Kaczor, C.P. Kirol, C.A. Mandich, D. Marshall, G. McKee, C. Olson, A.C. Pratt, C.C. Swanson, and B.L. Walker. 2015. Habitat prioritization across large landscapes, multiple seasons, and novel areas: An example using Greater Sage-Grouse in Wyoming. *Wildlife Monographs* 190(1): 1-39.

Blomberg E.A., J.S. Sedinger, M.T. Atamian, and D. V. Nonne. 2012. Characteristics of climate and landscape disturbance influence the dynamics of greater sage-grouse populations. *Ecosphere* 3:art55. http://dx.doi.org/10.1890/ES11-00304.1.[1]

Caudill D., M. R. Guttery, B. Bibles, T. A. Messmer, G. Caudill, E. Leone, D. K. Dahlgren, and, R. Chi. 2014. Effects of climatic variation and reproductive trade-offs vary by measure of reproductive effort in greater sage-grouse. *Ecosphere* 5:art154. http://dx.doi.org/10.1890/ES14-00124.1

Guttery M.R, D.K .Dahlgren, T.A. Messmer, J.W.Connelly, and K.P. Reese. 2013. Effects of Landscape-Scale Environmental Variation on Greater Sage-Grouse Chick Survival. PLoS ONE 8(6): e65582. doi:10.1371/journal.pone.0065582

Guttery, M. R., T. A. Messmer, E.T. Thacker, N. Gruber, and C. M. Culumber. 2013. Greater sage-grouse sex ratios in Utah: Implications for reporting population trends. *The Journal of Wildlife Management* 77:1593–1597. doi: 10.1002/jwmg.620

Zink R.M. 2014. Comparison of Patterns of Genetic Variation and Demographic History in the Greater Sage-Grouse (*Centrocercus urophasianus*): Relevance for Conservation. *The Open Ornithology Journal* 2014, *7*, 00-00.

IV. Restoration

The issue of restoration was only addressed in a cursory manner. Considerable research has been conducted regarding restoration which would inform the agencies in Emergency Stabilization and Burn Rehabilitation Programs, as well as inform GRSG habitat restoration policy.

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[1] This study is relevant to the NTT Report but not the COT Report.

A. Studies Ignored

Herriman K. R. 2009. Wyoming big sagebrush: Efforts towards development of target plants for restoration. Moscow, ID: University of Idaho. 63 p. Thesis.

B. Additional Studies that Must be Considered

Chambers J. C., D.A. Pyke, J.D.Maestas, M. Pellant, C.S. Boyd, S. B.Campbell, S. Espinosa, D.W. Havlina, K.E. Mayer, A. Wuenschel. 2014. Using resistance and resilience concepts to reduce impacts of invasive annual grasses and altered fire regimes on the sagebrush ecosystem and greater sage-grouse: A strategic multi-scale approach. Gen. Tech. Rep. RMRS-GTR-326. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 73 p.

Davies G. M., J. D. Bakker, E. Dettweiler-Robinson, P. W. Dunwiddie, S. A. Hall, J. Downs, and J. Evans. 2012. Trajectories of change in sagebrush steppe vegetation communities in relation to multiple wildfires. *Ecological Applications* 22:1562–1577.

Davies K. W., C. S. Boyd, and A.M. Nafus. 2013. Restoring the sagebrush component in crested wheatgrass-dominated communities. *Rangeland Ecology & Management* 66:472–478.

Dettweiler-Robinson E., J.D. Bakker, J.R. Evans, H. Newsome, G.M. Davies, T.A. Wirth, D.A. Pyke, R. T. Easterly, D. Salstrom, and P.W. Dunwiddie. 2013. Outplanting Wyoming big sagebrush following wildfire: stock performance and economics. *Rangeland Ecology & Management* 66(6,):657-666.

Fedy B.C., K.E. Doherty, C.L. Aldridge, M. O'Donnell, J.L. Beck, B. Bedrosian, D. Gummer, M.J. Holloran, G.D. Johnson, N.W. Kaczor, C.P. Kirol, C.A. Mandich, D. Marshall, G. McKee, C. Olson, A.C. Pratt, C.C. Swanson, and B.L. Walker. 2015. Habitat prioritization across large landscapes, multiple seasons, and novel areas: An example using Greater Sage-Grouse in Wyoming. *Wildlife Monographs* 190(1): 1-39.

McAdoo J. K., C. S. Boyd, and R. L. Shelley. 2013. Site, competition, and plant stock influence transplant success of Wyoming big sagebrush. *Rangeland Ecology & Management* 66:305–312.

Miller R.F., J. Ratchford, B.A. Roundy, R. J. Tausch, A. Hulet, and J.C. Chambers. 2014. Response of Conifer-Encroached Shrublands in the Great Basin to Prescribed Fire and Mechanical Treatments. *Rangeland Ecology & Management* 67(5):468-481.[2]

Miller R.F., J. Ratchford, B.A. Roundy, R. J. Tausch, A. Hulet, and J. C. Chambers. 2014. Response of Conifer-Encroached Shrublands in the Great Basin to Prescribed Fire and Mechanical Treatments. *Rangeland Ecology & Management* 67(5):468-481.

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[2] This study is relevant to the NTT Report but not to the COT Report.

Pyke D.A., S.E. Shaff, A.I. Lindgren, E.W. Schupp, P. S. Doescher, J. C. Chambers, J.S. Burnham, and M.M. Huso. 2014. Region-wide ecological responses of arid Wyoming big sagebrush communities to fuel treatments. *Rangeland Ecology & Management* 67(5): 455-467.

Rau B.M., J. C. Chambers, D.A. Pyke, B.A. Roundy, E.W. Schupp, P. Doescher, and T. G. Caldwell. 2014. Soil Resources Influence Vegetation and Response to Fire and Fire-Surrogate Treatments in Sagebrush-Steppe Ecosystems. *Rangeland Ecology & Management* 67(5):506-521.

Roundy B.A., R.F. Miller, R. J. Tausch, K. Young, A. Hulet, B. Rau, B. Jessop, J.C. Chambers, and D. Eggett. 2014. Understory Cover Responses to Piñon–Juniper Treatments Across Tree Dominance Gradients in the Great Basin. *Rangeland Ecology & Management* 67(5):482-494.

Roundy B.A., K. Young, N. Cline, A. Hulet, R.F. Miller, R. J. Tausch, J. C. Chambers, and B. Rau. 2014. Piñon–Juniper Reduction Increases Soil Water Availability of the Resource Growth Pool. *Rangeland Ecology & Management* 67(5):495-505.

V. Other Studies

The studies listed below are studies that change the understanding of impacts to GRSG from energy development.

A. Studies Ignored

Ramey, R.R., L.M. Brown, and F. Blackgoat. 2011. Oil and gas development and greater sage grouse (*Centrocercus urophasianus*): a review of threats and mitigation measures. *The Journal of Energy and Development* 35(1):49-78.

Taylor, R.C., B. Russell, B.P. Taylor. 2010. Greater sage-grouse populations and energy development in Wyoming.

B. Additional Studies that Must be Considered

Applegate D., N. Owens. 2014. Oil and gas impacts on Wyoming's sage-grouse: summarizing the past and predicting the foreseeable future. *Human-Wildlife Interactions* 8(2):284-290.

Kirol C.P., A.L. Sutphin, L. Bond, M.R. Fuller, T.L. Maechtle. 2014. Mitigation effectiveness for improving productivity of greater sage-grouse nesting in natural gas development areas. *Wildlife Biology*. http://www.wildlifebiology.org/accepted-article/mitigation-effectiveness-improving-nesting-success-greater-sage-grouse-influenced

Kirol C.P., J.L. Beck, S.V. Huzurbazar, M.J. Holloran, S.N. Miller. in press. Identifying greater sage-grouse source and sink habitats for conservation planning in an energy development landscape. *Ecological Applications*.

Ramey, R.R. and L. Ivey. 2014. Spatial and Temporal Analysis of Oil and Gas Development, Mitigation, and Sage Grouse Lek Attendance in the Pinedale Planning Area, Wyoming: 1990-2012. Unpublished report. Wildlife Science International.

Ramey, R.R., J. Thorley and L. Ivey. 2014. Hierarchical Bayesian Analyses of Greater Sage Grouse Population Dynamics in the Pinedale Planning Area and Wyoming Working Groups: 1997-2012. Wildlife Science International.

VI. Raven predation

The NTT and COT Reports largely ignore the tremendous impacts to GRSG from predation.

A. Studies Ignored

Bedrosian, B and D. Craighead 2010. Anthropogenic influences on Common Ravens in the Greater Yellowstone Ecosystem. Unpublished poster presentation. Available at: http://beringiasouth.org/ecology-of-the-common-raven. Accessed 10 August 2013.

Boarman, W. I. 1993. When a native predator becomes a pest: a case study. Pages 191–206 in S. K. Majumdar, E. W. Miller, D. E. Miller, E. K. Brown, J. R. Pratt, and R. F. Schmalz, editors. Conservation and resource management. Pennsylvania Academy of Science, Philadelphia, USA.

Boarman, W. I. 2003. Managing a subsidized predator population: reducing common raven predation on desert tortoises. *Environmental Management* 32:205–217.

Boarman, W.I., R. J. Camp, M. Hagan, W. Deal. 1995. Raven abundance at anthropogenic resources in the western Mojave Desert, California. Report to Edwards Air Force Base, CA. National Biological Service, Riverside, CA.

Boarman, W. I., and B. Heinrich. 1999. Common raven (*Corvus corax*). Account 476 in A. Poole and F. Gill, editors. The birds of North America. The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C., USA. Account 476 in A. Poole and F. Gill, editors. The birds of North America. The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C., USA.

Boarman, W. I., M. A. Patten, R. J. Camp, and S. J. Collis. 2006. Ecology of a population of subsidized predators: common ravens in the central Mojave Desert, California. Journal of Arid Environments 67:248–261.

Bui, T.D. 2009. The effects of nest and brood predation by common ravens (*Corvus corax*) on greater sage-grouse (*Centrocercus urophasianus*) in relation to land use in western Wyoming. M.S. Thesis, University of Washington. 48 pp.

Coates, P.S. 2007. Greater sage-grouse (*Centrocercus urophasianus*) nest predation and incubation behavior. Ph.D. Thesis, Idaho State University, Boise, ID. 191 pp.

Coates, P.S. and D.J. Delehanty. 2004. The effect of raven removal on sage grouse nest success. Proc. 21st Vertebrate Pest Conference (R.M. Timm and W.P. Gorenzel, Eds.) Published by the University of California, Davis. pp12-20.

Coates, P.S., J.W. Connelly, and D.J. Delehanty. 2008. Predators of greater sage-grouse nests identified by video monitoring. Journal of Field Ornithology 79:421-428.

Coates, P.S. and D.J. Delehanty. 2010. Nest predation of greater sage-grouse in relation to microhabitat factors and predators. *Journal of Wildlife Management* 74(2):240-48.

Conover, M.R., J.S. Borgo, R.E. Dritz, J. B. Dinkins and D. K. Dahlgren. 2010. Greater sage-grouse select nest sites to avoid visual predators but not olfactory predators. *The Condor* 112(2):331-336.

Cote, I.M. and W.J. Sutherland. 1997. The effectiveness of removing predators to protect bird populations. *Conservation Biology* 11:395-405.

DeLong, A.K., J.A. Crawford, and D. C. DeLong. 1995. Relationship between vegetational structure and predation of artificial sage grouse nests. *Journal of Wildlife Management* 59:88–92.[3]

Heinrich, B., D. Kaye, T. Knight and K. Schaumburg 1994. Dispersal and Association among Common Raven. *The Condor* 96(2):545-551.

Lockyer, Z. B., P. S. Coates, M. L. Casazza, S. Espinosa, and D. J. Delehanty. 2013. Greater Sage-Grouse nest predators in the Virginia Mountains of northwestern Nevada. *Journal of Fish and Wildlife Management* 4(2):242-254.

Moynahan, B. J., M. S. Lindberg, J. J. Rotella, and J. W. Thomas. 2007. Factors affecting nest survival of greater sage-grouse in northcentral Montana. *Journal of Wildlife Management* 71:1773–1783.

Preston, M.L. 2005. Factors Affecting Winter Roost Dispersal and Daily Behaviour of Common Ravens (*Corvus corax*) in Southwestern Alberta. Northwestern Naturalist, Vol. 86, No. 3 (Winter, 2005), pp. 123-130.

Snyder, N.F.R., R.R. Ramey, and F.C. Sibley. 1986. Nest-site biology of the California condor. *Condor* 88:228–241.

Watters, M.E., T.L. McLash, C.L. Aldridge, and R.M. Brigham. 2002. The effect of vegetation structure on predation of artificial greater sage grouse nests. *Ecoscience* 9:314–319.

Webb, W.C., W.I. Boarman, and J.T. Rotenberry. 2009. Movements of juvenile common ravens in an arid landscape. *Journal of Wildlife Management* 73(1):72-81.

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[3] This study is relevant to the NTT Report but not the COT Report.

B. Additional Studies that Must be Considered

USDA/APHIS/Wildlife Services. 2013. Letter from R.J. Merrell, District Supervisor, SW District Wyoming, USDA/APHIS/WS to Whom it may concern. 2pp.

Wyoming Game and Fish. 2012b. Letter from S. Talbott, Wyoming Game and Fish Director to R. Krischke, Wyoming State Director, USDA/APHIS Wildlife Services. Dated 3 April 2012. 3pp.

VII. Dispersal Ability, Habitat Fragmentation, and Population Persistence

While dispersal ability and population persistence is virtually unrecognized, habitat fragmentation is overstated as a threat.

A. Studies Ignored

Bush, K. 2009. Genetic diversity and paternity analysis of endangered Canadian Greater Sage-Grouse (*Centrocercus urophasianus*). Ph.D. dissertation, University of Alberta, Edmonton, Alberta, Canada.

Bush, K.L., C.L. Aldridge, and J.E. Carpenter, et al. 2010. Birds of a feather do not always lek together: genetic diversity and kinship structure of greater sage-grouse (Centrocercus urophasianus) in Alberta. *The Auk* 127(2):343−353.

Bush, K.L., C.K. Dyte, B.J. Moynahan, C.L. Aldridge, H.S. Sauls, A.M. Battazzo, B.L. Walker, K.E. Doherty, J. Tack, J. Carlson, D. Eslinger, J. Nicholson, M.S. Boyce, D.E. Naugle, C.A. Paszkowski, and D.W. Coltman. 2011. Population structure and genetic diversity of greater sage-grouse (*Centrocercus urophasianus*) in fragmented landscapes at the northern edge of their range. *Conservation Genetics* 12:527–542.

WAFWA. 2008. "Greater Sage-Grouse Population Trends: An Analysis of Lek Count Databases 1965-2007". Unpublished report by the Sage- and Columbian Sharp-tailed Grouse Technical Committee. Cheyenne, Wyoming: Western Association of Fish and Wildlife Agencies.

B. Additional Studies that Must be Considered

Thompson, T.R. 2012. Dispersal ecology of greater sage-grouse in northwestern Colorado: evidence from demographic and genetic methods. Doctoral dissertation, University of Idaho.

Wyoming Game and Fish. 2012a. Wyoming Sage-Grouse Population Trends 1995-2012. Unpublished presentation of analyses by Tom Christiansen, Wyoming Game and Fish, Sage-Grouse Program Coordinator, Cheyene, Wyoming. 14pp.

Zink, R. M. 2014. Comparison of patterns of genetic variation and demographic history in the Greater Sage-Grouse (*Centrocercus urophasianus*): Relevance for conservation. *The Open*

Ornithology Journal. 7:19-29.

VIII. State, Local and Private Land Conservation

The NTT and COT Reports give scant attention to state, local and private land conservation efforts.

A. Studies Ignored

Adler, J.H. 2008. Money or nothing: the adverse environmental consequences of uncompensated land use controls. *Boston College Law Review* 49:301-366.

Adler, J.H. 2011. The Leaky Ark. The American. October 5, 2011. Available at http://www.american.com/archive/2011/october/the-leaky-ark/

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IX. Noise

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Exhibit D: Peer Review and Information Quality Breakdown in an Endangered Species Act Decision: The Case of the Greater Sage Grouse

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16 October 2013

ABSTRACT
This paper discusses issues with the implementation of Information Quality Act guidelines in U.S. Endangered Species Act (ESA) listing decisions. These issues are illustrated by the key scientific paper and peer review processes that figured prominently in the decision to list the greater sage grouse (*Centrocercus urophasianus*) as "warranted" under the ESA as a threatened or endangered species in 13 states and provinces. We examine limitations of the data, errors and bias in the analyses and inferences based upon those analyses, and then explore why and how questionable data and analyses were used as the basis for such a far-reaching decision, even when independent peer review did not support the conclusions. We discuss policy implications and potential policy solutions, and how these checks and balances could reduce opportunities for various types of error and bias in the ESA decision-making process.

INTRODUCTION

The conservation of biodiversity is a worldwide concern, especially the conservation of threatened and endangered species and the habitats they depend upon. In the United States the protection of species threatened with potential extinction is provided by the Endangered Species Act (ESA) of 1973. The Act requires that the U.S. Fish and Wildlife Service (USFWS) make decisions to list species as threatened or endangered, *"solely on the basis of the best scientific and commercial data available"*. The USFWS must determine whether a species, subspecies, or distinct population is likely to become threatened or in danger of extinction (endangered) in the reasonably foreseeable future, throughout all or a significant portion of its range. In making such decisions (and those that follow to aid the recovery of species), the USFWS is afforded substantial judicial deference in interpreting what constitutes best available scientific and commercial data, sometimes refered to as *best available science* (Hickey 2009). Although the ESA refers to *data*, the USFWS actually relies on published and unpublished studies, and professional opinion, rather than the underlying *data*. The USFWS assures the quality of the information which is used for its decisions by relying on the Information Quality Act (IQA), the bulletin (OMB 1999, 2002) implenting IQA, and the Department of Interior's Scientific Integrity policies (DOI 2011).

For many rare or declining species, there are only limited data available, and those data may be incomplete or inadequate for the purposes of assessing population numbers and trends. The problem is particularly acute in species that are not of commercial value. For example, data may have been collected over many years for other purposes and now applied to answer questions that were not originally anticipated. Or, the agencies monitoring the species may have been reluctant to change and adopt superior methods of data collection. Therefore, listing decisions and recovery actions may be made on the basis of limited or sub-optimal data, which can hinder the types of discriminating analyses and the inferences that can be drawn from them.

In other cases, underlying data used in studies may not be made public because agencies or researchers have witheld access to them. This may be because agencies or researchers consider the data proprietary, or they may not want to reveal the locations of endangered species. In either case, when data are not made public, it prevents independent reanalysis and review (Fischman and Meretsky 2001).

In this paper we explore these issues by examining the highly influential scientific paper by Garton et al. (2011), that figured prominently in the decision to list the greater sage grouse as "warranted but precluded" for threatened or endangered status under the ESA (USFWS 2010). We examine limitations of the data used by Garton et al. (2011), the analyses, inferences based upon those analyses, and then explore why and how such an important decision as an ESA listing could have been based on such questionable analyses of questionable data. This is of particular concern given that there was considerable independent peer review that did not support the conclusions of that analysis. We also discuss potential policy solutions to these shortcomings, and how these

checks and balances could benefit the conservation of species by reducing opportunities for various types of error in the research and decision making process.

SHORTCOMINGS OF THE APPLIED METHODOLOGY

The species in question, the greater sage grouse, is a large ground-nesting bird dependent upon sagebrush habitat in western North America. Each spring, sage grouse congregate at traditional sites (leks) where the males display in order to attract and mate with females. Thirteen states and provinces began counting the number of adult male sage grouse at prominent leks in the 1940's and 1950's as a potentially useful index of population size. Initially, male counts were made at a few large and easily located leks. Then, from 1965 to 2001, the number of counted leks increased approximately ten-fold. The data collection, however, continued to be a non-random sample of leks, but included no information on the number of leks that were not included in these counts.
Concern and repeated litigation over the status of sage grouse, and a desire to quantitatively estimate population sizes and trends, has motivated three different research groups to conduct analyses of male lek count data (Connelly et al. 2004; WAFWA 2008; Garton et al. 2011). The most recent and most ambitious of these studies, Garton et al. (2011), used 42 years of male lek count data (from 1965-2007) to estimate population trends, reconstruct estimates of past population sizes, and forecast population sizes and probabilities of persistence 30 and 100 years into the future, to 2037 and 2107 respectively.

The male lek count data used by Garton et al. (2011) and previous authors were collected by different states and provinces - some of which used different methods - and by many different individuals at thousands of locations. Data from different states and provinces were combined for analysis in Sage Grouse Management Zones (SMZs) and metapopulations. The authors claim that they carefully examined all data prior to analysis to ensure that they were obtained following appropriate procedures, but the authors also acknowledged that they *"had to assume that the data were collected properly."* However, the number of cases where this assumption had to be made was not reported, nor did they report the number of leks that were deleted from the raw data.

After filtering the data, the analytical approach had multiple procedures:

(a) Male lek count data were used to develop annual estimates of the rate of change from the previous year to the present year for each lek with successive counts, and these were then averaged across each population.

(b) The reciprocal of those estimates was then used to back-calculate (reconstruct) breeding population sizes prior to 2007 (the terminal year in which the largest number of leks was counted). This effectively estimated how many male sage-grouse would have been counted in earlier years, if the maximum number of leks counted had been counted every year. A formula for estimating the compounding error of such a

procedure was applied to their reconstructed population data and 90 percent confidence intervals (CI) were reported.

(c) The reconstructed population sizes were then used to find "best fit" stochastic population models by considering 26 exponential and density-dependent growth models with varying numbers of parameters (including year, two time periods (1969-1987 and 1988-2007), and time lags). Model selection procedures were employed to evaluate models relative to each other. Additionally, the data were grouped in 5-year blocks, using averages and associated statistics for each block.

(d) The models developed in (c) were used for 30 and 100-year population forecasts as part of a population viability analysis (PVA). Extinction predictions were based on the proportion of replicate trajectories where the estimated effective population (N_e) sizes fell below 50 or 500, in which case populations were deemed "quasi-extinct."

Garton et al. (2011) reported that 44% of their models indicated declining carrying capacity through time, ranging from -1.8% to -11.6%. In other words, their results found that 56% of populations were stable, increasing, or had no significant trend. Also, 18% of the models incorporated lower carrying capacities from 1987 – 2007, compared to 1967-1987. Again, this could also be viewed as 72% of populations being stable, increasing, or having no significant trend. They also reported that 13% (3) of 24 populations for which they had sufficient data, had a high likelihood of declining below $N_e = 50$, and 54% (13) had a likelihood of declining below $N_e = 500$ within 30 years. On a 100-year time horizon, 75% of the populations and 29% of the SMZs were projected to decline below effective population sizes of 500. For 2007 they estimated a minimum of 88,816 male grouse. They assumed a ratio of 2.5 adult females per lekking male, yielding a minimum population estimate of 310,856 adult sage grouse. This number contrasts with an estimated population size of approximately 535,542 sage grouse, based on estimates provided by states and provinces (USFWS 2010).

The authors acknowledged the inherent inaccuracy of lek counts and several limitations of the data for inferring population abundance and trends, and conceded that they made no attempt to estimate true population abundance using leks counts. Yet, despite this caveat, Garton et al. (2011) subsequently used lek count data to create an index of historical abundance, population reconstructions, and probability of extinction forecasts for 30 and 100-year time horizons. They concluded by proposing that: *"these forecasts will be useful in guiding decisions concerning the future of sage-grouse and the sagebrush communities upon which they depend."*

Data limitations in the conservation of endangered species can lead to a policy dilemma analogous to the challenge of minimizing Type I and Type II statistical errors. Type I error occurs when conservation actions are based on an erroneous or exaggerated conclusion that a biologically meaningful and statistically valid risk threatens a species. Type II error may occur if conservation actions are *not* taken, based on the mistaken belief that little or no biologically meaningful and statistically valid risk threatens a species, when one actually does. Minimizing both types of error can be difficult, because

attempts to minimize one type of error can increase the probability of the other type of error.

In practice, the situation is more complex than this simple dichotomy for two reasons. First, Type I and II error scenarios assume that the basic data are sound, a condition that can be difficult to meet with endangered species. Because scientific uncertainty is anathema to government, scientists are encouraged to fill these information gaps as best they can with new analyses of existing data, or new data and analyses. Second, when one type of error is viewed as having more serious consequences than the other, the standard of proof becomes asymmetrical (MacCoun 1998). For the USFWS, one of the consequences of a decision that might result in a species decline (or extinction) is the threat of costly lawsuits brought by environmental groups. And once listed, the USFWS and other agencies have an additional consequence to consider: in 1978 the U.S. Supreme Court interpreted language of the ESA to conclude that *"the value of endangered species is incalculable"* and that a listed species must be protected *"whatever the cost."* Such interpretations naturally lead to a precautionary approach and to increased potential for Type I error in listing decisions. Other errors, including errors of omission, selective interpretation, or confirmation bias (Nickerson 1998; Robertson 2009), may also contribute to either Type I or II error.

Known issues with lek count data

Numerous published papers have pointed out *why* male lek count data are unreliable and inappropriate for inferring population abundance and trends. These include: Jenni and Hartzler (1978), Emmons and Braun (1984), Walsh et al. (2004), Connelly and Schroeder (2007), Garton (2007), and Western Association of Fish and Wildlife Agencies (2008). There were also six publicly available peer reviews commissioned by the Colorado Division of Wildlife that specifically pointed out methodological issues with Garton et al. (2011). These include Conroy (2009), Noon (2009), Runge (2009), and three anonymous peer reviews (CDOW 2009). (Note: The version of Garton et al. that was reviewed in 2009 by Conroy, Noon, and Runge was the peer reviewed and accepted version that the USFWS relied upon in making its ESA listing decision in 2010 (Garton et al. 2009). The 2011 version of Garton et al. that we discuss here is virtually identical to the 2009 version, with just minor edits to text.)

Briefly, the issues identified by the authors and reviewers listed above include:

1) No demonstrated correspondence between male lek counts and actual population number or trends.
2) Data collection procedures were not standardized among states and sometimes varied within states over time.
3) Personnel monitoring leks and individual differences in methods and detection ability change over time, leading to *observer bias*.
4) Data sets from multiple states and provinces (i.e. data from two to six states) were combined for analysis of SMZs. (This problem is exacerbated by the fact

that some states supplied data summaries while others provided raw lek count data.)

5) Data were not randomly collected by any state or province, and there are an unknown number of unsampled leks in each population. Therefore, it is impossible to know the extent to which sampling effort is representative of the distribution of sage grouse within populations or SMZs. This also affects the definition of dispersal distances which, in turn, are used to determine whether populations are isolated.
6) Only males were counted; there is no accounting for the number of females or juveniles in the populations sampled, their sightability, nor how these differ across different sagebrush habitats or decades.
7) The number of grouse counted at a lek depends upon the spatial definition of a lek: a more inclusive definition includes nearby satellite leks and results in a higher count, while a more restrictive definition results in more leks with fewer birds counted in each lek. Previous authors provided quantitative criteria for what constituted a lek. Connelly et al. (2004) considered all males within 2.5km of a lek to be part of that lek, while the Western Association of Fish and Wildlife Agencies (2008) used 0.5km as a cut-off. Garton et al. (2011) did not specify any cut-off distance.
8) A disregard for estimating the number of unknown leks makes it is impossible to use male lek count data to estimate population number or trends.
9) A lek is not reported in databases until two or more male grouse are found using it. Consequently, counts at a lek start with a positive number and any lek that has become inactive or merged with another lek is followed by zero counts. This leads to negatively-biased trends.
10) The assumption that lek-attendance rates of adult male greater sage-grouse are high and constant is not supported by the data.
11) The number of sage grouse leks being counted has increased over time, but the non-random sampling of leks has not yet changed.
12) Small sample sizes and variation in sample sizes across years at each lek increases the statistical unreliability of reconstructed population estimates.

The low resolution of population reconstructions

Plots of population reconstructions and their 90% confidence intervals in the study by Garton et al. (2011) are so wide that no trend can be supported at that confidence level for many populations. (At 95%, the confidence intervals would be so wide that there would be nothing to discuss about the results.) The following illustrates the magnitude of the problem: First, the 90% CI for the Dakotas (Figure 2 in Garton et al. 2011): about 950 male sage grouse were estimated for 2005, but the 90% CI for 1968 was 400 - 9,250, thus a trend ranging between a 90% decrease and a 150% increase over that time period. Second, the east-central Idaho population, with only two leks counted in 1965-1969 and four leks in 2000-2007, had 90% CIs between zero and no upper limit across all years. Yet despite the enormous uncertainty surrounding these and other population reconstructions, Garton et al. (2011) were willing to make several remarkably *precise*

predictions about the future of some populations. For example, they stated that the Powder River Basin, Wyoming population *"will fluctuate around carrying capacity which will decline from 3,042 males attending leks in 2007, to only 312 males attending leks in 2037, to going extinct with only two males attending leks in 2107 if this trend continues at the same rate in the future."* That population had a 90% CI of 0 - 180,000 in 1968, 5,000 - 40,000 in 1987, and an estimate of about 8,000 in 2007.

Lack of accounting for error in population growth models and negative trend bias

It is important to recognize that the population growth models in Garton et al. (2011) were not fitted to observed lek count data but instead to *reconstructed population estimates*. These were calculated in such a way that the input and output variables share data, and therefore cannot be considered independent (i.e. the population reconstruction method depends upon quantities that appear on both the "prediction" and "predictor" side of the equation). One reviewer (Conroy 2009) reported that this resulted in "built in patterns" in the reconstructed population estimates, which in turn affected the population growth models and led to erroneous inferences. Similarly, one of the anonymous CDOW reviewers reported a negative trend bias when Garton et al's (2011) method was applied to simulated input data that deliberately had *no* trend. That reviewer reported that 34-40% of the simulated populations produced a statistically significant negative trend using Garton et al.'s (2011) methods. These reviewers also pointed out that sampling variation and statistical uncertainty from reconstructed population estimates were not carried over by Garton et al. (2011) into subsequent models of population growth and persistence.

These assessments are supported by results in Appendix 1 of Garton et al. (2011) where they list results for best models of their reconstructed population data: the 26 adjusted r^2 values range from 0 to 0.682, the highest of which is for a population with data for only 1996-2007, and the next closest value was 0.498, and average r^2 was only 0.257. This indicates that the models, on average, did not explain 75% of the variation in the data sets (i.e. low resolution).

The low statistical resolution of the reconstructed populations for which the models were developed suggests that a great deal of error accompanies the PVA forward projections. Similar to the issues with estimating population reconstructions in reverse time, errors will compound and grow exponentially. Garton et al. (2011) discuss this potential, but ultimately emphasize the literature that better supports their analyses. In reality, given the poor resolution of the reconstructed population data base and the growth models based upon it, the PVA projections incorporate a great deal of compounded error that renders projections at even 30 years meaningless. This leaves almost no clearly useful analytical results in what Garton et al. (2011) produced.

Mathematical error(s)

Garton et al's (2011) use of 20 males and 2.5 times that number of females to achieve an N_e of 50, is in error and should result in an N_e of 57.14 (using Wright's 1938 equation). Instead, only 17.5 breeding males would be needed for an N_e of 50 (assuming a ratio of 2.5 females per lekking male). Likewise, 175 males rather than 200 would be required for an N_e of 500. In other words, extinction risk was overestimated across all populations by setting the minimum number of breeding males *higher* than necessary for maintaining an N_e of 50 or 500. Although these differences may seem slight, they do establish different thresholds for generating extinction probabilities across all populations. (This was not a result of the formula error noted below.)

Garton et al. (2011) presented an incorrect equation for estimating effective population size: $N_e=1/((1/Nm) + (1/Nf))$, where Nm is number of breeding males and Nf is the number of breeding females in a population. The correct equation, from Wright (1938) is: $N_e=4NmNf/(Nm+Nf)$. The two equations would have been mathematically equivalent if Garton et al. (2011) had used a four instead of a one in the numerator. It is unknown whether this mistake carried over into the population viability analysis (in which case it would have overestimated extinction risk), or whether it was a typographical error in their paper. This question cannot be answered because the code and data used to perform the analysis are not publicly available.

Reliance on the 50/500 rule of thumb: an obsolete concept

The basic concept underlying minimum viable population size (MVP) and population viability analysis is that there must be some "minimum conditions for the long term persistence and adaptation of a species or population" (Soule 1987). An effective population size (N_e) of 50 was suggested as the minimum in the short term to limit the loss of heterozygosity through genetic drift and potential resultant inbreeding depression that could lead to a risk of population extinction (Soule 1980). An N_e of 500 was proposed as the minimum necessary to maintain the long-term adaptive potential of a population (Franklin 1980) based on a handful of studies of quantitative genetic variation in highly inbred lines of mice, maize and *Drosophila* (summarized by Lande 1976). None of those studies actually compared extinction risk with genetic variation or N_e.

Although the 50/500 rule of thumb is widely cited, field data, laboratory studies, and theory show that this rule of thumb is not a reliable predictor of extinction. Successful populations have been founded by few individuals, and populations with a much lower N_e than 50 have persisted long past when they should have gone extinct under the 50/500 rule of thumb (Krausman et al. 1993, 1996; Goodson 1994; Luikhart and Cornuet 1997; Wehausen 1999; Ramey et al. 2000; Frankham 2005). Criticism of the 50/500 rule of thumb was succinctly summarized by Boyce (1997): *"Unfortunately, the 50/500 rule does not have a sound genetic or demographic basis. And there is no theoretical or empirical justification for basing MVP on an estimate of N_e… until such evidence becomes available, reliance on rules of thumb, such as the 50/500 rule is arbitrary and capricious."*

In practical terms, the predictions of future sage grouse population sizes by Garton et al. (2011) are not falsifiable because they are simply probability statements about what might happen if environmental conditions are unchanged. While long-range predictions based on models are potentially useful heuristic tools, they are also notoriously inaccurate and can be easily over-applied (Pielke, Jr. and Conant 2003). Their lack of potential falsifiability effectively places decisions based upon them outside the realm of science.

Hunting mortality: an error of omission in model development

Garton et al. (2011) ignored the effects of sport hunting in their models, although it is the largest documented source of sage grouse mortality: 207,433 sage grouse harvested in the U.S. during 2001-2007 (Reese and Connelly 2011). We find it curious that Garton et al. (2011) ignored hunting mortality, while suggesting that other human activities must have reduced carrying capacity, specifically: expansion of cheatgrass and conifer woodlands, increased fire frequency, energy development, and spread of West Nile Virus.

If one accepts population estimates (88,816 male grouse in 2007 or a total population size of 310,856), then hunters removed 28,180 sage grouse or approximately 9 percent of the species in 2007 alone. In four of the six pervious years, the take was even higher (up to 37,607 in 2006). These numbers do not include the number of grouse that were wounded and not recovered by hunters.

Regionally, the estimated percentage of sage grouse hunted may have been even higher in some years. For example, in 1992 an estimated 34,388 sage grouse were harvested by sport-hunters in Wyoming (Reese and Connelly 2011). Using the upper and lower 90% CI values of the estimated number of males in the Wyoming Basin SMZ and Powder River population in 2007 (and 2.5 adult females per male counted at leks), hunting loss would have amounted to 12 - 29% of the estimated adult population. This is the same SMZ where Garton et al. (2011) estimate a rate of decline between 3.4% and 10.5% annually. With this level of hunting mortality occurring annually, we question the assumption that there is no (additive) demographic effect (Gibson et al. 2011). The difficulty in establishing a link is in part due to the fact that sage grouse lek counts, the basis of hunting harvest, are not a reliable indicator of population number or trends (see discussion above). Clearly, more refined data and methods are needed to address this question.

DISCUSSION

Once a ESA listing is final, compliance is a costly endeavor. Compliance with regulations associated with listings usually involve a substantial allocation of conservation resources in order to be effective (Government Accountability Office 2006; Ferraro et al. 2007). Compliance can lead to secondary costs to local communities and regional economies (Wanger 2010), and is imposed with no regard to cost based on the

Supreme Court's admonishment that ESA listed species must be protected *"whatever the cost*" (*TVA v. HILL, 437 U.S. 153 (1978)).*

Independent and detail-oriented peer reviews are important for prudent decision makers. Equally important is the availability of data and methods used to ensure the replicability of results and allow identification of errors, methodological biases, and potential for falsification of hypothesized population trends (Fischman and Meretsky 2001). This is recognized and required by IQA Guidelines issued by federal agencies. However, in the case of the greater sage grouse, the failure was not of the guidelines themselves, but of the agencies' failure to apply them.

In the case of the sage grouse decision, the question is: what were the checks and balances in the ESA listing process, and why did these fail to detect and filter out a study with numerous limitations, errors, and unfalsifiable predictions? We argue that the reason is largely due to reliance on an ineffective peer review process and acceptance of "scientific" information that has not been sufficiently scrutinized (e.g. due to data being withheld or reliance on population predictions with unreasonable margins of error).

Peer Review

Science is a human activity, therefore errors can and do occur, and peer review exists as a filter on information quality. However, there is no guarantee that papers being peer reviewed will be examined in depth, results replicated, or reviewer comments fully addressed and made public. Unless peer reviewers are provided the original data along with sufficient time and resources to adequately investigate the analyses, the reviewers are forced to assume that the data are sound.

Currently, the USFWS does not require that the data used in research that it cites be made publicly available, nor do they actively engage in or encourage replication of results in peer review. Since 2002 however, IQA guidelines set a higher standard for federal agencies, including the USFWS. They require that studies be reproducible and provide a rebuttable presumption that peer-review of the studies was adequate (OMB 2002). Additionally, the U.S. Department of Interior's information quality guidelines (US-DOI 2002) require that reproducibility *"shall generally require sufficient transparency about data and methods that an independent reanalysis could be undertaken by a qualified member of the public."* And USFWS (2007) guidelines state that, *"higher levels of scrutiny are applied to influential scientific, financial or statistical information, which must adhere to a higher standard of quality."* It is apparent that these requirements were not applied to their full extent by the USFWS in its consideration of Garton et al. (2011) because the raw data were unavailable, and valid criticisms of the data and methods made by reviewers outside of the production of this monograph series were clearly ignored by both the editors of the volume and the USFWS in its decision. This raises questions about the efficacy of the peer review process in the production of this highly influential paper, and with the peer review of the USFWS decision that cited the paper 62 times.

It also raises issues with the efficacy of the peer review of the recent USFWS and State-sponsored Conservation Objectives Team Report (COT 2013), which cited Garton et al. (2011) 61 times and based their population threats analyses, population definitions, current and projected numbers of males in each population, and probability of population persistence on Garton et al. (2011).

As long-time students of the ESA and peer reviewers of USFWS recovery plans and proposed rules, it has been our experience that peer reviewer and public comments on proposed rules are typically combined into broad categories, paraphrased, and summarized by the USFWS. Responses are then prepared to these summaries. Many valid criticisms and details are potentially lost in this process, diminishing the value of reviews and public comments. For example, valid issues raised in outside peer reviewer comments of Garton et al. (2011) were only discussed in a brief paragraph in the USFWS's "warranted but precluded" decision (USFWS 2010):

> *"We received these reviews and have reviewed them in the context of all other data we received in preparation of this finding. Their primary concern was about the applicability of analyzing and presenting future population projections in the manner done by Garton et al. (in press), based on the limitations of the data, the assumptions required, and uncertainty in the estimates of the model parameters. Garton et al. (in press) acknowledged these concerns, as several of the reviewers pointed out, and their analyses underwent peer review via the normal scientific process prior to acceptance for publication."*

The last sentence of this summary also illustrates a key false assumption in the ESA decision-making process: that the *"normal scientific peer review process"* leading to publication is automatically a good filter on information quality. Empirical evidence and the collective experiences of many authors renders this assumption disputable (Mahoney 1977; Roy and Ashburn 2001; Hilborn 2006; McCook 2006; Sandström and Hällsten 2008; Casadevall and Fang 2009; Fang et al. 2012; and Ramey 2012). While traditional peer review is a useful tool, it is clearly an imperfect tool and applied with great variation. As a result, proposals have come forth on how to improve its effectiveness or adopt innovative alternatives (Weicher 2008; Suls and Martin 2009).

Despite variation in how peer-review is conducted, there are at least two well-justified standards that distinguish a rigorous peer-review process from a less than rigorous one. One is: required preparation of a detailed response to each of the peer review criticisms, and discussion of why the criticisms might not be considered valid and should be ignored. While the extent to which this occurred in production of the *Studies in Avian Biology* monograph (of which Garton et al. 2011 is one of 25 chapters) is unknown because reviews were confidential (itself a violation of the Information Quality Guidelines), the USFWS's response to outside peer reviewer's criticisms (see previous paragraph) is illustrative of a process that deviates from this standard.

The second standard is: the role of editorship and authorship need to be independent so that editors are not in a position to review and approve articles that they have authored. In

the case of Garton et al. (2011), one of the authors, J. Connelly, was also one of the two editors of the monograph that Garton et al. (2011) was published in. (Both editors were authors on multiple papers in this monograph.)

There is the need for greater accountability and a more comprehensive review process for highly influential scientific papers used in ESA listing decisions (and of the listing decisions themselves). However, it is questionable whether an additional round of peer review or the convening of expert panels would be adequate. An extensive social psychology literature points to the reasons *why*: even with intentions of neutrality, traditional peer review and expert panels may be unable to uncover the whole truth because of inherent cognitive and motivational mechanisms that contribute unintentionally to bias (e.g. strategy-based errors, confirmation bias, or majority amplification; see MacCoun 1998 for an extensive review).

Better access to data

In an ideal world, all of the data used to develop a highly influential scientific paper would be publicly available to allow for independent replication and ensure the potential for falsifiability. Therefore, it is worth asking: why is this not the case with Garton et al. (2011) and many similar, highly influential papers, especially given that *"The* [sage grouse] *monograph is recognized by the USFWS and the Court as the primary source of science for the new review and listing determination."* (USGS 2009b).

Until such time that underlying data of highly influential studies used in ESA decisions are mandated to be publicly available, few options exist to gain access to these data. While the option to obtain data under FOIA from federal agencies is available, and has been used for replication and publication of analyses (e.g. Turner et al. 2004, 2006), federal agencies must possess the data if they are to be obtained under FOIA. However, the little known OMB Circular A-110 provides a second option for public access to data under FOIA when studies are federally grant-funded (OMB 1999):

> *"(d) (1) In addition, in response to a Freedom of Information Act (FOIA) request for research data relating to published research findings produced under an award that were used by the Federal Government in developing an agency action that has the force and effect of law, the Federal awarding agency shall request, and the recipient shall provide, within a reasonable time, the research data so that they can be made available to the public through the procedures established under the FOIA."*

Procedures are well established, as some agencies (such as the National Institute of Health) are familiar with the responsibilities of granting agencies and awardees. To our knowledge, no data requests under A-110 have yet been submitted to the USFWS.

A third potential remedy exists in the form of "requests for correction" under the IQA. This administrative procedure only allows for suggested corrections to the record and does not provide legal remedy should an agency fail to correct or provide information.

The remedy of last resort, costly and time consuming for all involved, but comprehensive in its potential depth, is the power of subpoena.

From our viewpoint, these remedies should not be necessary. It is in the best interests of biodiversity conservation, responsible agencies, and researchers, to provide ready access to data used in scientific papers and key decisions, either online or in publicly accessible archives.

CONCLUSIONS

It is our view that a scientifically critical review of the study by Garton et al. (2011) on greater sage grouse would have concluded that there was no scientific basis for a "warranted" decision (for a ESA threatened listing) because of fundamental problems with the available data as well as with the analyses. Instead, the decision should have called for development of better data collection, with the goal of revisiting the issue in 5 years, when the relationship of lek counts to actual population data might be better understood, or a probability-based census method implemented. This would have minimized Type I error without increasing Type II error.

We acknowledge that multiple studies have presented documentation of the loss of sagebrush in the western U.S. and Canada (i.e. Miller and Rose 1999; Schroeder et al. 2004), however, the extent to which this loss of habitat translates into loss of sage grouse, is not certain. Therefore, the policy-relevant questions about sage grouse should be: 1) are populations in decline; 2) if so, where; 3) why has it occurred; and 4) what can be done to insure the stability of these populations? In order to address these questions, reliable data on population numbers and trends are needed. Those data are currently lacking.

To their credit, Garton et al. (2011) called for establishment of range-wide, standardized methodologies based on probability sampling of leks, breeding males, and females, that would allow for more meaningful population analyses in the future (e.g. sentinel-lek and dual-frame sampling methods). Walsh et al. (2010) have recently proposed the application of mark–resight methods to estimate population size in sage grouse and other lekking species.

From our assessment, the data collected for more than 50 years by thirteen states and provinces are inadequate to answer the above questions regardless of the analysis applied. Repeated calls to reform this weak and outdated methodology, whose limitations have been clearly documented here and elsewhere, have not yet moved agencies into reforming their "business as usual" approach to counting male sage grouse on leks each spring. This puts the overall management of this species on a shaky database and will continue to hinder effective management until more biologically relevant and statistically defensible census methods are adopted.

The issues and potential solutions identified here also apply to the ESA listing of species outside of the U.S. (an increasing trend) and more broadly to endangered species laws of other nations (e.g. Australia's Environment Protection and Biodiversity Conservation Act of 1999, Canada's Species at Risk Act of 2002, and South Africa's National Environmental Management: Biodiversity Act of 2004), as well as international treaties (e.g. the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) of 1973). Failure to implement changes will result in falure to adequately protect species that are truly at risk of extinction.

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BEFORE THE UNITED STATES DEPARTMENT OF THE INTERIOR,
U.S. FISH AND WILDLIFE SERVICE DATA QUALITY OFFICIAL

GARFIELD COUNTY, COLORADO	)	**Data Quality Act Challenge**
GRAND COUNTY, COLORADO	)	**to U.S. Department of the Interior**
JACKSON COUNTY, COLORADO	)	**Dissemination of Information**
MESA COUNTY, COLORADO	)	**Presented in the U.S. Fish and**
MOFFAT COUNTY, COLORADO	)	**Wildlife Service Conservation**
RIO BLANCO COUNTY, COLORADO	)	**Objectives Team Report**
CARTER COUNTY, MONTANA	)	
FALLON COUNTY, MONTANA	)	
FERGUS COUNTY, , MONTANA	)	
MCCONE COUNTY, MONTANA	)	
MUSSELSHELL COUNTY, MONTANA	)	
PHILLIPS COUNTY, MONTANA	)	
PRAIRIE COUNTY, MONTANA	)	
RICHLAND COUNTY, MONTANA	)	
TOOLE COUNTY, MONTANA	)	
YELLOWSTONE COUNTY, MONTANA	)	March 18, 2015
ELKO COUNTY, NEVADA	)	
EUREKA COUNTY, NEVADA	)	
UINTAH COUNTY, UTAH	)	
WESTERN ENERGY ALLIANCE	)	
AMERICAN EXPLORATION & MINING	)	
ASSOCIATION	)	
COLORADO MINING ASSOCIATION	)	
COLORADO WOOL GROWERS ASSOCIATION	)	
INDEPENDENT PETROLEUM ASSOCIATION	)	
OF AMERICA	)	
INTERNATIONAL ASSOCIATION OF	)	
DRILLING CONTRACTORS	)	
MONTANA ASSOCIATION OF OIL, GAS &	)	
COAL COUNTIES	)	
MONTANA PETROLEUM ASSOCIATION	)	
NEVADA MINING ASSOCIATION	)	
PETROLEUM ASSOCIATION OF WYOMING	)	
PUBLIC LANDS COUNCIL	)	
UTAH MULTIPLE USE COALITION	)	

Petitioners

v.

U.S. FISH AND WILDLIFE SERVICE

AN AGENCY OF THE U.S. DEPARTMENT OF THE INTERIOR

CHALLENGE PURSUANT TO THE DATA QUALITY ACT

Correspondence Control Unit
Attention: Information Quality Correction
Request Processing
U.S. Fish and Wildlife Service
1849 C Street, NW, Mail Stop 3331-MIB
Washington, D.C. 20240

Dan Ashe
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I. Introduction

The counties and organizations listed above (the "Petitioners") hereby submit this Challenge for Correction of Information ("Challenge") against the U.S. Fish and Wildlife Service ("FWS") entitled "Greater Sage-grouse (*Centrocercus urophasianus*) Conservation Objectives Team Final Report (February 2013) (the "COT Report") pursuant to the Federal Information Quality Act, (44 U.S.C. § 3516) ("Data Quality Act" or "DQA") and the "Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information disseminated by Federal Agencies" issued by the Office of Management and Budget (67 Fed. Reg. 8452 (Feb. 22, 2002) ("OMB Guidelines")), as well as the "Information Quality Guidelines" of the U.S. Department of the Interior (67 Fed. Reg. 50687 (Aug. 5, 2002) ("DOI Guidelines")) and FWS Guidelines ("FWS Guidelines")[1] collectively known as (the "Guidelines") as well as presidential memoranda and secretarial orders on scientific integrity and transparency as discussed below.

In March of 2010, FWS issued a listing decision on greater sage-grouse ("GRSG") under the Endangered Species Act ("ESA").[2] FWS cited an alleged inadequacy of existing regulatory

[1] Available at: http://www.fws.gov/informationquality/topics/InformationQualityGuidelinesrevised6_6_12.pdf
[2] 75 Fed. Reg. 13910 (Mar. 23, 2010).

mechanisms in concluding listing was warranted but precluded by higher priorities (the "WBP Decision").[3] Pursuant to a settlement agreement with activist litigants, FWS agreed to consider listing the species under the ESA by September 30, 2015. The settlement agreement is presently being challenged by at least one of the aforementioned Petitioners.

The COT Report was prepared by five representatives from FWS and ten from State agencies in a collaborative effort to develop range-wide conservation objectives for GRSG and to inform and influence FWS in its upcoming listing decision. The COT Report is a one hundred thirteen (113) page document with conclusions on wildlife ecology, wildlife science, conservation biology, GRSG biology, and GRSG population dynamics.[4] There was no opportunity for public review or comment on this highly influential document prior to its release.

In the meantime, BLM and the U.S. Forest Service ("USFS") drafted amendments for some 98 land use plans ("Land Use Plan Amendments") across 11 western states to identify and incorporate appropriate GRSG conservation measures from the COT Report and BLM's National Technical Team ("NTT") Report.[5] BLM and USFS intend to make final decisions on these plans in 2015 so that regulatory mechanisms are included before FWS makes a listing decision.

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[3] Dept. of the Interior, Bureau of Land Management, *Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement*, p. xxi (August 2013) ("NW CO DEIS").

[4] Dan Ashe, The Fish and Wildlife Service, http://www.fws.gov/mountain-prairie/species/birds/sagegrouse/COT/COT-Report-with-Dear-Interested-Reader-Letter.pdf, at 1-2, (published March 22, 2013).

[5] BLM, *Federal Agencies Announce Initial Step to Incorporate Greater Sage-Grouse Conservation Measures into Land Management Plans* (Dec. 8, 2011), http://www.blm.gov/wo/st/en/info/newsroom/2011/december/NR_12_08_2011.html; BLM, *Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement* at xxvi, and 5-6 (August 2013), https://www.blm.gov/epl-front-office/projects/lup/36511/44083/47449/Draft_Grouse_EIS_Build_1.pdf ("The COT Report includes areas identified as priority areas for conservation, the most important areas needed for maintaining GRSG representation, redundancy, and resilience across the landscape.").

While the COT Report's stated purpose is to, "to define the degree to which threats need to be reduced or ameliorated to conserve GRSG so that it is no longer in danger of extinction or likely to become in danger of extinction in the foreseeable future,"[6] it lacks the scientific quality, integrity, objectivity and utility required by the DQA, the Guidelines and the additional authority cited herein. The COT Report description of "science" makes no mention of hypothesis testing or potential falsification. Accordingly, it runs counter to the DOI Manual on Scientific Integrity as well as the DQA and its Guidelines. The DOI Manual defines the scientific method as, "[A] method of research in which a problem is identified, relevant data are gathered, a hypothesis is formulated from these data, and the hypothesis is empirically tested in a manner specified by documented protocals and procedures."[7] The fact that the COT members started with preferred conservation measures, and then sought to justify them, reveals that it misused the scientific method in order to reverse-engineer their recommendations.

The COT Report acknowledges uncertainty nearly 100 times in the document. It concedes there is a shortage of established research, credible conservation results and a lack of clear patterns with regard to GRSG. Population numbers, habitat, range, threats and viability are all acknowledged uncertainties. Despite those obvious and admitted shortcomings, FWS persists with presenting the COT Report as the best science available and the "gold standard" by which all GRSG conservation measures should be measured. As demonstrated in this Challenge, that is not the case.

FWS Director Ashe recognized the importance of the document and its shortcomings in his March 22, 2013, letter accompanying the public release of the COT Report.[8] According to

[6] COT Report at 5.
[7] 305 DM 3.5(N).
[8] *Id*.

Director Ashe, the COT Report acknowledges the uncertainty associated with issuing such a report, but aims to "stimulate discussions" regarding the GRSG and planning efforts.[9]

The DQA, Section 515 of the Treasury and General Government Appropriations Act of FY 2001 (Public Law 106-554), requires Federal agencies to ensure and maximize the quality, objectivity, utility, and integrity of information, including statistical information, disseminated by Federal agencies on or after October 1, 2002. Agencies are required to review the quality of information before its dissemination and treat information quality as integral to every step.

The OMB government-wide guidelines impose three core responsibilities on the agencies:

- First, the agencies must embrace a basic standard of "quality" as a performance goal, and agencies must incorporate quality into their information dissemination practices. OMB's guidelines explain that "quality" encompasses "utility" (usefulness to its intended users), "integrity" (security), and "objectivity." "Objectivity" focuses on whether the disseminated information is accurate, reliable, and unbiased as a matter of presentation and substance.

- Second, the agencies must develop information quality assurance procedures that are applied before information is disseminated.

- Third, the OMB government-wide guidelines require that each agency develop an administrative mechanism whereby affected parties can request that agencies correct poor quality information that has been or is being disseminated. If one is dissatisfied with the initial agency response to a correction request he or she may file an administrative appeal.

The COT Report qualifies as information disseminated by FWS, or in the alternative, as FWS-sponsored information.[10] "The intent of the COT was to produce a report that not only informs FWS' listing determinations, but also outlines the necessary conservation actions to ensure the long-term persistence of healthy populations of the sage-grouse for the foreseeable

[9] *Id*.
[10] FWS Guidelines II-2; III-1 and III-2.

future."[11] Because DOI agencies are considering Land Use Plan Amendments based upon the COT Report, and it may be utilized in a listing decision for GRSG under the ESA, the COT Report is "highly influential" information subject to even higher standards of quality.[12] The COT Report is not subject to any exclusion from the DQA nor from the Guidelines.[13]

Petitioners have identified a number of serious flaws with the COT Report that, if implemented, will have enormous social and economic consequences in the West without commensurate benefits to local GRSG populations and habitat. While FWS characterizes the Report as "guidance only," its recommendations are being incorporated into Land Use Plan Amendments that will affect nearly 60 million acres of public land in the West.[14]

FWS must rectify these issues and recognize that state and local conservation efforts are already underway that have proven more effective than the top-down, one-size-fits-all federal approach. Therefore, Petitioners request FWS retract the COT Report and all reliance thereon in agency decisions on permits, authorizations and the listed status of GRSG under the ESA. Alternatively, FWS could issue an amended COT Report that uses sound analytical methods and the best data available, including specifically the information omitted in the current Report and referenced herein, ensuring transparency and objectivity in the information disseminated.

The information disseminated should be corrected upon consideration of the most recent or thorough information from stakeholders, the public and the scientific community. FWS recognizes that objectives in the COT report are "subject to modification as dictated by new

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[11] Draft Scientific Peer Review of the Sage-Grouse Conservation Objectives Draft Report at 1 (Oct. 2012).
[12] FWS Guidelines III-10.
[13] *See, e.g.* FWS Guidelines II-3.
[14] *See* COT Report at 5; *see also, e.g.,* BLM, *Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement* at xxvi, and 5-6 (August 2013), https://www.blm.gov/epl-front-office/projects/lup/36511/44083/47449/Draft_Grouse_EIS_Build_1.pdf
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findings, changes in species' status, and the completion of conservation actions."[15] This challenge presents the most recent and thorough information such that FWS should retract or amend the COT Report accordingly.

II. The Petitioners

Petitioners have a direct interest in the quality and integrity of agency science and decision making, including how the COT Report affects GRSG and public lands management in the West. The Petitioners engage in ranching, grazing, mining, and energy development on multiple-use federal, state and private lands throughout the West, or are counties that rely on these activities for their economic and social viability. The management restrictions, regulatory measures and closures recommended in the COT Report will have a direct impact on the Petitioners, the economy and the future viability of scores of communities, local governments, small businesses, family farms and ranches, mining enterprises, electricity and oil and natural gas development in the West.

- Counties:
  - Colorado: Garfield County, Grand County, Jackson County, Mesa County, Moffat County, Rio Blanco County
  - Montana: Carter County, Fallon County, Fergus County, McCone County, Musselshell County, Phillips County, Prairie County, Richland County, Toole County, Yellowstone County
  - Nevada: Elko County, Eureka County
  - Utah: Uintah County

- Western Energy Alliance (the "Alliance") represents more than 450 companies engaged in all aspects of environmentally responsible exploration and production of oil and natural gas across the West. The Alliance represents independents, the majority of which are small businesses with an average of fifteen employees.

- American Exploration & Mining Association is a 120 year old, 2,500 member, non-profit, non-partisan trade association based in Washington. AEMA members reside in 42 states and are actively involved in prospecting, exploring, mining, and reclamation closure activities on federally administered lands, especially in the West. Our diverse

[15] COT Report at ii.

membership includes every facet of the mining and represents a true cross-section of the American mining community from small miners and exploration geologists to junior and large companies. Most of our members are individual citizens or small businesses.

- Colorado Mining Association is an industry association, founded in 1876, whose more than 1,000 members include individuals and organizations engaged in the exploration, development and production of coal, metals, agricultural and industrial minerals throughout Colorado, the west and the world. CMA's membership also includes persons and enterprises providing support, services and supplies to the mining industry.

- Colorado Wool Growers Association was founded in 1926. It is premier legislative, regulatory, and policy management organization for the Colorado sheep industry.

- Independent Petroleum Association of America (IPAA) represents the thousands of independent oil and natural gas producers and service companies across the United States. Independent producers develop 95 percent of domestic oil and gas wells, produce 54 percent of domestic oil and produce 85 percent of domestic natural gas. IPAA members are dedicated to meeting environmental requirements while economically developing and supplying energy resources for consumers.

- The International Association of Drilling Contractors (IADC) is a leading oil and gas trade association and it is considered the authoritative body in the drilling space. Headquartered in Houston, Texas, IADC represents the interest of drilling contractors operating throughout the world including all oil and gas producing areas of the United States.

  - Montana Association of Oil, Gas & Coal Counties is a non-profit corporation providing leadership on energy issues and promoting responsible energy development for the future of Montana. There are 34 counties that belong to the Association.

  - The Montana Petroleum Association is a voluntary, non-profit trade association, whose members include oil and natural gas producers, gathering and pipeline companies, petroleum refineries and service providers and consultants.

  - The Nevada Mining Association (NvMA) is a statewide trade organization formed over 100 years ago to address issues facing the mining industry in Nevada. The association has hundreds of members representing mine operators, the exploration community and vendors.

  - The Petroleum Association of Wyoming (PAW) is Wyoming's largest and oldest oil and gas organization dedicated to the betterment of the state's oil and gas industry and public welfare. PAW members, ranging from independent operators to integrated companies, account for approximately ninety percent of the natural gas and eighty percent of the crude oil produced in Wyoming.

- The Public Lands Council (PLC), headquartered in Washington, D.C., represents ranchers who use public lands, manage the natural resources and preserve the unique heritage of the West. PLC is a Colorado nonprofit corporation. PLC represents state and national cattle, sheep and grasslands associations. PLC works to maintain a stable business environment in which livestock producers can conserve the natural resources of the West while producing food and fiber for the nation and the world.

- Utah Multiple Use Coalition: Recognizing Utah is a public lands state, eighteen organizations relying on access for natural resources, grazing, recreation and jobs banded together for a single united voice. Through prudent application of multiple-use management principles, precious recourses such as timber, wildlife, forage, minerals, energy, water and recreation can co-exist with Utah's unique and sensitive environments. Coalition members include the Utah Farm Bureau, Utah Mining Association, Utah Woolgrowers, Utah Rural Electric Association, and Western Counties Alliance.

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III. The COT Report Violates the Quality, Objectivity, Utility and Integrity Standards of the DQA and its Guidelines

The COT Report: (1) was developed with unsound research methods resulting in a partial and biased presentation of information; (2) ignores studies that do not support its theses; (3) jumps to conclusions that are not scientifically supported but are pure conjecture; and (4) disseminates information that is not objective or reliable and that lacks scientific integrity. Both the DQA and the Guidelines require agencies to "ensure and maximize" the quality, objectivity, utility, and integrity" of information disseminated by federal agencies.[16] "Utility" refers to "the

[16] DQA §515(a), OMB Guidelines, § 11(2), 67 Fed. Reg. at 8458.

usefulness of the information to its intended users, including the public."[17] For the reasons discussed herein, the COT Report fails to meet quality, objectivity, utility and integrity standards of the DQA, the Guidelines and the additional authorities cited herein. *See* Exhibit A: The COT Report Fails to Meet DQA Standards at 2-8; *see also* Exhibit B: Studies Cited in the COT Report Fail to Meet DQA Standards at 16-17, 22, 24-16, and 29.

Accordingly, Petitioners ask FWS to correct, retract or supplement information referenced in the COT Report and also seek to ensure that all information disseminated by FWS meets the quality, objectivity, utility and integrity requirements of the DQA and the Guidelines.

A. The COT Report is Not Transparent

The COT Report fails to meet quality and utility standards of the DQA and the Guidelines. OMG Guidelines require a high degree of transparency for influential information such as the NTT Report. Transparency equates to disclosure of the "data and methods of analysis" such that replication of results could be achieved.[18] Peer-review of original and supporting data and results "does not necessarily imply that the results are transparent and replicable."[19] The many shortcomings of the COT Report related to peer review are discussed in detail below.

OMB has recognized the benefits of transparency extend beyond the ability to spot errors in government work. Far more important is the ability to assess the extent to which results hinge upon an agency's choices in analysis.[20] "Agency guidelines shall, however, <u>in all cases</u>, require a disclosure of the specific data sources that have been used and the specific quantitative

[17] OMB Guidelines V(2). 67 Fed. Reg. at 8459. (emphasis added).
[18] OMB Guidelines V(3)(b)(ii).
[19] http://www.whitehouse.gov/omb/fedreg_reproducible
[20] http://www.whitehouse.gov/omb/fedreg_reproducible

methods and assumptions that have been employed."[21] OMB explains that: "[i]n assessing the usefulness of information that the agency disseminates to the public, the agency needs to consider the uses of the information not only from the perspective of the agency but also from the perspective of the public. As a result, when transparency of information is relevant for assessing the information's usefulness from the public's perspective, the agency must take care to ensure that transparency has been addressed in its review of the information."[22] As discussed herein, the COT Report was far from transparent.

FWS failed to provide basic information to the public about the COT Report, despite the heavy reliance on it in agency decision-making. In response to questions posted from a hearing before the House Natural Resources Committee in 2013 titled *Examining the Endangered Species Act*, Counselor Michael Bean was asked how FWS justifies withholding information and data paid for by taxpayer monies. Bean opined that FWS complies with executive mandates and policies, routinely provides data upon request, and stated that FWS only withholds materials pursuant to the terms of the Freedom of Information Act ("FOIA").

Petitioners efforts to seek transparency on the COT Report contradict Mr. Bean's assertions. The Alliance had to undergo great lengths to obtain relevant information about peer review of the COT Report. The Alliance filed a FOIA request on May 2, 2013 and a follow-up letter on June 14, 2013. When FWS failed to reply, the Alliance submitted a DQA request for the information on July 30, 2013. Eventually, on October 15, 2013, the Alliance was forced to file suit against FWS for information that should have already been in the public domain pursuant to the DQA, its Guidelines and presidential and secretarial memoranda and orders discussed further herein.

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[21] OMB Guidelines V. (emphasis added).
[22] OMB Guidelines, § V(2) (emphasis added).

FOIA requires an agency to respond to such requests within 20 business days. FWS refused to disclose all of the information requested by the Alliance in these FOIA requests until the Alliance initiated litigation. In the case of the Alliance's FOIA cases against FWS, it took nearly 16 months from filing the FOIA to receive the information requested. These actions ultimately resulted in the disclosure of more than 162 pages of relevant information that should have been disclosed and open for public review and comment.

Had FWS complied with the aforementioned authorities, many of the Alliance's extensive legal efforts would have been unnecessary and the public could have timely ascertained whether these documents were scientifically sound and substantially capable of replication.

B. The COT Report is Not Reproducible

Transparency is a lynchpin to reproducibility. "The purpose of the reproducibility standard is to cultivate a consistent agency commitment to transparency about how analytic results are generated: the specific data used, the various assumptions employed, the specific analytic methods applied, and the statistical procedures employed."[23] "Reproducibility means that the information is capable of being substantially reproduced, subject to an acceptable degree of imprecision."[24] Again, the more important the information disseminated, the more rigorous the standard.[25]

The COT Report fails to meet DQA standards for reproducibility. OMB Guidelines provide a higher standard than even peer review applies to influential information, namely a "substantial reproducibility standard."[26] DOI and FWS have adopted, and indeed must adopt,

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[23] *Id*.
[24] *See* OMB Guidelines V10.
[25] OMB Guidelines V10.
[26] 67 Fed. Reg. 8452, 8457 (Feb. 22, 2002).

OMB Guidelines. FWS Guidelines define "reproducibility" as "information [is] capable of being substantially reproduced, subject to an acceptable degree of precision."[27] In appropriate cases, OMB encourages the agencies to consider "confirmation" as a standard in assessing the objectivity of original and supporting data.[28] "The more important the information, the higher the quality standards to which it should be held, for example in those situations involving 'influential scientific, financial or statistical information'"….[29]

The COT Report fails to meet the substantially reproducible standard required under the DQA and the Guidelines. *See* Exhibit A at 2-3, and 6; *see also* Exhibit B at 10-12. For these reasons, the information disseminated violates the "objectivity" standard and the "utility" standard and are not useful to the public because they are made without giving the public access to the underlying information.

C. The COT Report Fails the Required Robustness Checks

The COT Report failed to undergo adequate robustness checks to meet the DQA standards of quality, objectivity, utility and integrity. *See* Exhibit A at 1-8; *see also* Exhibit B at 16-17, 22, 24-27, and 29. For example, there are substantial technical errors in the COT Report including misleading use of authority. This makes it difficult to provide scientific verification of the COT Report's claims. Furthermore, by making recommendations, and then seeking scientific support for them, the COT Report was in effect backing into their preferred conclusions rather than providing a comprehensive and objective treatment of alternatives.

These issues evidence bias and a lack of transparency and reproducibility in contravention to the DQA and the Guidelines. They also violate Executive Order 13563, which calls for "objectivity of any scientific and technical information and processes used to support

[27] FWS Guidelines at III-12.
[28] 67 Fed. Reg. 8452, 8457 (Feb. 22, 2002).
[29] OMB Guidelines V(3)(b)(ii).

[an] agency's regulatory actions."[30] As a result, the public has not been afforded the opportunity to determine the objectivity, utility, and reproducibility of the COT Report in contravention of the DQA, the Guidelines and the additional authorities referenced herein.

To the extent FWS believes it cannot disclose certain information that are material to information that it does disclose, robustness checks are required for ensuring compliance with the DQA because the public will not be afforded any other mechanism for determining the objectivity, utility, and reproducibility of this non-disclosed information. In fact, "agencies shall apply <u>especially rigorous robustness checks</u> to analytic results and document what checks were undertaken."[31] DOI and FWS Guidelines mirror this requirement.[32] The COT Report underwent no such rigorous checks.

OMB explained in its February 22nd agency-wide guidelines that the "general standard" for these robustness checks is "that the information is capable of being substantially reproduced, subject to an acceptable degree of imprecision."[33] "For example, a qualified party, operating under the same confidentiality protections as the original analysts, may be asked to use the same data, computer model or statistical methods to replicate the analytic results reported in the original study."[34] Here, the COT Report, and many of the most influential studies and models it relies upon, are neither transparent nor reproducible. *See* Exhibit A at 2-6; *see also* Exhibit B, *gen*. The FWS Guidelines provide:

> "Transparency about research design and methods is pivotal to reproducibility. With regard to analytical results, we will generally require sufficient transparency about data and methods that a qualified member of the public could undertake an independent reanalysis. These transparency standards apply to our analysis of data

[30] *Available at: http://www.gpo.gov/fdsys/pkg/FR-2011-01-21/pdf/2011-1385.pdf.*
[31] OMB Guidelines V3.b.ii.B.ii (emphasis added).
[32] FWS Guidelines IV-3.
[33] 67 Fed. Reg. 8452, 8457 (Feb. 22, 2002).
[34] http://www.whitehouse.gov/omb/fedreg_reproducible

from a single study as well as to analyses that combine information from multiple studies."[35]

The highly influential COT Report does not meet these rigorous standards. Moreover, the underlying data behind many of the studies has not been publicly released.

D. The COT Report Contains Conflicts of Interest

The Department of the Interior Manual ("DOI Manual") defines a conflict of interest as "any personal, professional, financial, or other interests that conflict with the actions or judgments of those covered by this policy when conducting scientific and scholarly activities or using scientific and scholarly data and information because those interests may: (1) significantly impair objectivity; (2) create an unfair competitive advantage for any person or organization; or (3) create the appearance of either."[36]

A number of the relevant regulations and guidance stress the importance of independence[37] and the need to avoid conflicts of interest.[38] Among other things, independence means that a peer reviewer may not have been a contributor to the work product leading to the listing of a species and the peer reviewer has not been influenced by funding considerations. The National Academy of Sciences ("NAS") considers financial interests, access to confidential

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[35] FWS Guidelines IV-3.

[36] DOI Manual, available at http://elips.doi.gov/elips/browse.aspx; 305 DM 3.

[37] Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities 59 Fed. Reg. 34270 (Jul. 1, 1994); OMB Peer Review Bulletin; Memorandum for the Heads of Executive Departments and Agencies. 74 Fed. Reg. 10671 (Mar. 11, 2009), available at: http://www.gpo.gov/fdsys/pkg/FR-2009-03-11/pdf/E9-5443.pdf (http://www.whitehouse.gov/sites/default/files/microsites/ostp/scientific-integrity-memo-12172010.pdf); Performance Work Statement for Scientific, Technical and Advisory Services (http://www.fws.gov/informationquality/peer_review/IDIQ_Performance_Work_Statement_17Nov2011.pdf); Information Quality Guidelines and Peer Review (http://www.fws.gov/informationquality/topics/InformationQualityGuidelinesrevised6_6_12.pdf).

[38] Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports (http://nationalacademies.org/coi/); Final Information Quality Bulletin for Peer Review 70 Fed. Reg. 2664 (Jan. 14, 2005); Memorandum for the Heads of Executive Departments and Agencies (http://www.whitehouse.gov/sites/default/files/microsites/ostp/scientific-integrity-memo-12172010.pdf); Department Manual, Part 305, Chapter 3 (http://www.fws.gov/science/pdf/DOIScientificIntegrityPolicyManual.pdf).

information, reviewing one's own work, public statements and positions, and employees of sponsors as problems to be avoided in its conflicts policy.[39]

In this case, a small number of GRSG specialist-advocates have had a disproportionate influence on formulating federal policy including their overlapping participation in preparation of the NTT and COT Reports as well as the highly influential USGS GRSG Monograph and peer reviews thereon. Since the three documents have interlocking relationships among their authors and peer reviewers which overlap with the authors of the few studies on which the Reports depend, the result is an insularity that clearly violates DQA and the Guidelines. More diverse expertise and viewpoints are clearly needed.

FWS failed to consider a range of diverse and objective scientific viewpoints and, instead, relied heavily on this small, select group of specialist-advocates with homogenous and biased opinions. For instance, FWS relied on the same scientists for the preparation of multiple reports. Dr. Jack Connelly served as both a COT member and as the co-editor of the Monograph. Dr. Steven T. Knick was an NTT author and another co-editor of the Monograph. Similarly, Shawn Espinosa was involved in the preparation of both the NOT and COT reports. Likewise, Dr. David E. Naugle was not only an NTT member, but also served as a source of support for the FWS document, which cited Naugle's work frequently.

Further demonstrating the lack of diversity, along with the lack of independence in authorship, is the fact that the authors of these influential reports frequently cited to their own previous work. For instance, Naugle, an NTT member, cited to his own work, Walker and Naugle 2011, in preparing the NTT Report. Another NTT member, Knick, cited his own work repeatedly throughout the NTT report. Knick and Hanser 2011 was cited six times in the NTT report, Knick et al. 2003 was cited once in the NTT Report, and Knick et al. 2011 was cited six

[39] *Available at:* http://www.nap.edu/openbook.php?isbn=0309059437&page=9

times by the NTT report.

If these authors weren't citing their own work, they were citing the work of colleagues with whom they had a long history of collaboration. For example, in the NTT Report, Naugle cited to Doherty et al. 2008 six times, Walker et al. nine times, Holloran 2005 12 times, and Tack three times. However, Naugle had previously collaborated and co-authored papers with each of the four aforementioned authors. Naugle published Naugle et al. 2011a, which included as co-authors Doherty, Walker, Copeland, Holloran, and Tack. Naugle and Walker were also co-authors on another paper, Doherty et al. 2011. Naugle also co-authored at least three other papers with Doherty (Doherty et al. 2010a, Doherty et al. 2010b, and Doherty et al. 2011). Doherty and Holloran have been co-authors on at least one other paper.

The Reports rely on the same limited set of studies, reflecting a lack of diversity of viewpoints among the Reports. Doherty et al. 2008 was cited six times in the NTT Report and once in the COT Report. Walker et al. was cited nine times in the NTT Report and twice in the COT Report. Holloran 2005 was cited twelve times in the NTT Report and twice in the COT Report and nineteen times in the 2010 FWS listing decision on GRSG. Knick et al. was cited once in the NTT Report and fourteen times in the COT Report. Knick and Hanser was cited six times in the NTT Report, eight times in the COT Report, and 38 times in the 2010 GRSG listing decision. Knick et al. was cited six times by the NTT Report and twice by the COT Report. Leu and Hanser 2011 was cited in the USGS Monograph and three times in the COT Report. Yet with all the self-referential citing, these Report authors failed to consider a wide body of scientific literature, which is provided in Exhibit C.

Finally, there were a number of instances where authors who contributed to the Reports reviewed and edited their own work. For instance, Naugle served as his own editor for Naugle et

al. 2011a. Similarly, in the NTT Report, Knick cited to his own work, Knick et al. 2003, which he also edited.

These facts demonstrate that a handful of scientists, who have pre-established professional relationships and singular viewpoints, have had a disproportionately substantial influence on these Reports. When there is reliance upon singular viewpoints, and researchers who have overlapping participation in preparation of influential documents and peer reviews, there is a violation of the governing authority on scientific research and data. Such actions also fail to maintain independence and the avoidance of conflicts of interest.

Furthermore, many of the authors responsible for the reports leading to the listing of the species have historically demonstrated a disregard for the policies on independence in the peer review process. The Center for Environmental Science, Accuracy, & Reliability ("CESAR") exposed similar issues in its review of the USGS GRSG Monograph, which involved a number of the authors who were also involved in the NTT and COT Reports, and found a lack of independence in both authorship in peer review.[40] Likewise, here, there is a discernible pattern of disregard for the policies and regulations governing independence and conflicts of interest.

As recently as March 12, 2015, Reese, Beck, and Holloran co-signed a letter to individual White House and DOI officials advocating for the most egregious regulatory restrictions in the NTT Report and virtually threatening an ESA listing if such measures were not adopted. Other signatories included COT member Connelly, NTT member Rinkes and Monograph authors Garton and Braun. This and similar activity indicates that these scientists have overstepped their bounds, and have gone from providing independent, objective science to advocating policies based on their biases.

[40] https://www.hightail.com/download/UW14OU1VMVh0TWxYd3NUQw.

The conflicts of interest that permeate the COT Report violate numerous sources of authority, including the DQA, its implementing Guidelines, the DOI Manual, NAS policy and various secretarial orders and presidential memoranda discussed herein.

E. Peer Review

The COT Report failed to undergo adequate peer review as required by the DQA, the Guidelines and the presidential and secretarial orders and memoranda discussed herein. Notably, this is not the first time the FWS peer-review process has been criticized. On December, 15, 2014, Majority Staff for the House Natural Resources Committee issued a report: *Under the Microscope: An examination of the questionable science and lack of independent peer review in Endangered Species Act listing decisions* (the "House Report").[41] The House Report detailed systemic flaws and inconsistencies with the peer review process employed by FWS.

Peer review is a process by which something proposed for research or publication and evaluated by a group of experts in the appropriate field.[42] Peer review is used to ensure work meets appropriate standards of the scientific and technical community[43] and maximizes the quality, objectivity, utility, and integrity of provided information meets the standards of the scientific and technical community.[44] Reviewers are not to be selected from among the authors' close colleagues, students, or friends.[45]

1. Peer Review Standards

DOI's Information Quality Mission Statement provides, in pertinent part:

> "In order to ensure the accuracy and integrity of its published scientific information, DOI follows a <u>robust</u> peer review process wherein the information undergoes internal

[41] http://naturalresources.house.gov/uploadedfiles/esa_peer_review_science-staff_report.pdf
[42] http://www.merriam-webster.com/dictionary/peer%20review.
[43] *Id.*
[44] http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf
[45] http://www.apsanet.org/content_43805.cfm; http://www.elsevier.com/journals/journal-of-molecular-biology/0022-2836/guide-for-authors

> peer review and is subject to public scrutiny. DOI, its bureaus and offices, and the National Invasive Species Council maintain the highest standards possible for published information to ensure integrity and transparency."[46]

Given the charge of the reviewers of the COT Report, we question how "robust" the peer review process actually was. In fact, FWS has failed to meet the applicable peer review planning standards.[47] In addition, peer review of the COT Report was not subject to any public scrutiny whatsoever.

DOI Guidelines require not only that information be consistent with the Guidelines, but that the agency maintain an administrative record of review proceedings.[48] FWS failed to do so. Further, for influential information, DOI commits to provide "more rigorous review of the conclusions than the review performed by the originating office."[49] No such rigorous review was undertaken here.

The government-wide guidance for peer review of government science is established in the "*Final Information Quality Bulletin for Peer Review*" issued by OMB of the Executive Office of the President (the "OMB Peer Review Bulletin").[50] The OMB Peer Review Bulletin provides detailed guidelines for peer review of influential scientific information and applies more stringent peer review requirements to highly influential scientific assessments. Peer review shall be solely of scientific and technical matters.[51] It typically evaluates 1) the clarity of hypotheses, 2) the validity of the research design, 3) the quality of data collection procedures, the robustness of the methods employed, 4) the appropriateness of the methods for the hypotheses being tested,

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[46] http://www.doi.gov/archive/ocio/iq.html (emphasis added).
[47] *See* DOI: Chief Information Officer, Department of the Interior Information Quality Mission Statement, DOI Bulletin for Peer Review, http://www.doi.gov/archive/ocio/iq_1.html.
[48] DOI Guidelines II.5.
[49] *Id.*
[50] *Id.*
[51] http://www.nrc.gov/public-involve/ml051600303.pdf

5) the extent to which the conclusions follow from the analysis, and 6) the strengths and limitations of the overall product.[52]

The OMB Peer Review Bulletin requires that reviewers are selected based upon 1) expertise, to ensure that the selective reviewer has the knowledge, experience, and skills necessary to perform the review; 2) balance: to represent a diversity of scientific perspective relevant to the subject; 3) independence: to ensure that the reviewer was not involved in producing the draft document to be revised; and 4) conflict of interest: to examine prospective reviewers' potential financial conflict including significant investments, consulting arrangements, employer affiliations, and grants/contracts.[53] The rigorous review required by the DQA, the Guidelines and the OMB Peer Review Bulletin was not completed for the COT Report.

2. Conflicts of Interest in Peer Review

The OMB Peer Review Bulletin requires agencies to adopt or adapt the National Academy of Sciences policy and procedures depicted in the "*Committee Composition and Balance and Conflicts of Interest*".[54] The term "conflict of interest" means any financial or other interest which conflicts with the service of the individual because it (1) could significantly impair the individual's objectivity or (2) could create an unfair competitive advantage for any person or organization.[55]

As a result of the Alliance's FOIA litigation, FWS ultimately disclosed data and information relative to peer review of the COT Report.[56] Specifically, FWS released a document

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[52] *See Id*. at 3.
[53] http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf
[54] See *Id*. at 10.
[55] http://www.nationalacademies.org/coi/bi-coi_form-0.pdf
[56] Western Energy Alliance submitted a FOIA request to the FWS on May 2, 2013. When the FWS failed to respond, Western Energy Alliance filed a FOIA suit against the FWS on October 15, 2013. On October 24, 2013, the FWS provided some of the documents requested.

titled, "Scientific Peer Review of the Sage-Grouse Conservation Objectives Draft Report" (the "Peer Review Report"). From that disclosure, we understand FWS retained Atkins, North America ("Atkins") to perform the review.

Atkins solicited five reviewers: Dr. Jeffrey L. Beck, University of Wyoming; Dr. Matthew J. Holloran, Wyoming Wildlife Consultants, LLC; Dr. Terry A. Messmer, Utah State University; Dr. Kerry P. Reese, University of Idaho, and Dr. James S. Sedinger, University of Nevada, Reno.[57] Atkins was asked to solicit well-qualified and independent reviewers with certain expertise and to ensure they had no financial or other conflicts with the outcome or implications of the COT Report.[58]

However, Atkins failed to meet applicable peer-review standards due to conflicts and financial interests. FWS and USGS provided grant support to certain peer-reviewers as well as significant financial support for certain GRSG studies. Reviewers Holloran, Messmer and Reese received over $10 million in federal financial support which seriously calls into question their ability to provide independent science to the agencies.[59] As recently as March 12, 2015, Reese, Beck, Holloran co-signed a letter to individual White House and DOI officials advocating for the most egregious regulatory restrictions in the NTT Report and virtually threatening an ESA listing if such measures were not adopted. Other signatories included COT member Connelly, NTT member Rinkes and Monograph authors Garton and Braun.

Dr. Kerry Reese, and Dr. John W. Connelly (an author of the COT Report and editor of the Monograph) published eight papers together, including two papers in 2012 and four in 2011. All of these were included in the Monograph. Dr. Reese participated in no fewer than eleven

[57] Scientific Peer Review of the Sage-Grouse Conservation Objectives Draft Report at 3.
[58] *Id.* at 2.
[59] Reese listed over $6.3 million in funding and in-kind contributions, but failed to account for precisely how much can be attributable to sage-grouse.

presentations with Connelly, four with Gardner, another COT Report author, and four with Dr. Edward O. Garton. Garton et al. 2011 forms the very basis of the COT Report and is the most frequently cited paper therein. Dr. Reese received a $255,203 grant from IDFG with Garton in 2011 and over $1.3 million in sage-grouse funding including $178,442 from the USGS (the funding agency on the Monograph).[60]

Dr. Jeffrey L. Beck has two papers with COT member Connelly. Dr. Beck authored numerous papers with other frequently cited sage-grouse biologists including Naugle, an author of the NTT Report. No financial support is listed in the information received by the Alliance via FOIA, but given that Beck has published 12 papers on the topic, such support could be expected to be significant.

Dr. Matthew J. Holloran is one of the most cited papers in the COT Report. He authored a 2011 Monograph paper with Connelly, and another with Connelly and Knick. Dr. Holloran also authored three papers with Connelly in 2006, 2009, and 2012. Dr. Holloran's Ph.D. dissertation concluded "currently imposed [natural gas] developmental stipulations are inadequate to protect the greater sage-grouse, and that stipulations need to be modified to maintain populations within natural gas fields."[61] Note the amount of financial support on six recent grants and contracts on sage-grouse totaled more than $3.1 million. Funding sources were not listed. This indicates a bias by Dr. Holloran that calls into question his ability to perform an independent peer review. Holloran also coauthored a USGS Science Summary paper with Manier, Wood and Oyler-McCance of the USGS.Dr. Terry A. Messmer reported no authorship conflicts with COT Report team members; however, he listed financial support for some 18 recent grants and contracts on sage-grouse totaling more than $2.3 million.

[60] Scientific Peer Review of the Sage-Grouse Conservation Objectives Draft Report, Appendix A.
[61] Holloran 2005.

Dr. James S. Sedinger was an author with COT and NTT member Shawn Espinosa on a 2011 Monograph chapter and a 2010 paper. Grant and contract support includes $40,000 on sage-grouse from BLM, and five grants and contracts totaling $252,939 from FWS. These examples are all indicative of serious conflicts of interest.[62]

3. Peer Review Failed to Undergo Public Comment

FWS failed to produce an administrative record for peer review as required by the DQA and the Guidelines. In reference to its peer review planning process requirements, DOI directs readers to links[63] to its agencies' websites. Notably, FWS peer review link contains absolutely no reference to peer review on the COT Report.[64] Further, DOI provides no evidence that it rigorously reviewed the COT Report as required. FWS certainly did not submit peer reviews on the COT Report to the public for review and comment.

Only upon commencement of FOIA litigation did FWS divulge the information requested relative to peer review of the COT Report. This information should have already been publically available.

4. Peer Review Was Not Transparent

The OMB Peer Review Bulletin[65] established government-wide guidance to improve the peer review of scientific documents, providing specific requirements for "influential scientific information" and "highly influential scientific assessments." Agencies are to, "disclose the

[62] Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports (http://nationalacademies.org/coi/); OMB Peer Review Bulletin; Memorandum for the Heads of Executive Departments and Agencies (http://www.whitehouse.gov/sites/default/files/microsites/ostp/scientific-integrity-memo-12172010.pdf); Department Manual ("DM") Part 305, Chapter 3 (http://www.fws.gov/science/pdf/DOIScientificIntegrityPolicyManual.pdf).

[63] It should be noted that the most recent Peer Review Report referenced by DOI in its link for "Information Quality and Peer Review Reports," was from FY2010.

[64] http://www.fws.gov/mountain-prairie/science/peer_review.cfm

[65] 70 Fed. Reg. 2664 (Jan. 14, 2005).

names of the reviewers and their organizational affiliations in the report"[66] and mak[e] available to the public the written charge to the peer reviewers, the peer reviewers' names, the peer reviewers' report(s), and the agency's response to the peer reviewers' report(s)."[67] FWS failed to do so until the Alliance pursued FOIA litigation. Even then, FWS chose to provide only unattributed reviews in contravention of the DQA.[68] This is directly contrary to OMB Peer Review Bulletin and the DOI and FWS Guidelines.

5. Petitioners Have Made a Persuasive Showing that the COT Report Was Not Objective

OMB guidelines state that information will generally be presumed to be objective if data and analytic results have been subjected to formal, independent peer review; however, this presumption is rebuttable "based on a persuasive showing by a petitioner in a particular instance."[69] The issue is what will be considered a "persuasive showing" that will overcome the presumption of objectivity under the proposed agency guidelines. An example of such a review is the process used by scientific journals.[70] However, even journal peer review does not necessarily equate to quality. As OMB has recognized, there are well-documented examples of flawed science published in respected journals.[71] Accordingly, the presumption is rebuttable.[72]

In this case, FWS has not met the applicable standards due to significant conflicts of interest and failure to adhere to DQA standards overcome such a presumption. FWS refused to even disclose information on peer review of the COT Report until forced to disclose via FOIA litigation. It solicited only unattributed reviews on the COT Report. Moreover, FWS failed to

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[66] *Id.* (emphasis added).
[67] *Id.*
[68] Draft Scientific Peer Review of the COT Report at 3.
[69] 67 Fed. Reg. 8452, 8454 (Feb. 22, 2002).
[70] *Id.*
[71] http://www.whitehouse.gov/omb/fedreg_reproducible
[72] *Id.*

address several comments and issues raised by peer reviewers in the COT Report. *See* Exhibit A at 2-4.

F. The COT Report Was Not Based on the Best Available Science

The COT Report failed to meet DQA standards for the best available data. Agencies are directed[73] to adopt congressional standards of scientific integrity stemming from the Safe Drinking Water Act ("SDWA").[74] Notably, the COT Report provides no original data or quantitative analyses. It fails to provide a comprehensive and unbiased review of *all* of the available scientific literature and perpetuates outdated information and beliefs.

Among other issues, the COT Report also places undue reliance on the database NatureServe for its ranking of threats. NatureServe comes with a glaring disclaimer:

> "All documents and related graphics provided by this server and any other documents which are referenced by or linked to this server are provided "as is" without warranty as to the currentness, completeness, or accuracy of any specific data."

As a result, outdated information and beliefs are perpetuated in the COT Report in violation of the DQA, the Guidelines and the additional authorities cited herein. *See* Exhibit A at 4; *see also e.g.* Exhibit B at 5 and 16.

The COT Report and the studies cited therein fail to meet the best available science standards. *See* Exhibit A at 1, and 5-6; *see also* Exhibit B at 10-12. The information disseminated fails to meet DQA standards for quality, objectivity, integrity and utility. Significant uncertainties are ignored and conjecture and opinion are presented as facts.[75]

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[73] OMB Guidelines V3.b.ii.B.ii.C.
[74] 42 U.S.C. § 300g-1(b)(3)(A).
[75] *Id.*

Executive Order 13562 also requires that regulations "must be based on the best available science" and in a way that imposes the least burden on society.[76] In this case, FWS cannot possibly justify the alleged benefits of measures recommended in the COT Report against the dramatic societal costs they would entail. FWS is directed to select approaches that impose the least burden on society and to identify alternatives to direct regulation. Here, FWS did not even attempt to do so. The onerous regulatory measures recommended in the COT Report are far from justified. In fact, they impose an incredible burden on the Petitioners and the public without scientific justification.

The COT Report and many of the studies upon which it relies have significantly flawed assumptions, questionable analytic models and questionable statistical procedures. *See* Exhibit A, *gen.*; *see also e.g.* Exhibit B at 1, 8, 10, and 19. Virtually all of the significant studies relied upon in the COT Report utilize models. *See* Exhibit B. *gen*. The COT Report relies extensively upon these models and even models built upon models to evaluate the alleged human footprint on sagebrush habitat and alleged GRSG population responses. *See* Exhibit B at 21-22. In contravening the Guidelines, FWS has not demonstrated to OMB that there is no other option than to use these third-party models. FWS has not demonstrated why it ignores actual population data available from state wildlife agencies.

Here, FWS has not identified several sources in the COT Report and has not disclosed the supporting data and models for the public to assess the objectivity of the Report. The models relied upon are quite complex. However, because the underlying data used in many of them has not been fully released nor provided to peer reviewers for independent analysis they are neither transparent nor reproducible. The peer reviewers, journal editors, or scientific and regulatory

[76] Executive Order 13563: *Improving Regulation and Regulatory Review*, http://www.gpo.gov/fdsys/pkg/FR-2011-01-21/pdf/2011-1385.pdf.

audience cannot independently evaluate the quality and potential biases in the data and studies. Accordingly, the studies relied upon fail to meet the DQA nor the Guidelines.

Moreover, the data have been collected by different people in different states using different standards and levels of effort--all of which have changed over time. The data are not properly curated and maintained in a central repository. Metadata to describe precisely how the data were collected, recorded and summarized along with quality and control assurances are undocumented. Key variables have not been released. Simply put, the raw data and methods that one could potentially use to reproduce the final data sets used in analyses are not available either because they are not released, undocumented, or may no longer exist.

Moreover, the models themselves often exhibit a complete lack of transparency and reproducibility. *See*, *e.g*, Exhibit B at 10-12. What little background presented to the public regarding the models is presented in a confusing fashion with only vague references to the assumptions upon which it was based.

While federal agencies often use various models developed by third parties to formulate policies based upon influential scientific information, the DQA and the Guidelines require that influential scientific information be reproducible. This reproducibility standard generally requires that the models, data used to develop the models, and computer code used to develop such information be publicly available. In the rare instances in which the underlying data relevant to these studies has been disclosed, there are very serious data quality issues with the lek count data used. Recent efforts to develop range-wide conservation and mitigation objectives for the GRSG resulted in several documents proposing specific strategies or actions.

The COT Report proposed that the effectiveness of restoration activities must be demonstrated prior to receiving any credit for mitigating losses, and that the effectiveness must

be determined by GRSG use resulting in a positive population trend within the restored areas. *See* Exhibit A at 1-2; *see also* Exhibit B at 27-31. Although the counts of male GRSG on leks has been, and continues to be, the primary mechanism for collecting data about the relative abundance and population trends of GRSG, the COT Report does not acknowledge that lek counts provide only a crude, nonrandom, and statistically invalid estimates of population trends.[77]

Even though there is little to no statistical confidence in existing male lek count data or how it is currently analyzed, the USFWS prepared the GRSG Range-Wide Mitigation Framework in 2014 and proposes that this information can be used as a starting point for evaluating the effectiveness of GRSG mitigation programs. However, FWS has not produced any data to demonstrate that the targets for GRSG populations and leks are achievable nor how the targets will allegedly enhance genetic connections, especially when the role of female grouse in the population monitoring is completely ignored. Without such scientifically defensible data and analyses, the COT Report does not withstand the standards of the DQA, the Guidelines or the additional authorities cited herein.

In addition, the majority of the underlying data, especially that collected before the late 1990s, is nearly worthless (as is some of the more recent data) due to undocumented methods, mixed methods, suspect values, satellite leks, incorrect datums, single counts, biased counts, and uncertainties that are not acknowledged. Not only are the data for these studies not public, but the methods used to arrive at the final data are not described with a level of detail that would allow them to be reproducible, rendering the entirety of the lek count data inoperative. FWS ignored these issues with Knick et al. 2013, Knick and Hanser 2011, Garton et al. 2011 and other

[77] Walsh et al. 2004; Ramey et al. 2014.

cited studies. Accordingly, the required robustness checks required are missing or inadequate. *See* Exhibit A at 1-2, and 4-6; *see also* Exhibit B at 20-21.

For all but a handful of studies, neither Petitioners nor the public have access to information that is integral to these studies and the models upon which they depend. For example, states within the range of the GRSG collect annual counts on GRSG leks. Integral to understanding the science of GRSG is the means upon which to count their populations and to predict potential trends. Agency biologists have cherry-picked lek count data from the states to form the basis of opinions memorialized in the key reports utilized by BLM, FWS and the U.S. Geological Survey (USGS). FWS cannot simply ignore data it does not like. For example, it fundamentally and erroneously assumes GRSG populations are in decline; and that declines in lek attendance equate to population declines, but this assumption is based on a selective use of available data.[78] It also concedes to a near-total lack of knowledge on how GRSG respond to anthropogenic disturbance, yet proposes multitudes of unfounded regulatory restrictions to address them. *See* Exhibit B at 7, and 13. The modeling efforts within these studies form the backbone of the federal, top-down and one-size-fits approach being imposed through Land Use Plan Amendments.

Not only are the data for these studies not public, but the methods used to arrive at the final data are not described with a level of detail that would allow them to be reproducible, rendering the entirety of the lek count data inoperative. Without the underlying data, these reports are neither transparent nor reproducible.

H. Bias and Lack of Objectivity in the COT Report

The COT Report failed to meet DQA standards for quality and integrity. It is biased by the use of policy-driven assumptions, inferences, and uncertainties that are not supported by

[78] *See* Ramey, Thorley and Ivey 2014.

scientific data. The COT Report inadequately treats uncertainties through presumptive interpretations of data, inaccurate portrayal of threats and differential treatment of environmental factors, ie in treatment of renewable energy versus fossil fuels. For example, it fundamentally and erroneously assumes GRSG populations are in decline; and that declines in lek attendance equate to population declines.[79]

The COT Report is not presented in an accurate, clear, complete and unbiased manner.[80] *See* Exhibit A at 1-2, 5, and 8; *see also* Exhibit B at 1, 3-4, 8, 14, 16-17, 24, and 28. For example, the modeling and assumptions in studies cited fail to meet the standards of the DQA, the Guidelines or the additional authorities cited herein. *See* Exhibits A, B and C, *gen*.

More than one reviewer cited real uncertainties regarding management and potential impacts on GRSG populations. In fact, "…the majority of the reviewers found that the report fell short of meeting its stated goals in several important areas, and they identified opportunities to better achieve those goals and improve its utility for decision making…."[81] Reviewers identified an astonishing lack of reference to at least 15 relevant scientific papers.[82]

Fundamentally, the COT Report did not meet its stated objectives with regard to the degree to which threats need to be ameliorated.[83] Risk levels may need to be reconsidered and there was doubt expressed that threat ratings were credible.[84] One reviewer noted that it was questionable how scientific sources were used to establish risks and that there were limited (if any) direct relationships between habitat characteristics and population change.[85] For example, the COT Report cited Knick *et al.* 2003; Connelly *et al.* 2011a for the proposition that large

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[79] *See* Ramey, Thorley and Ivey 2014.
[80] *See* OMB Guidelines V(3)(a).
[81] Scientific Peer Review of the Sage-Grouse Conservation Objectives Draft Report at 3.
[82] *Id*. at 7.
[83] *Id.* at 5.
[84] *Id*. at B-16.
[85] *Id*. at 7.

seasonal and annual movements emphasize the need for large, functional landscapes to support viable populations.[86] These citations are misplaced.

Knick et al. 2003 was cited an astonishing 14 times in the COT Report. The very title of this piece evidences extreme bias, "Teetering on the edge or too late?...." In addition, the authors complain about a lack of political agenda and advocate that public lands be "Protect[ed] from economic use." Moreover, Knick et al. 2003 is not supported by data and relies on the invalid assumption that GRSG cannot bypass unsuitable or fragmented habitat during seasonal movements. *See* Exhibit B ats 14-15. Connelly et al. 2011 is fraught with similar errors of omission and inaccuracies.

Reviewer 2's comments indicate a bias in favor of listing and his belief that existing regulatory mechanisms are inadequate for sage-grouse. Reviewer 2 complained that they were not required to review how conservation objectives would be met, "I assume that another group at another time in another forum will do this, otherwise the species will remain in peril."[87] He further stated, "COT should be urging for enhanced, improved and additional management actions because the "continued" is not adequate as is across most of the species range."[88] Reviewer 2 praised Garton, along with "limited" scientific references and expert opinion as the "strongest part" of the COT Report.[89] This raises the question of whether Reviewer 2 was one of the reviewers that has worked very closely with Garton.

Some terms, like fragmentation, were not well defined.[90] Resistance and resilience were never quantified causing some to label them redundant, of little use, and little substance.[91]

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[86] COT Report at 8-9.
[87] Scientific Peer Review of the Sage-Grouse Conservation Objectives Draft Report at B-16.
[88] *Id*. at B-17.
[89] *Id*. at B-19.
[90] *Id*. at 5.
[91] *Id*. at 4.

Reviewers also cited generalities, uncertainties, and questions regarding whether some recommendations were feasible or practicable.

Reviewer 1 admonished the COT Report to acknowledge that we truly do not know the magnitude of population declines of GRSG.[92] Some concepts were ambiguously defined and not enough information was provided to assess threat ranking.[93] A lack of transparency in the threats analysis was a common theme. Reviewer 3 could not even replicate the results of the analysis (Table 2) with the information provided.[94] This evidences failure to meet the transparency and reproducibility requirements of the DQA, the Guidelines and the additional authorities cited herein.

The COT Report ignored evidence that GRSG may adapt to a disturbed environment. For example, highly naturally fragmented habitats have GRSG persistence. Some reviewers commented that genetics-based connectivity was over-emphasized and should be considered a much lower priority.[95] One reviewer commented that the COT Report failed to take into account that effects of infrastructure may be more related to the level of disturbance relative to habitat quality rather than mere presence.[96] The COT Report did not analyze how, if threats are addressed, population persistence may be altered.[97] Incredibly, Reviewer 3 recognized the COT Report could not acknowledge what effective habitat management was. He also noted the COT Report failed to address the effectiveness of existing regulatory measures. Reviewer 3 remarked, "[I]n my opinion it is a mistake to focus on managing anthropogenic activities at the expense of researching and implementing actions to improve the quality of sagebrush ecosystems."[98]

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[92] *Id*. at B-4.
[93] *Id*. at B-23.
[94] *Id*. at B-23.
[95] *Id*. at B-27.
[96] *Id*. at B-7.
[97] *Id*. at B-9.
[98] *Id*. at B-21.

The COT Report discounts established strategies to protect the "best of the best" habitat along with many of the significant conservation efforts currently utilized by the states. Reviewer 1 stated the COT Report should be seen as a tool rather than an absolute.[99] He also noted that management actions were largely at the purview of the states.[100]

The COT Report does not recognize the latest state and local habitat mapping efforts (such as that employed by Garfield County, Colorado). For example, some areas defined as habitat in the COT Report do not exist. Reviewer 1 explained the COT Report also ignored that tribal lands provide and protect significant habitat for GRSG in Utah.[101] Reviewer 2 noted several priority areas seem to have been labeled in an inconsistent manner.[102] Descriptions of seasonable habitat were also lacking.

Reviewer 4 questioned how the footprint of renewable energy development might differ from nonrenewable energy development[103] and that statements in the COT Report about predation were speculative with no empirical basis.[104] Reviewer 4 pointed out that direct relationships between specific habitat characteristics and population change are limited, if not lacking entirely.[105] The COT Report fails to capture an understanding of effects on GRSG from most of the potential risks referenced. "We have a poor empirical basis for understanding most potential impacts on sage-grouse," said Reviewer 4.[106] He continued, "[T]his severely limits our ability to predict the response of sage-grouse populations to changes in their habitats."[107]

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[99] *Id*. at B-3.
[100] *Id*. at B-3.
[101] *Id*. at B-7.
[102] *Id*. at B-15.
[103] *Id.* at B-28.
[104] The COT Report suggests the best way to mitigate predation is to maintain quality habitat with good connectivity.
[105] Scientific Peer Review of the Sage-Grouse Conservation Objectives Draft Report at B-26.
[106] *Id.* at B-27.
[107] *Id.* at B-29.

Similarly, Reviewer 5 remarked that conclusions in the threats analysis were based upon findings stemming from professional opinion.[108]

FWS clearly failed to address these fundamental shortcomings with the COT Report and failed to adequately explain assumptions, limitations and bias in the information disseminated. *See* Exhibits A and B, *gen*. Accordingly, the COT Report falls short of the DQA, the Guidelines and the OMB Peer Review Bulletin. It also contradicts FWS's own policy on peer review.[109]

DOI commits that its bureaus shall adapt the SDWA science standards.[110] FWS incorporates these standards in regards to analysis of risks to human health, safety and the environment.[111] Given the COT Report's purpose, the "best available" standard clearly applies. Here, FWS has sought only selective input in a way that likely violates FACA as well as the DQA and its Guidelines.

I. Unfounded Restrictions on Human Activities

Despite the lack of scientific support, the COT Report proscribes land management actions such as: prevent fire in GRSG habitat; manage for sagebrush; manage land uses; improve grazing "systems," and close rangelands that are highly susceptible to fire to OHV use during the fire season.[112] In clear violation of the DQA, the Guidelines and the additional authorities referenced herein, FWS would have these measures implemented without any tracking and testing of the effectiveness of the multitudes of currently required conservation efforts.

The COT Report concedes to a near-total lack of knowledge on how GRSG respond to anthropogenic disturbance, yet proposes multitudes of unfounded regulatory restrictions to

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[108] *Id.* at B-33.
[109] http://www.nmfs.noaa.gov/pr/pdfs/fr/fr59-34270.pdf.
[110] DOI Guidelines VII.3.b.
[111] FWS Guidelines IV-3.
[112] COT Report at 41.

address them. The proposed restrictions in the COT Report are based upon the opinions of authors and selective citation of information rather than data. *See* Exhibit A, *gen.*; *see also* Exhibit B at 5-10, 12, 15-16, 19, 24-25, and 29-30. FWS cannot rely on the biased opinions and selective presentation of information to support a recommendation that is unsupported by data. Moreover, the COT Report presented no scientific data that these proposed restrictions are: (1) scientifically defensible; (2) achievable; (3) would result in stable GRSG populations; (4) would not result in irreparable harm to other species; and (5) would not unnecessarily have a negative effect on local economies. *See* Exhibits A and B, *gen*.

FWS has not utilized accepted methods or best available science along with sound and objective scientific practices in the COT Report. Rather, the COT Report represents a partial presentation of scientific information to justify a narrow range of preferred conservation measures and policies. For example, with little credible support the COT mandates, "no new development of infrastructure corridors within PACs."[113] Even designated but not yet built infrastructure corridors would be re-located outside of PACs unless they will have "no impacts" or positive impacts on GRSG populations.[114] Significant flaws in the COT Report include mandates with respect to habitat requirements and threshold values, issues of scale and failure to adequately recognize and incorporate existing regulatory and conservation efforts.[115]

The COT Report claims that it, "delineates reasonable objectives, based upon the best scientific and commercial data available at the time of its release…."[116] However, the COT Report objectives are neither reasonable nor based on the best science available. Further, the research that ostensiblysupports onerous restrictions on human activities do not actually provide

[113] COT Report at 51.
[114] *Id.*
[115] *See* COT Report at 11.
[116] COT Report at ii.

the justification claimed by the COT Report, or are mis-cited as supporting those prescriptions..[117]

1. Standards for Sagebrush Canopies are Unsupported

The COT Report alleges little sagebrush within the range of the GRSG remains undisturbed (citing primarily Knick et al. 2003) and goes on, without citation or support, to state disturbed or altered habitats have "less resilience than intact habitats."[118] Serious issues with Knick et al. 2003 are discussed in Exhibit B at 14-15.

Two of the most frequently used sources with respect to vegetative habitat requirements, provide that "adequate" vegetative cover for sage-grouse ranges from 15% to 25% sagebrush cover with greater than 10% forbs and greater than 10% grass canopy, and even smaller percentages depending on the season or ecological location (Connelly et. al. 2000, Hagen et. al. 2007). However, these objectives are not supported by the literature. *See* Exhibit B at 8-9. Absent from these studies are data to support the COT Report's conclusion that 70% of the range within priority habitat must provide "adequate" habitat in order for sage-grouse to persist. Limiting disturbance to less than 30% of the *total* habitat is not scientifically supported, nor is it reasonable to assume this limit is even possible.

While FWS concedes there is little information available regarding minimum sagebrush patch size required to support populations of sage-grouse, it goes on to recommend needless one-size-fits all regulations based upon this suspect or faulty bases.[119] The best available scientific research has refuted the belief that there is a widely-accepted or "magic" number, in terms of

[117] Applegate and Owens 2014; *see also* Ramey et al. 2011.
[118] COT Report at 9.
[119] *See* COT Report at 8.

habitat patch size or population number, that can defensibly be used to identify a "viable" population of any species, much less GRSG.[120]

For example, recommendations for management of priority habitat were made without any definition or quantification of priority habitat themselves. The COT Report presents no data showing that hypothetical migration and connectivity corridors actually exist or that 70% sagebrush cover in Priority Habitat is: 1) scientifically defensible, 2) achievable, 3) would result in stable sage grouse populations, and 4) would not result in irreparable harm to other species, and 5) would not negatively affect local economies.

Connelly et al. 2000 does not support the proposition cited in the COT Report. Connelly et al. 2000 states that land treatments should not be based on schedules, targets, and quotas.[121] And reliance on Knick is misplaced. While FWS concedes sagebrush is the most widespread vegetation in the intermountain lowlands of the western United States (citing West and Young 2000); it mischaracterizes it as "one of the most imperiled ecosystems in North America due to continued degradation and lack of protection."[122] Knick et al. 2003 cannot be relied upon for such an allegation because this paper lacks any useful scientific findings and seems basically a biased call to arms for environmental groups. For example, the authors complain about a lack of political agenda and advocate that public lands be "Protect[ed] from economic use." *See* Exhibit B at 14-15. There is no hypothesis testing, and no real data presented in Knick et al. 2003.[123]

The COT Report improperly alleges with no citation to any scientific authority that the intentional removal or treatment of sagebrush using prescribed fire, or any mechanical and chemical tools contributes to habitat loss and fragmentation which are a primary factor in the

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[120] Flather et al. 2011; Hubbell and Hubbell 2011; Ramey et al. 2014.
[121] Connelly et al. 2000.
[122] COT Report at 8.
[123] *Id* at 17.

[alleged] decline of GRSG populations.[124] To assert that habitat is a substantial limiting factor to sage grouse is questionable at best. Rather, the COT Report should recognize the quality of the habitat and the very real impact of predation, hunting and competition from other species on GRSG populations.

FWS must incorporate and rely upon the most recent information for the COT Report. The COT Report recommendations rely on older research that fails DQA standards and fails to qualify as the best available science. The COT Report acknowledged only three real uncertainties with regard to GRSG conservation:

1. The lack of robust, range-wide genetics-based connectivity analyses
2. The ability to successfully restore lower-elevation and weed-infested habitats (citing Knick *et al*. 2003 and Pyke 2011)
3. The effect of climate change on the amount and distribution of future habitat.[125]

Incredibly, in light of these uncertainties, its recommendations were unequivocal: "impacts to sage-grouse and their habitats should be avoided to the maximum extent possible…." Somehow, FWS equates this ubiquitous proscription to "management flexibility."[126] Similarly, in regard to allegations of climate change, the COT Report went on to direct land use agencies to incorporate its potential impacts into their planning efforts.[127]

Accordingly, the information disseminated in the COT Report does not meet DQA standards for objectivity and integrity and must therefore be retracted or corrected. Moreover, by acting on flawed measures in the COT Report, FWS has committed itself to an action before making a final decision. This could be construed as pre-decisional and an irreversible,

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[124] COT Report at 44.
[125] COT Report at 31.
[126] *Id.*
[127] *Id.* at 39.

irretrievable commitment of resources contrary to the National Environmental Policy Act (NEPA).[128]

For all the reasons herein, FWS must retract or reject the proposed restrictions in the COT Report in favor of a more realistic approach that deals with the specific cause and effect mechanisms that underlay demonstrable threats to GRSG in each local population.

2. Misrepresenting the Impact of Oil and Natural Gas Operations

The COT Report omits numerous scientific papers and reports on oil and gas mitigation measures, mitigation of raven predation, and the fact that GRSG traverse (fly) over or around roads, agricultural areas, and oil and gas development.[129] While the COT acknowledged GRSG, "dispersal (permanent moves to other areas) <u>is poorly understood</u> and appears to be sporadic,"[130] it omits reference to the best science that indicates GRSG disperse over much greater distances than previously thought. *See* Exhibit B at 11, 14-15, 21, and 26.

Key assertions in the COT Report are both biased and in error, especially the frequently repeated, but erroneous assumption, that a temporary decrease in lek counts caused by nearby development equates to a population decline.[131] The COT Report mistakenly presumes, "[A]dult sage-grouse rarely switch from these habitats once they have been selected, limiting their ability to respond to changes in their local environments (Schroeder *et al*. 1999)."[132]

With no credible scientific support (nor any citation) the COT Report blindly states that development results in GRSG population declines.[133] The COT Report does cite Walker et al. 2007 for the mistaken proposition that GRSG populations can be significantly reduced, and in

[128] *See* 40 C.F.R. § 1502.2(g).
[129] Kehmeier et al. 2014.
[130] COT Report at 8 (emphasis added).
[131] COT Report at 43.
[132] COT Report at 6.
[133] COT Report at 43.

some cases locally extirpated, by non-renewable energy development activities, even when mitigation is implemented.[134] But reliance on Walker et al. 2007 is untenable. *See* Exhibit B at 30. Further, this evidences bias against non-renewable energy: GRSG do not distinguish between activities from one type of energy versus another. The COT Report failed to mention methodological problems with the study or the fact that the author did not report a population-level decline in GRSG rather than a localized effect on rates of male lek attendance near disturbances.[135]

FWS describes energy development as one of the greatest threats to GRSG. Naugle and Copeland 2011, Naugle and Doherty 2011, and other studies cited grossly exaggerate the potential impacts of energy development despite the findings that there is little overlap between energy development and GRSG habitat.[136] *E.g.* Exhibit B at 24-26. Other examples, Garton et al. 2011 and Knick and Hanser 2011, erroneously claimed populations in the Colorado Plateau have a 96% chance of declining below 200 males by 2037 due primarily to threats from oil and gas.

While surface disturbance from oil and natural gas had local negative effects on male sage grouse lek attendance, it did not result in significant effects at a population level.[137] In Pinedale, predictions of population level declines have failed to come true.[138] Data show GRSG population <u>increases</u> despite intensive energy development that has occurred in Jonah, Labarge, and Pinedale Anticline within four miles of active leks.[139] The Pacific Decadal Oscillation ("PDO") a climate index derived from sea surface temperatures in the North Pacific accounted

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[134] COT Report at 10.
[135] *Id.*
[136] *See* http://blogs.scientificamerican.com/extinction-countdown/2014/10/17/sage-grouse-oil-drilling/.
[137] Ramey et al. 2014.
[138] Ramey and Ivey 2014.
[139] Ramey et al. 2014; *See also* Wyoming Game and Fish Department, *Wyoming Sage-Grouse Population Lek Count Data* (2013); Wyoming Oil and Gas Conservation Commission *Well Data*; Disturbance Data from PAPO, JDMIS, and PDMIS databases.

for 78% of population variations in Pinedale and 67% in Wyoming GRSG working groups.[140] If the primary climate drivers of GRSG populations are not taken into account, as they are not in the COT Report, then management prescriptions will be based on erroneous information and doomed to failure. The publicly available lek count data from states show that GRSG population cycles have *not* been lost. Instead, lek counts, even in areas of oil and natural gas development, show a pattern of synchronous cycling (Wyoming Game and Fish 2012).

The COT Report misrepresents Naugle et al. 2011a and Doherty et al. 2008 to allege that habitat fragmentation results in a total loss of winter habitat. In reality, these studies only demonstrate that GRSG avoid densely developed Coalbed Methane (CBM) fields, and should not be erroneously applied across all oil and natural gas producing areas.[141]

While conceding there is little published research on the topic, FWS describes energy development as one of the greatest threats to GRSG. As one example, Knick and Hanser 2011 (Knick and Hanser were cited eighttimes in the COT Report, six times in the NTT Report and 38 times in the 2010 GRSG listing decision) claim populations in the Colorado Plateau have a 96% chance of declining below 200 males by 2037 due primarily to threats from oil and gas. Such assertions are without basis given the status of GRSG populations today.[142] Reliance on Connelly et al. (2004) and Garton et al. (2011) is particularly misplaced. *See* Exhibit A at 2; *see also* Exhibit B at 7-10.

Reliance on Garton 2009, pers. comm., is also misplaced. FWS has stated, "[P]opulation stability may also be compromised if cycles in sage-grouse populations are lost, which current analyses suggest, minimizing the opportunities for population recovery if habitat were available

[140] Ramey et al. 2014.
[141] *See* Ramey, Brown and Blackgoat 2011, Applegate and Owens 2014 and Kirol et al 2015, etc.
[142] *See* Zink 2014; Ramey et al. 2014.

(Garton 2009, pers. comm.)."[143] This suggests GRSG populations have been lost and that this loss can compromise population stability. However, there are no data or analyses to support these statements.

Garton et al. 2011 was cited 62 times in the 2010 WBP decision. However, Garton et al. 2009, 2011 did not include any analysis of population cycles, or their potential drivers, into their population reconstructions, statistical analyses, or population persistence models. *See* Exhibit D, Peer Review and Information Quality Breakdown. Nor did Garton (2009, 2011) analyze the potential effects of oil and gas development on GRSG population trends. In fact, Petitioners are aware of no published studies that have shown that oil and gas development has affected GRSG population cycles. FWS may not rely upon Garton 2009, pers. comm. or Garton et al. 2011 without violating the DQA, the Guidelines and the additional authorities cited herein.

Reliance on studies such as Connelly et al. 2004, Garton et al. 2011 and Taylor et al. 2012 to analyze the lek count data is also misplaced. Table 2 in the COT Report (threats) are based entirely on Garton et al. 2011.[144] As discussed herein, Garton et al. 2011 has been thoroughly discredited. *See* Exhibit A at 2; Exhibit B at 7; Exhibit D. This threats analysis was alleged based upon, "known occurrence of threats, existing management strategies, and professional experience."[145]

Garton et al. 2011 and Taylor et al. 2012 were modeling exercises based upon lek count data. Estimates derived from those data have extremely large errors and low statistical confidence. For example, Garton et al. 2011 had extremely low resolution. *See* Exhibit D. This indicates that the models, on average, did not explain 75% of the variation in the data sets.

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[143] The cited personal communication is listed in the Literature Cited for the 2010 listing decision as: "[T]elephone interview. Dr. Oz Garton, Professor, University of Idaho, in Moscow, ID (December 18, 2009)."

[144] COT Report at 16.

[145] COT Report at 14 (emphasis added).

Adding to this error, neither Garton et al. 2011 nor Taylor et al. 2012 accounted for the effect of documented population fluctuations as a result of climatic fluctuations (i.e. Wyoming Game and Fish 2012b; Blomberg 2012; Ramey et al. 2014) on their trend estimates. Taylor et al. (2012) used data from 2003 to 2009, a period of population fluctuation that peaked in 2006 and then declined (a fact not mentioned by the author nor acknowledged by the COT Report). Taylor et al. 2012 also contains a number of overstatements and omissions,

> "[F]indings reflect the status of a small remaining sage-grouse population that has already experienced an 82% decline within the expansive energy fields (Walker et al. 2007a), a level of impact that has severely reduced options for delineating core areas that are large enough and in high enough quality habitats to sustain populations."

While this statement is dramatic, the reality of the situation is quite different.[146]

In addition, Walker et al. 2007 had confidence intervals so large that they are effectively meaningless (i.e., a rate of increase in coal bed methane fields of 0.65 with a 95% confidence interval between 0.34 and 1.25, as 34 to 125% annual increase). Walker fails to acknowledge that lek counts declined from 2001 through 2004 but rebounded in 2005.[147]

None of the cited studies were representative of the Great Basin birds. The study area used by Aldridge and Boyce 2007[148] is not representative of GRSG range-wide. Moreover, the Alberta population is small and has minimal suitable habitat available as a result of ecology and geologic formations. Therefore, any impact on this population will appear heightened compared to what may happen to other, more robust populations.

The COT Report's treatment of noise and oil and natural gas operations violates the DQA and the Guidelines. Recommendations were based on the subjective opinions of the authors of

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[146] See Ramey, Thorley and Ivey 2014.
[147] Wyoming Game and Fish 2012b.
[148] Interestingly, the data in Aldridge and Boyce 2007 suggest the majority of the late brood rearing habitat is already on land that is regulated by BLM.

cited studies rather than data. *See* Exhibit A at 5-8; *see also* Exhibit B at 2-4. The cited studies, all performed by one research group, used substandard equipment and employed methods that were inconsistent with professional data collection and reporting standards in the industry that are used to ensure unbiased and systematic data collection. The underlying data in the cited noise studies is not public and not reproducible. What is being proposed for noise thresholds is an impossible standard to achieve found in an idyllic wilderness setting; and described with non-standard equipment and unaccepted techniques.

These studies do not support the proposition for which they are cited. They do not report population-level effects to GRSG. Rather, temporary avoidance was observed under very specific circumstances with no evidence of deleterious effects on fitness. *See* Exhibits A and B, *gen*. Moreover, the authors, and the COT Report, fail to examine whether noise could have positive effects on GRSG—such as interference with predation or whether daily motorized trips to noise monitoring stations to replace batteries may have interfered with test results.

Here, the most recent science indicates GRSG use greater variances in habitat (Reinhart et al. 2013) and that noise tolerances and habitat selection in areas of high road density are greater than previously documented.[149] Moreover, topographic roughness appeared to be a much stronger indicator of habitat avoidance than anthropogenic disturbances.[150]

The COT Report's treatment of noise is completely inconsistent with the previous background of 39 dBA background plus the 10 decibel threshold. This overly restrictive threshold is based on a questionable study referenced directly in the COT Report and will be difficult, if not impossible to achieve. There is no peer reviewed data that supports a background

[149] Patricelli et al. (2012).
[150] *Id.*

at dawn for a 20-24 background level. FWS needs to replace these flawed recommendations with the 39 dBA which is currently in use when assessing noise considerations in GRSG habitat.

The COT Report also failed to acknowledge lower impact technologies and mitigation currently in use by the oil and gas industry, including specifically those detailed in Ramey, Brown, and Blackgoat 2011 and Applegate and Owens 2014. In fact, the COT would impede the use of this new technology by limiting activities including year-round oil and gas development and its associated benefits such as reduced truck traffic, reduced emissions, and phased development.

Frequently cited studies in the COT Report regarding energy infrastructure and disturbance on GRSG are outdated. Kirol et al. 2015, Ramey, Brown and Blackgoat 2011, and Applegate and Owens 2014, have demonstrated technological advances and mitigative methodologies help to minimize impacts to GRSG. In addition, all of the cited studies in the COT Report were conducted in heavily developed energy fields which did not utilize today's technology. Thus, the studies represent a small fraction of the range of GRSG only in heavily developed energy fields in Wyoming and Alberta.

The COT Report cites Doherty et al. 2010 for the proposition that energy development should be avoided in priority areas of conservation ("PACs") and Blickley et al. 2012 for the proposition that development should minimize use of tall structures.[151] But reliance on these studies is also misplaced as they are not supported by hard data. *See* Exhibit A at 6-9.

While avoidance might occur due to heavily developed oil and gas fields, the intensive down-hole development of yesteryear at Pinedale is not representative of a typical field today. Notably, many of these areas developed prior to widespread use of directional drilling and clustered development. Accordingly, impacts from oil and gas development today are likely to

[151] COT Report at 43.

be even smaller. Further, Pinedale GRSG populations have not reacted as these authors predicted.[152]

Other errors of omission in the COT Report include numerous scientific papers and reports on oil and gas and mitigation measures. *See* Exhibit B at 18-20. The COT Report fails to acknowledge that this situation has substantially changed due to the advent of advanced reclamation, methods to limit surface disturbance, and other protective measures that are now mainstream in development that takes place in habitat areas. For example, a study prepared by SWCA Environmental Consultants catalogued an astonishing 773 conservation measures and an average of 6.5 Conditions of Approval (COA) or conservation measures to protect GRSG per project.[153]

Oil and natural gas development and mining activities are by nature temporary disturbances. The highest level of surface disturbance associated with development occurs during the construction drilling and completion phases, which can last from a few weeks to a few months. Once production is achieved, the surface disturbance that results from these activities shrinks dramatically and long-term disturbances represent only a small fraction of the initial disturbance.

3. Mining

Similarly, in regards to mining, the COT Report claims (with no citations nor support) that facilities within GRSG habitat result in the direct loss of habitat, habitat fragmentation, and indirect impacts from disturbance and that current reclamation activities do not always consider GRSG habitat needs and might take decades to restore.[154] Similarly, with no citation

[152] *See* Ramey et al. 2014; *see also* WY Fish and Game population summaries.
[153] *See Id*. at page 5; *see also* List of NEPA Documents Reviewed beginning at 35.
[154] COT Report at 49.

whatsoever, FWS claims that climate change could expand the importance of fire and invasive plans.[155]

These bald assertions fail to meet the DQA, the Guidelines or the additional authorities cited herein. Other alleged threats cited with no citations nor authority include recreational activities, ex-urban development,[156] and development of infrastructure "for any purpose" results in habitat loss, fragmentation, and may cause GRSG habitat avoidance.[157]

For all of these reasons, FWS has not adequately addressed these significant issues in the COT Report in contravention of the DQA, the Guidelines and the additional authorities cited herein.

IV. The COT Report Misrepresents Several Key Issues

A. Robust GRSG Populations

There are many errors in the COT Report's approach to GRSG populations. For example, FWS has not produced any data to demonstrate that its targets for GRSG populations and leks are achievable or how the targets will allegedly enhance genetic connections, especially when the role of female grouse in the population monitoring is completely ignored. In addition, Ramey et al. 2013 detected several errors in the calculations of the seminal study cited in the COT Report (Garton et al. 2011) that dramatically skew probabilities to estimated declines over time.

There is no evidence of the purported population declines nor genetic isolation that FWS contends. In his recently published study (Zink 2014), Dr. Robert Zink found no genetic evidence of population declines in GRSG.

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[155] *Id.* at 10.
[156] *Id.* at 49-50.
[157] *Id.* at 51.

Zink "compare[d] genetic variability measures with quantitative estimates of population trends to determine whether the effects of population declines can be observed at two geographic scales in the microsatellite and mitochondrial DNA data…" Populations in decline should show reduced genetic diversity with corresponding risks to population persistence. But for GRSG, "the expected population genetic signatures of differences in population size were not observed." Dr. Zink concluded, "[T]here is no clear evidence that the population genetic variability of the greater sage-grouse has been influenced by range reduction and fragmentation" and that "there is no evidence of heightened inbreeding in smaller populations."

For example, in Utah, the number of leks counted has increased from a low of 125 to 361 currently.[158] In regards to males counted, the increase is even more dramatic: 1,555 males in 1996 to 5,973 in 2006 (280%).[159] While current numbers are not quite that high, differences in methodologies and inaccuracies inherent in lek counts must be considered. BLM also acknowledges in its Land Use Plan Amendments that, "GRSG in Colorado have been increasing for about the last 17 years, and breeding populations have not declined for the last 39 years,"[160] and that sagebrush habitat in Jackson County (which harbors the second largest population in the planning area) is, "largely intact, and there is little threat of fragmentation."[161] And data from the Nevada Department of Wildlife ("NDOW") indicates GRSG populations have been increasing over the last three years. According to NDOW, the 2010 fall population estimate increased about 18% compared to the 2009 estimate, and the population has been increasing since 2008.

It should be noted that FWS and USGS convened a closed-door workshop on October 22-23, 2014 in Ft. Collins, Colorado entitled "Expert Elicitation Workshop on the Genetics of

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[158] Utah GRSG DEIS 3.2.1 at 3-8.
[159] *Id.*
[160] *See* Northwest Colorado GRSG DEIS at 253 *citing* Figure 3-5.
[161] *Id.* at 246.

Greater-Sage Grouse" (the "Workshop'). The aim of the Workshop was ostensibly to work on "specific technical questions." The way in which the agencies convened this Workshop also drew sharp rebukes and calls for transparency from 18 Members of Congress in an October 16, 2014 letter to Interior Secretary Sally Jewell.[162] Petitioners believe the way the Workshop was convened and conducted likely violates FACA, the DQA and its Guidelines as well as presidential memoranda and DOI orders on scientific integrity and transparency. We caution FWS not to adopt or incorporate any alleged findings from this closed-door Workshop.

The COT Report fails to acknowledge that the size of GRSG populations sufficiently negates threats. FWS has estimated the GRSG population to be 535, 542.[163] Many species have been delisted or removed from candidate status with far less significant population numbers and ranges, such as:

- FWS withdrew the black-tailed prairie dog ("BTPD") from candidate status despite significant variations in certain populations. In the 12-month finding for the BTPD, FWS noted that urbanization represents a locally substantial loss of occupied habitat, but in a range-wide context, it is not significant. FWS further stated, given population estimates in Colorado and elsewhere, urbanization cannot be considered a threat at present or in the foreseeable future, either in Colorado or range-wide, despite the fact that "considerable effects due to this factor have occurred in the past."[164]

- FWS removed the peregrine falcon from the list of endangered and threatened species with only 1,650 peregrine breeding pairs in the United States and Canada.[165]

- FWS withdrew its proposal to list the mountain plover where the current total population of mountain plovers was estimated to be between 5,000 and 11,000 individuals.[166]

- Due to the size of the current Aleutian Canada goose population (37,000 individuals) and the management practices on currently used goose habitats, FWS found that potential threats such as development, variable market conditions, changing agricultural practices, and adverse climactic conditions did not threaten the continued survival of the species. FWS stated it believed that the size of the population was such that it would have time to

[162] http://naturalresources.house.gov/news/documentsingle.aspx?DocumentID=397887
[163] 75 Fed. Reg. 13910, 13921 (Mar. 23, 2010).
[164] 69 Fed. Reg. 51217 (Aug. 18, 2004).
[165] Press Release, FWS, *The Peregrine Falcon is Back!*, (Aug. 20, 1999).
[166] 68 Fed. Reg. 53083 (Sept. 9, 2003); *see also* Press Release, *FWS Withdraws Proposal to List the Mountain Plover as a Threatened Species*, (Sept. 8, 2003).

intervene on behalf of the subspecies should any of these become threats to the continued survival of the subspecies.[167]

- In its 2014 Candidate Notice of Review, FWS lowered its listing priority number for Sprague's pipit due to its large population size.[168]

Perhaps never before has FWS considered listing a species so numerous and wide-ranging as GRSG. As noted above, there is ample precedent not to embark on the proposed regulatory restrictions, let alone a federal listing, when population numbers are robust, as they are for GRSG. Such actions are unlikely to benefit the species but would certainly harm the West.

B. GRSG Populations Naturally Fluctuate

A summary of population information found that GRSG lived longer, have higher winter survival rates, lower rates of reproduction, and are more migratory over greater distances than previously thought.[169] While the COT Report concedes, "[T]he actual decline in the number of sage-grouse from pre-settlement times is unclear as estimates of greater sage-grouse abundance were mostly anecdotal prior to the implementation of systematic surveys in the 1950s (Braun 1998),"[170] it fails to recognize that populations of any given species naturally fluctuate.

Populations of any given species are known to be extremely dynamic. It is critical to understand the trends in population dynamics and the factors responsible for population variability to properly evaluate and manage species. Understanding natural fluctuations in abundance and the population dynamics of individual and range-wide populations is also essential for the proper status assessment of a species.

A summary of population information found that GRSG lived longer, have higher winter survival rates, lower rates of reproduction, and are more migratory over greater distances than

[167] 66 Fed. Reg. 15643 (Mar. 20, 2001); *see also* Press Release, FWS, *An Endangered Species Success Story: Secretary Norton Announces Delisting of Aleutian Canada Goose*, (Mar. 19, 2001).
[168] 79 Fed. Reg. 72450, 72453 (Dec. 5, 2014).
[169] Connelly et al. 2011.
[170] COT Report at 6.

acknowledged in the COT Report.[171] The COT Report fails to take into account that populations of species are responsive to such factors as seasonal and long-term fluctuations in regional weather conditions, short-term weather extremes and stochastic events, intra- and inter- species competition for resources, intra- and inter- species behavioral competition, predator-prey relationships, and subtle or severe changes in habitat quality. As discussed above, climactic patterns associated with the PDO greatly influence GRSG populations in Wyoming.[172] These and other factors may influence a species greatly, and may mask or prevent a correct interpretation of direct and indirect anthropomorphic factors.

GRSG populations characteristically exhibit multi-annual fluctuations in abundance (Appendix 1, Figure 1 and 2), indicating that some mechanism or combination of mechanisms are causative factors.[173] Factors influencing GRSG abundance may include weather patterns and the composition and abundance of predators that influence nesting success (Montana GRSG Working Group 2005) Nesting success and chick survival is considered to be the most significant parameter affecting population dynamics.[174]

Published studies of factors affecting nest success and GRSG chick survival have focused on micro-scale habitat factors such as percent coverage and height of forbs and grasses and availability of arthropods.[175] These studies follow logically from previous research on GRSG brood habitat selection (Sveum et al. 1998, Drut et al. 1994a, Wallestad 1971, Klebenow 1969) and chick diets (Drut et al. 1994b, Johnson and Boyce 1990, Peterson 1970, Klebenow and Gray 1968). Many relevant studies were with ignored in the COT Report or published subsequent to its release. *See* Exhibit C. Collectively, these studies clearly demonstrate that nesting GRSG

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[171] Connelly et al. 2011.
[172] *See* Ramey et al. 2014.
[173] USFWS 2013, Fedy and Doherty 2010, Montana GRSG Working Group 2005.
[174] Schroeder et al. 1999.
[175] Aldridge and Boyce 2007, Dahlgren et al. 2010, Gregg and Crawford 2009.

typically select relatively mesic[176] habitats with abundant forbs and arthropods and that chick survival is highly correlated with these factors. Chick survival has been shown to be an important determinant of population growth rates, yet relatively little is known about chick survival at the population level relative to large-scale abiotic factors such as regional variation precipitation and temperature.

Guttery et al. 2013 reported that climatic variables play a primary role in determining GRSG reproductive success and the study demonstrated that temperature and precipitation have significant effects on chick survival. Similarly, Blomberg et al. 2012 found strong correlation between multiple climatic variables and GRSG population dynamics (*see* Appendix 1, Figure 3 and Figure 4). Annual recruitment of GRSG was higher in years with higher precipitation, based on annual precipitation, annual rainfall, and average winter snow depth. Likewise, GRSG population growth was positively correlated with annual rainfall and mean monthly winter snowpack in the study area. Annual survival of adult male GRSG was negatively affected by high summertime temperatures, as higher survival rates occurred in years with relatively low maximum temperatures.

Extended periods of below normal precipitation and shorter term severe drought may reduce the abundance and duration of herbaceous cover at nest sites, and result in a reduction in the quantity and quality of food resources available to hens and chicks, which, if severe, could jeopardize GRSG survival.[177] The COT Report conveniently ignored environmental impacts to GRSG and focused almost exclusively on alleged human impacts. Prolonged drought during the 1930's and mid- 1980's to early 1990's coincided with declining GRSG populations throughout much of the species' range (Patterson 1952, Fischer 1994, Hanf et al. 1994, Connelly and Braun

[176] Habitat with moderate or well-balanced supply of moisture.
[177] McCarthy and Kobriger 2005; Connelly et al. 2004; Fischer et al. 1996.

1997, Braun 1998). From 1985 through 1995, the entire range of GRSG experienced severe drought, as defined by the Palmer Drought Severity Index, with the exceptions of north-central Colorado and southern Nevada (USFWS 2013). Heath et al. 1997 concluded that drought conditions during spring and summer 1994 in Wyoming resulted in impaired productivity and decreased survival of GRSG, most likely because of subsequent decreases in forb production and increased predation resulting from a lack of sufficient cover.

These results are consistent with the hypothesis that water balance in sagebrush systems is important to GRSG populations and led the authors to conclude that the stability of GRSG populations is dependent upon stable annual survival rates and occasional large inputs of new individuals into the population when climatic conditions are favorable for chick and juvenile survival.

The amount and timing of spring and summer rainfall affects annual plant production and influences population dynamics of GRSG, causing short term fluctuations of less than 10 years in GRSG abundance.[178] Wet springs often result in increased green-up and an increase in the variety of forbs, and consequently insects, on the sage-steppe thereby increasing chick survival.[179] Wyoming Game and Fish Department 2009 reported increases in GRSG numbers in Wyoming during the late 1990's with some individual leks seeing three-fold increases in the number of males between 1997 and 1999. This increase was synchronous with increased spring precipitation over the period. The return of drought conditions in the early 2000's appeared to have led to decreases in chick production and survival, thus resulting in declining populations.

[178] Eustace 2002.
[179] McCarthy and Kobriger 2005, Blomberg et al. 2012.

Conversely, extreme precipitation during spring and summer caused widespread flooding in 2011 in southeastern Montana and increased GRSG nest failure and depressed hatch rates.[180]

Cold, wet weather or extremely low temperatures during the hatching period can result in loss of chicks and young birds to hypothermia.[181] Measures of drought, precipitation, and temperature can be correlated to winter snow pack which is known to be a major driver of vegetation dynamics throughout much of the mountainous regions of western North America.[182] Long, cold winters with deep snows that cover sagebrush plants on winter ranges can be a threat to survival because GRSG are totally dependent upon sagebrush as food during winter months.[183]

Until several recent studies, there was no evidence that severe winter weather affected GRSG populations unless sagebrush habitat had been greatly reduced (Connelly et al. 2000); however, such an effect was reported recently in several studies. Danvir 2002 recorded declines in a GRSG population following deep snow winters of 1985-86 and 1992-93 in Wyoming. The theory being that the GRSG survival rates declined because the species became more visible, and vulnerable to predation, and that there was increased competition with jackrabbits, mule deer, and other grouse for the sagebrush foliage available above the snowpack. Moynahan et al. 2006 found that a severe winter affected survival of GRSG in Montana from 2001 to 2004. Similarly, Anthony and Willis 2009 reported strong evidence that severe weather (i.e., mean daily min. temp, extreme min. temp, snow depth) affected survival of female GRSG in southeastern Oregon.

The effects of both annual and long-term fluctuations in weather patterns on the nest success and survival of GRSG have been well documented. Short-term fluctuations in weather

[180] Foster et al. year unknown.
[181] McCarthy and Kobriger 2005, Hannon and Martin 2006.
[182] Walker et al.1993.
[183] McCarthy and Kobriger 2005.

patterns are significant factors contributing to the annual and near future population status, while long term weather patterns have a greater effect on condition of habitats occupied by the population and play a larger role in determining the long term trends of the population.[184]

Critical information on natural population fluctuations and the factors that drive them such as weather patterns and survival rates are glaringly omitted in the COT Report. *See* Exhibit C. Taking into account natural fluctuations in GRSG population and their primary drivers, using explicit, data-driven population models (e.g. Bayesian hierarchical state-space models) must be included in any objective and statistically rigorous evaluation of the population status.[185] An accurate assessment of GRSG population dynamics and fluctuations are also critical to proper species management and developing effective conservation and mitigation strategies. Rather than conducting a trends analysis or considering environmental factors that impact populations, the COT Report blindly assumes that long term population trends can be controlled through restrictions on human activity and curtailing multiple uses of public lands.

The COT Report lays the groundwork for an improper regulatory threshold that GRSG populations must be stable or increasing in all cases which is arbitrary, capricious, and unscientific in violation of the DQA, the Guidelines and the additional authorities discussed herein.

C. Predation and Predator Control

The COT Report ignores substantive threats to GRSG in favor of pre-conceived notions of human impact in violation of the DQA and the Guidelines. Predation is the most common cause of direct mortalities of the GRSG. GRSG eggs are preyed upon by red foxes (*Vulpes vulpes*), coyotes (*Canis latrans*), American badgers (*Taxidea taxus*), common ravens (*Corvus*

[184] *Id.*
[185] Coates *et al.* 2014.

corax), and black-billed magpies (*Pica hudsonia*). Common predators of juvenile and adult GRSG are golden eagles (*Aquila chrysaetos*), prairie falcons (*Falco mexicanus*), other raptors, coyotes, American badgers, and bobcats (*Lynx rufus*). Younger birds, especially broods, are preyed upon by common ravens, red foxes, northern harriers (*Circus cyaneus*), weasels (*Mustela sp.*), and various species of ground squirrels and snakes.

Of these predators, the common raven is the most abundant and has the greatest impact on the survivorship of the GRSG. Raven populations have increased an estimated 300% in the past 27 years in the United States (Sauer et al. 2008) with reports of 1,500% increases within a 25-year period in some areas of the West.[186] The COT Report virtually ignores this critical fact. While not migratory species, crows and ravens are inexplicably protected under the Migratory Bird Treaty Act ("MBTA").[187] Nowhere does the COT Report call out that the primary predator of GRSG is protected by the MBTA such that predator control efforts that would benefit GRSG are hindered by regulatory red-tape and FWS approvals.

Mortality due to predation during the first few weeks after hatching was estimated to be 82%.[188] In regards to Gunnison sage-grouse, "survival of juveniles to their first breeding season was estimated to be low (10%)" which could be similar for GRSG.[189] The COT Report alleges nest success and survival studies are impacted by predation only where poor land management, which the COT Report seems to characterize as grazing, is an issue. Exhibit A at 8-9. Failure to recognize the significant impacts of predation and the attempt to attribute such impacts to human influences clearly exhibits bias. Moreover, nothing is presented to quantify the habitat

[186] Boarman 1993.
[187] 50 C.F.R. § 20.100.
[188] Gregg *et al.* 2007.
[189] GUSG Threatened Listing, 79 FR 69192, 69274 (Nov. 20, 2014).

conditions that are purported to increase the significance of predation and nothing to identify the significance those conditions to sage grouse habitat throughout their range in the COT Report.

The common raven is clever and highly adaptable, which allows it to opportunistically exploit food resources provided by human activities. Ravens routinely forage at landfills, in dumpsters, and at livestock operations and they commonly scavenge on carcasses of animals killed by vehicle strikes. The explosive increase in raven abundance has resulted in large increases in predation, and has contributed to the severe decline of many species including the desert tortoise (*Gopherus* sp.), marbled murrelet (*Brachyramphus marmoratus*), least tern (*Sternula antillarum*), California condor (*Gymnogyps californianus*), and GRSG.

While many scientific studies have found that GRSG nest predation is related to the amount of herbaceous cover surrounding nest sites and that nesting success is correlated with vegetation structure and composition, suggesting that the quantity and condition of breeding habitat is the most important factor that dictates the productivity of GRSG (Connelly et al. 1994, Braun 1998, Schroeder and Baydack 2001, Coates 2007, Hagen 2011). The COT Report ignores substantial evidence indicating that most GRSG nests are lost to predators such as red foxes, badgers, coyotes, black-billed magpies, and common ravens, even in <u>excellent</u> GRSG habitat. *See* Exhibit B at 19-20.[190]

The negative effects of predation and raven abundance on nest success have been well documented. GRSG nests are subject to varying levels of predation. Predation can be total (all eggs destroyed) or partial (one or more eggs are destroyed). However, in either case, hens abandon the nests.[191] Re-nesting efforts may partially compensate for the loss of nests due to predation (Schroeder 1997) but may not completely offset the losses. Additionally, the presence

[190] *See also* Gregg et al. 1994, Heath *et al.* 1997, Holloran 1999, Connelly et al. 2004.
[191] Coates 2007.

of high numbers of predators within a GRSG nesting area may negatively affect GRSG productivity without causing direct mortality. Loss of breeding hens and young chicks to predation can influence overall GRSG population numbers, as these two groups contribute most significantly to population productivity.[192]

According to Valkama et al. (2005), predation may influence grouse population dynamics by reducing nest success, survival of juveniles especially during the first few weeks after hatching, and annual survival of breeding age birds. Similarly, others found that nest predation can be a limiting factor for GRSG population sustainability.[193] Moynahan et al. (2007) reported that 54% of nest failures were caused by predation. Gregg et al. (2007) estimated that GRSG mortalities due to predation were as high as 82% during the first few weeks after hatching.

Raven abundance was strongly associated with GRSG nest failure in northeastern Nevada, resulting in negative effects on GRSG reproduction.[194] The study associated increased raven abundance with a reduction in the time spent off the nest by female GRSG, thereby potentially compromising the ability to secure sufficient nutrition to complete the incubation process. Similarly, high crow and related corvid family abundances attributed to increased GRSG nest and brood failure in western Wyoming (Bui 2009). Coates and Delehanty (2010) found that GRSG nest failure and observed raven predation of GRSG nests were associated with indices of raven abundance. Decreases in daily survival rate of GRSG were attributed to increased raven abundance.

Unlike other population limiting factors such as weather, and drought, predation can realistically be reduced by applying appropriate management measures.[195] Management of some

[192] Baxter et al. 2008.
[193] Nelson 1955, Gregg et al. 1994, Schroeder and Baydack 2001.
[194] Coates 2007.
[195] Cote and Sutherland 1997.

predator populations, especially raven populations occurring in areas where GRSG mortality is high, is needed to ensure that GRSG populations are not depressed by a known and easily mitigated source of mortality.

In 2001, the U.S. Department of Agriculture (USDA) Animal Plant Health Inspection Service (APHIS) Wildlife Services (WS) initiated a systematic raven management program in Nevada to reduce raven numbers in GRSG habitat. The primary method of raven removal was through chicken egg baits treated with DRC-1339 (3-chlorop- toluidine hydrochloride). Coates and Delehanty (2004) observed that GRSG nest success near these raven removal activities was significantly greater (73.6%) than the mean nest success (42.6%) based on 14 studies from 1941 to 1997.[196] They also observed that raven numbers in treated areas declined from a high of 5/km^2 to low of 0.31/km^2 over a period of five month.

In 2007, the USDA/APHIS/WS began testing the effects of the removal of common ravens using baits treated with DRC-1339 to livestock depredation in southern Wyoming. This program provided additional information of the potential effects of raven removal on GRSG nest success. It was found that the nest success of GRSG was reduced when ravens were present within 550 meters of a nest. The study also reported that the abundance of ravens can be substantially reduced at a relatively large scale (15-km radius or 706.5 km^2) by using DRC-1339; raven densities decreased by 61% at removal sites compared to an increase of 42% at non-removal sites. In areas occupied by ravens, average GRSG nest survival was estimated at 22%; and in areas absent of ravens, nest survival was estimated at 41%. This suggests that areas with high raven populations may contribute to lower GRSG population growth rates (Dinkins 2013). Cote and Sutherland (1997), using meta-analytic techniques, found that predator removal has a

[196] Schroader et al. 1999.

large, positive effect on post breeding population size and hatching success for several species of game birds.

Results of these raven removal efforts suggest that well-designed raven management strategies could substantially increase GRSG nest survival rates in areas where raven predation is a substantial contributing factor to nest failure. Long-term solutions to reduce artificially high raven abundances are necessary to address the detrimental effects of raven predation on GRSG and other imperiled species. Reducing raven abundance has been shown to be effective using some lethal means, and reducing numbers may also be possible using other as yet untested lethal and non-lethal means. Effective lethal control might be accomplished by shooting, removal of raven nests and eggs, and poisoned baits. Effective non-lethal control might be accomplished by reducing or eliminating nesting structures and/or making subsidized food resources (road-kill, dead livestock, and garbage) unavailable. Despite the research and application of these methods for raven management, the COT Report selectively disregarded them.

The negative effects of predation on the nest success of the GRSG have been well documented and should be included in any objective and complete analysis of threats to GRSG. The 2010 WBP decision (USFWS 2010) recognized predation as a primary threat to the GRSG and devoted three pages of discussion to this issue.[197] Despite this, some recent efforts to develop range-wide conservation objectives for the GRSG and to inform the public of the upcoming 2015 listing decision failed to recognize and address predation as a primary threat to the species.

The COT Report virtually ignored the topic of predation and the major body of scientific literature on raven predation and experimental data on predator management. It fails to recognize predation as the single most important factor affecting the abundance of the GRSG.

[197] 75 Fed. Reg. at 13910.

Substantial and critically important information on these topics is available from a variety of sources including Boarman 1993; Boarman 2003; Boarman et al. 1995; Boarman and Heinrich 1999; Boarman et al. 2006; Bedrosian and Craighead 2010; Bui 2009; Cagney et al. 2010; Christiansen 2011; Coates 2007; Coates and Delehanty. 2004; Coates et al. 2008; Coates and Delehanty 2010; Conover et al. 2010; Cote and Sutherland 1997; DeLong 1995; Gregg et al. 1994; Heinrich et al. 1994; Moynahan et al. 2007; Preston 2005; Ramey, Brown, and Blackgoat 2011; Schroeder and Baydack 2001; Snyder et al. 1986; Sovada et al. 1995; Watters et al. 2002; and Webb et al. 2009. Finally, recent work Baxter et al. 2013 shows even bottlenecked GRSG populations can see marked population improvements following predator control efforts.[198]

The COT Report ignored the body of literature relevant to raven predation on GRSG, including its deleterious effect on survivorship and recruitment, and most importantly, the integrated management strategies that can reduce losses of GRSG. Only two references related to predation on GRSG were cited (Greg et al. 1994 and Hagen 2011) and the word "raven" was mentioned only once, at 63. The COT Report did not mention predator management that could benefit GRSG within high risk areas and instead, viewed predation as a byproduct of human activities that could be regulated through land health assessments and emphasizing vegetation cover as a means to measure and mitigate livestock use; or increasing landscape level habitat connectivity. This extremely passive and scientifically untested approach is speculative at best and therefore would not result in a reduction of the short-term or long-term threats caused by high raven abundances.

Even though the COT Report contends that predation impacts are solely related to habitat condition, there is no information to suggest that habitat conditions alone will compensate for

[198] Baxter, R. J., Larsen, R. T. and Flinders, J. T. (2013), Survival of resident and translocated greater sage-grouse in Strawberry Valley, Utah: A 13-year study. The Journal of Wildlife Management, 77: 802–811. doi: 10.1002/jwmg.520.

excessively high predator populations. The information disseminated concludes that, regardless of habitat conditions, predation does not affect GRSG populations in general. However, the removal of predators was a primary factor in the recovery and delisting of the Aleutian Canada goose in North America.[199] In delisting the Aleutian Canada goose, FWS also recognized the removal of predators benefited not only that species, but many other bird species on the islands, including puffins, murrelets, and auklets.[200]

The COT Report provides limited and selective evaluations of threats to GRSG, and ignore the major body of scientific literature that is available on raven predation and experimental predator management. In order to comply with the DQA and the Guidelines, the The FWS needs to address and incorporate this information on the effects of predation and predator control into the COT Report.

D. Hunting

The COT Report virtually ignores hunting as a threat to GRSG. GRSG have rangewide population estimates in excess of 535,000.[201] Some 207,430 GRSG were harvested during hunting seasons between 2001 and 2007.[202] As a result, ongoing hunting is likely a contributor to declines in GRSG populations or avoidance of human activities in GRSG populations. New data and research published by Gibson et al. 2011 have refuted the frequently repeated belief that there is a no additive demographic effect of hunting on GRSG populations. Thus, the hunting of some populations can have an effect not only on those populations but also on nearby populations that are not hunted (but are genetically and demographically linked by dispersal).[203]

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[199] 66 Fed. Reg. 15643 (Mar. 20, 2001); *see also* FWS News Release, March 19, 2001.
[200] 66 Fed. Reg. 15643 (Mar. 20, 2001); *see also* Press Release, *An Endangered Species Success Story: Secretary Norton Announces Delisting of Aleutian Canada Goose*, (Mar. 19, 2001).
[201] 75 Fed. Reg. 13910, 13921 (Mar. 23, 2010).
[202] Reese and Connelly 2011.
[203] Gibson et al. 2011.

E. West Nile Virus

The COT Report presents West Nile Virus ("WNV") as a threat to GRSG, yet fails to acknowledge that mosquitoes are already sufficiently managed and there are new technologies other than larvicides that have been proven effective to controlling mosquito populations. According to data from the Centers for Disease Control ("CDC") the risk to avian species from WNV has declined to virtually nothing since 2003.[204] This is an example of where only a portion of the available information is used to address the impacts, in this case of WNV on GRSG, resulting in onerous and unfounded mitigation requirements.

F. Existing Regulatory Mechanisms

In 2010, FWS determined GRSG were warranted for listing based primarily on the present or threatened destruction, modification or curtailment of habitat or range and the alleged inadequacy of existing regulatory mechanisms. The COT Report sets forth strategies to address resilience focused on habitat.[205] However, the COT Report also recognized that adequate regulatory mechanisms are essential to addressing habitat concerns.[206] While the COT dimly acknowledges BLM and USFS Land Use Plan Amendments and the development and implementation of individual state management plans for GRSG, it fails to grasp the depth and breadth of these efforts.

Moreover, the COT Report fails to acknowledge the regulatory mechanisms already inherent to BLM's regulation and management of the onshore oil and natural gas program. No drilling, access, seismic studies or any other surface disturbing work can proceed without regulatory authorization by BLM. This regulatory authorization comes in multiple forms, but the

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[204] *See* http://diseasemaps.usgs.gov/wnv_us_human.html.
[205] COT Report at 38.
[206] *Id.*

primary are commitments made in project-specific NEPA documents, and Applications for Permit to Drill ("APD").

Companies may not apply for an APD without first completing project-specific environmental analysis under NEPA. When BLM determines that there sill be significant impact to GRSG or other resources for that matter, it prepares and Environmental Impact Statement (EIS) that includes mitigation measures for protecting GRSG. BLM and the companies make a firm commitment that the mitigation measures in the EIS will be enforced through Conditions of Approval ("COA") on APDs. As the APD is absolutely required before drilling can occur, this amounts to a regulatory mechanism that should be recognized by FWS. In fact, a study prepared by SWCA Environmental Consultants found that oil and natural gas companies have more stringent standards in place than the agencies acknowledge. From just a sample of 103 NEPA documents for oil and natural gas projects, the study found that companies have implemented 773 conservation measures for GRSG. This equates to an average 6.5 firm, enforceable regulatory commitments through COAs on APDs to protect GRSG. [207] .

These measures include monitoring existing populations, restricting human activities to protect leks, interim and final reclamation, noxious weed control, dust suppression through application of water or chemical suppressant to roadways, enforcing speed limits, seeding of all disturbed areas that are not used during the well production phase, NSO buffers to protect wetlands, and general noise abatement.[208] Additionally, oil and natural gas companies have

[207] *See Id*. at page 5; *see also* List of NEPA Documents Reviewed beginning at 35.
[208] *Id*. at page 7-8.

made concerted efforts to reduce human-subsidized GRSG predators, and access to wastewater pits to prevent GRSG oiling and drowning.[209]

NEPA is indeed a valid regulatory mechanism to protect and conserve GRSG, as there is certainty that each COA or conservation measure will be implemented.[210] The Western Governor's Association has compiled similar useful information on existing conservation efforts.[211] The State of Colorado audited COAs recommended by Colorado Parks and Wildlife through Colorado Oil and Gas Conservation Commission rules and found a 97% adoption and implementation rate:

> "Results show very high correlation between Best Management Practices (BMPs) recommended by SPW for protection of GrSG habitat and voluntary adoption. In other words, CPW met with operators every time a permit for drilling in GrSG habitat was sought. During those consultations, CPW recommended a series of actions designed to minimize or eliminate impacts on habitat. Adoption of those recommendations by an operator is entirely voluntary under the 1200-series regulations, but our analysis suggests that they are adopted 97% of the time. Please see Appendix B for the full report."[212]

FWS has ignored these, and other, extensive existing regulatory mechanisms in the COT Report in violation of the DQA, the Guidelines and the additional authorities cited herein. This regulatory certainty should be acknowledged by FWS in the COT Report.

G. Livestock Grazing

The COT Report fails to recognize the best available science on livestock grazing. The COT asserts "[I]mproper livestock management" per local ecological conditions, may have negative

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[209] *Id*. at page 18; *see also* 139 (Exxon Mobile: "It will be the responsibility of the operator to effectively preclude migratory bird access to, or contact with, reserve pit contents that possess detrimental properties (i.e., through ingestion or exposure) or have potential to compromise the water-repellent properties of birds' plumage").
[210] *Id*. at page 27.
[211] http://www.westgov.org/.
[212] http://cpw.state.co.us/Documents/WildlifeSpecies/SpeciesOfConcern/GreaterSageGrouse/ColoradoSynthesisReportFINAL.pdf

impacts on GRSG seasonal habitats.[213] While the primary focus is on PACs, the COT calls for changes to grazing management "across all sagebrush habitats" including even private lands.[214] In addition, the Report recommends removing, modifying or marking fences.[215] The COT Report recommends the avoidance of infrastructure at all within PACs.[216] These assertions are not based upon the best available information and, thus, violate the DQA, the Guidelines and the additional authorities cited herein.

The COT Report focuses on the negative impacts of historic grazing, with some citations to alleged threats from grazing being decades old.[217] Rather than proposing restrictions on historic activities that don't reflect actual practices today, FWS should be evaluating the application of and results of modern grazing management.[218] Historic grazing and research reports of specific grazing practices are immaterial to the question of how modern grazing management practices affect sage grouse habitat.

A 1990 US-DOI BLM report shows that good condition rangeland increased by 100% and poor condition rangeland decreased by 50% between 1936 and 1989. In the years since, there has been extensive progress in the implementation of proper grazing management on federal, state and private lands. Furthermore, it is more important and useful to consider rangeland trends rather than current condition. Regardless of current ecological status, rangelands that are in an upward ecological trend also have improving sage grouse habitat.

It is well established that "In the 1960s and 1970s, Idaho had large numbers of sage grouse and extensive livestock grazing. This suggests that healthy sage grouse populations and

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[213] COT Report at 44-45.
[214] *Id.* at 45.
[215] *Id*. at 52.
[216] *Id.* (emphasis added).
[217] *See* COT Report at 46.
[218] *See* Launchbaugh 2012; Mosley and Brewer 2006; Briske et al. 2011.

livestock grazing are compatible. In short, livestock grazing that results in rangeland in good ecological condition also provides acceptable sage grouse nesting, chick rearing and winter habitat."[219]

Furthermore, the COT Report is clearly contradictory where in one case it suggests grazing has an impact on predation that may affect bird populations and in the second case concludes that predation does not affect bird populations. Moreover, the Wyoming Department of Agriculture has strongly stated livestock grazing has no negative effects on the GRSG.[220]

According to the USDA National Agricultural Statistics, Wyoming sheep numbers were at or near all-time highs the same year GRSG numbers were at or near all time highs (1969).[221] Sheep numbers have dropped precipitously over the last several decades in Wyoming and other Western States.[222] Predator numbers have increased accordingly. In fact, the Wyoming Department of Agriculture stated, "[H]abitat alteration caused by livestock grazing (mosaic creation), as well as the predator control offered by livestock producers, have improved and benefited [sic] sage grouse."[223]

Besides ignoring these data from the states, which are the most accurate sources, FWS wholly failed to analyze the effectiveness of current livestock grazing and range management frameworks, standards, and guidelines and failed to consider site-specific considerations to provide case-by-case determinations of effective regulatory mechanisms actually needed for a location. Schultz 2004 (specific herbaceous height and cover values across the range of GRSG are inappropriate). The COT Report failed to consider that livestock grazing benefits GRSG

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[219] Idaho Sage Grouse Management Plan (1997).
[220] Letter from Jim Schwartz, Wyoming Department of Agriculture, to Dr. Pat Diebert, U.S. Fish and Wildlife Service (July 30, 2004) (on file with the Wyoming Department of Agriculture).
[221] http://www.nass.usda.gov:81/ipedb/report.htm).
[222] *Id.*
[223] Letter from Jim Scwharz, Wyoming Department of Agriculture, to Dr. Pat Deibert, U.S. Fish and Wildlife Service (July 20, 2004) (on file with Wyoming Department of Agriculture).

habitat and that regulatory restrictions on grazing could threaten the viability of ranching in the West. This is contrary to the DQA, its Guidelines and the best interests of GRSG.

The COT Report also undercuts the balanced grazing program passed by Congress as the Taylor Grazing Act ("TGA"). Congress intended TGA land be used primarily for grazing. The COT Report advocates single-use management in direction contravention to existing laws such as the TGA. Accordingly, the COT Report, as implemented through Land Use Plan Amendments and/or a potential listing of GRSG, will result in significant economic and social impacts. Federal agency demands for current conservation efforts fail to provide a true holistic approach to managing multiple ownership lands in an economically sustainable manner.

FWS must recognize that regulatory burdens such as those advocated in the COT Report, could prove so burdensome that ranching on private lands will become unsustainable. Private lands integral to GRSG conservation, then, will be marketed and sold. When this land is subdivided, GRSG populations may suffer. Accordingly, the very regulatory mechanisms proposed may threaten the productive private and public land relationships that sustain ranching, rural communities and wildlife populations.

The COT Report did not include input from any affected stakeholders or interdisciplinary experts aside from state and federal scientists and specialists. It ignores regional variances in GRSG needs, and does not present a comprehensive representation of the literature and research surrounding livestock grazing. For example, the COT Report ignored Cagney et al. 2010 which demonstrates positive attributes of grazing in Wyoming for nesting and early brood rearing habitat.

The COT Report fails to recognize that grazing is a key contributor to GRSG habitat and conservation and omits the many positive impacts of grazing. Grazing is integral to reducing

fuels.[224] Without grazing, GRSG habitat would suffer greatly in the West.[225] The many contributions of grazing and ranching, which are largely ignored or understated in the COT Report, include:

- Preservation of open space
- Noxious weed and invasive species eradication and containment
- Production of forb growth that is preferred by GRSG to non-grazed areas
- Wildfire prevention and controlled burn efforts
- Development of wildlife watering sources, including placement of bird ladders in troughs
- Predator management

H State, Local and Private Conservation Efforts

The COT Report also fails to recognize that states have undertaken significant efforts to conserve GRSG. State conservation plans are preferable alternatives to the misdirected management protocols in the Reports.[226] Federal agencies can rely upon state, regional, and local plans in their consideration of environmental impacts under NEPA.[227]

As Utah Governor Gary Herbert has pointed out, state plans better balance future economic activities with robust protections for GRSG, and were developed using a bottom-up process with input from diverse stakeholders, rather than the top-down approach taken by the agencies.[228]

The COT Report also fails to adequately consider the states' primary authority over wildlife management and their central role in managing GRSG populations and habitat within their borders. The states are better suited than the federal government to manage GRSG as such

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[224] *See* Davies et al. 2008; Diamond et al. 2009; Messmer and Peterson 2009; Freese et al. 2013; Taylor 2006; and Mosley and Roselle 2006.
[225] *See* Launchbaugh 2012; Mosley and Brewer 2006; Briske et al. 2011.
[226] *Conservation Plan for Greater Sage-Grouse in Utah, February 2013*; State of Wyoming's Governor's Executive Orders 2011-05 and 2013-3.
[227] *See, e.g.* 40 CFR § 1502.21; *Georgia River Network v. U.S. Army Corps of Engineers*, 334 F. Supp. 2d 1329, 1345 (N.D. Ga. 2003) (agency properly relied upon federal, state and local regulations, including local land use plan); *Sierra Club North Star Chapter v. La Hood*, 693 F. Supp. 2d 958, 990 (D. Minn. 2010) (accepting reliance on local plans in indirect effects analysis).
[228] *See* attached Exhibit A.

action falls within their traditional jurisdiction and professional expertise. Active consultation between the states and federal agencies, as well as local governments and local GRSG working groups, is a more effective approach than the top-down, one-size-fits-all restrictions in the COT Report.

Even the federal government's Sage Grouse Initiative has recognized the importance of private lands to GRSG conservation.[229] The COT Report must recognize that regulatory burdens such as those advocated in Land Use Plan Amendments, could prove so burdensome that ranching on private lands will become unsustainable. Private lands integral to GRSG conservation, then, would be marketed and sold. When this land is subdivided, GRSG populations would suffer. Accordingly, the very regulatory mechanisms proposed may threaten the productive private and public land relationships that sustain ranching, rural communities and wildlife populations.

Irrigation on private land provides an important link to GRSG leks which are often located on drier public lands. As *The Progressive Rancher* reported, hundreds or more small homesteads covered large portions of Nevada in the late 1800s to the mid-1900s.[230] The homesteads were nearly always located on a spring or stream that the owners used to irrigate meadows. The homesteaders also vigorously shot and trapped predators, such as coyotes, ravens and badgers. As the Reason Foundation summarized, "[T]he result, according to the article, was a higher sage grouse population than exists today and a distinct geography to the grouse's high

[229] Sage Grouse Initiative. 2014. *Private Lands Vital to Conserving Wet Areas for Sage Grouse Summer Habitat,* Science to Solutions Series Number 4. Sage Grouse Initiative. 4pp. http://www.sagegrouseinitiative.com/.
[230]Progressive Rancher, July/August Edition (last visited Dec. 23, 2014 at 4:24 PM). http://www.progressiverancher.com/Resources/ProgressiveRancher_JulyAug2014.pdf.

quality water-dependent habitat: lots of it in small pockets scattered widely across the landscape."[231]

Contrary to some assertions, federal regulation of private land is not conducive to continued conservation. Rather, federal regulation has a significant chilling effect on local, state and private conservation efforts. For example, when FWS proposed listing the Gunnison GRSG despite over $50 million in state investment and 65,000 acres of private lands protected by conservation easements, county officials felt deeply betrayed. Commission Chair Paula Swenson said she was "furiously frustrated" and Commissioner Jonathan Houck, former mayor of the town of Gunnison, said he felt "cut off at the knees."[232] Upon listing the Gunnison GRSG, Colorado Governor John Hickenlooper, in a significant bipartisan press release with Members of Colorado's Congressional Delegation, stated:

> "We are deeply disappointed the U.S. Fish and Wildlife Service chose to ignore the extraordinary efforts over the last two decades by the state, local governments, business leaders and environmentalists to protect the Gunnison sage grouse and its habitat. This sends a discouraging message to communities willing to take significant actions to protect species and complicates our good faith efforts to work with local stakeholders on locally driven approaches. In short, this is a major blow to voluntary conservation efforts and we will do everything we can, including taking the agency to court, to fight this listing and support impacted local governments, landowners and other stakeholders."[233]

In response to the Gunnison listing decision, the Colorado Cattlemen's Association issued a release titled, "Lawsuit-Inspired Listing Ends 20 Years of Conservation Efforts."[234]

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[231] Brian Seaholes, *Sagge Grouse Success is Inextricably Linked to Ranching and Farming in the West According to the Co-author of a Groundbreaking New Study*, http://reason.org/blog/show/sage-grouse-success-is-inextricably# (Oct. 9, 2014 at 9:43 AM) (last visited Dec. 23, 2014 at 4:38 PM).

[232] Lynn Bartels, The Denver Post, *Gunnison Seeks to Protect Grouse, Residents from Endangerment Listing*, http://www.denverpost.com/news/ci_26539987/gunnison-seeks-protect-grouse-residents-from-endangerment-listing (Sept. 15, 2014).

[233] Official Colorado State Web Portal, *Gov. Hickenlooper, Senators Bennet and Udall and Congressman Topton Issue Statements on Gunnison sage Grouse Listing Decision*, http://www.colorado.gov/cs/Satellite?c=Page&childpagename=GovHickenlooper%2FCBONLayout&cid=1251658153409&pagename=CBONWrapper (Nov. 12, 2014).

[234] http://us8.campaign-archive2.com/?u=8f5fe0c71eb61a94f0da35e3f&id=7432815534

Similarly, in a letter to Interior Secretary Sally Jewel, the Western Governors' Association expressed deep disappointment in one-size-fits-all regulatory restrictions proposed for GRSG and that coordination with the states was "treated more as an afterthought."[235]

These assertions are backed by sound evidence. According to NRCS, private conservation efforts declined by 95% when FWS proposed listing the bi-state population of GRSG. Even worse, private landowners understandably manage their lands specifically to avoid the presence of species once they have been listed under the ESA.[236]

While the COT Report, in some cases, relied upon state mapping to delineate Priority Areas for Conservation ("PACs"),[237] it has failed to include mapping at an appropriate local scale. For instance, Garfield County developed a Greater Sage-Grouse Conservation Plan based on the best available science and a tailored approach to private and public land management to benefit the species.[238] In recognition of the County's unique habitat characteristics, i.e. extreme topographic variation and naturally fragmented suitable habitat patches, Garfield County commissioned an in-depth analysis of its 2,956 square miles, revealing that nearly 70% of Garfield County is not suitable for the GRSG.[239] However, there are small but important patches

[235] http://westgov.org/news/298-news-2014/800-western-governors-concerned-federal-work-with-states-on-sage-grouse-conservation-an-afterthought-seek-clear-concise-input

[236] Brian Seasholes of the Reason Foundation has provided an excellent summary of landowner reactions to the perverse disincentives of the ESA: http://reason.org/blog/show/the-state-of-the-birds-2014-report (emphasis added).

[237] COT Report at 13.

[238] Garfield County, Board of County Commissioners, *Greater Sage-Grouse Conservation Plan*, http://www.garfield-county.com/community-development/documents/FINAL-Approved-Grouse-Plan-Amendment%201_11-20-2014.pdf (Habitat mapping provided by state and federal agencies were not accurate and did not provide adequate planning information).

[239] *Id*. at pages 10-17, and 35-37 (The Plan utilized highly sophisticated and peer reviewed habitat modeling completed in November of 2014 that proved a 67% decrease in potentially suitable habitat from Colorado Parks and Wildlife's model, indicating the state and BLM over-mapped 147,000 acres of private and public land).

of suitable GRSG habitat in Garfield County, amounting to at least 70,000 acres.[240] Garfield County's plan accordingly focuses conservation efforts on that suitable habitat.

While the COT Report does recognize the efficacy of using local data, albeit with caveats for peer review requirements,[241] related to habitat conditions, fire and successful restoration activities,[242] it should also recognize that state and local conservation efforts have proven more accurate and effective than the top-down, one-size-fits-all federal approach. Here, the practical effect of the restrictions proposed in the COT Report would be to "protect" vast areas of non-habitat and marginal habitat with no demonstrable benefit to GRSG populations. *See* Exhibit B, *gen*. Land Use Plan Amendments are incorporating COT recommendations as seasonal four-mile NSO buffers around active leks during lekking, nesting and early brood rearing in all designated habitat.[243] However, the buffers proposed are far more extensive than necessary because of the reliance on suspect data, assumptions, and modeling. There are no data that show proposed exclusion areas (including proposed four-mile NSO buffers) would address any specific threat to GRSG or result in any quantifiable benefit to GRSG. *See* Exhibit B at 26-30.

I. Multiple-Use Mandates

The COT Report conflicts with statutory multiple-use mandates as it elevates conservation above all other uses of public lands. Implementation of the COT Report in Land Use Plans Amendments will impede the statutory missions of land management agencies and

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[240] *Id*. at pages 7-8, 16-18, and 25-26 (acreage includes suitable habitat for all range of GRSG lifespan behavioral requirements).
[241] As noted herein, the FWS itself has failed to comply with peer review requirements for the COT Report.
[242] COT Report at 39, 41.
[243] *See* NW CO GRSG DEIS at 161-165; The dates for nesting/early brood-rearing habitat vary by field office. Every field offices' nesting/early brood-rearing habitat starts on March 1 except for the White River Field Office which starts on April 15. All of the field offices' nesting/early brood-rearing habitat ends on June 30 with the exception of White River which ends on July 8. However, BLM statewide dates for nesting/early brood-rearing habitat are March 1 – July 15.

will adversely affect agriculture, recreation, local governments, utilities, mining and the ability to explore for, produce, and transport domestic energy on public lands.

FWS must also consider how the GRSG-centric management contained in the COT Report and the Land Use Plan Amendments is appropriate in the context of other special status species. FWS must resolve these issues and explain how the COT Report's recommendations by way of land use restrictions, prohibitions, and withdrawals achieve the required balance in managing the public lands. If the recommendations found in the COT are not implementable than the COT Report itself lacks the requisite "usefulness" or utility pursuant the DQA. The COT Report cannot amend nor alter the agencies' statutory missions. Nor can it impact valid existing rights.

V. The DQA Applies to the COT Report

DOI issued its Guidelines to ensure high quality information is generated, used, and disseminated; and to comply with OMB's charge that each agency adopt DQA Guidelines.[244] "The Department's methods for producing quality information will be made transparent, to the maximum extent practicable, through accurate documentation, use of appropriate internal and external review procedures, consultation with experts and users, and verification of its quality."[245] Information released by DOI will be reproducible to the extent possible and influential information shall be produced with "a high degree of transparency about data and methods."[246] "Analytic results shall generally require sufficient transparency about data and methodology that an independent reanalysis could be undertaken by a qualified member of the public resulting in substantially the same results."[247]

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[244] https://www.doioig.gov/docs/InformationQualityGuidelines.pdf.
[245] DOI Guidelines, II.
[246] *Id.*
[247] *Id.*

A. Information Dissemination Product

The OMB Guidelines define "Information Dissemination Product" as "any books, paper, map, machine-readable material, audiovisual production, or other documentary material, regardless of physical form or characteristic, an agency disseminates to the public. This definition includes any electronic document, CD-ROM, or web page."[248]

The COT Report was disseminated electronically by FWS. Accordingly, it meets the definition of "information dissemination product." The intended users of this information include FWS, BLM, USFS, state and local governments, domestic energy producers, agricultural producers, public land managers, local and state governments and the general public.

OMB Guidelines define "Dissemination" as "agency initiated or sponsored distribution of information to the public."[249] The COT Report was disseminated by FWS. The agency has represented the NTT Report as, and used it in support of, an official position of the agency in such a way that the Guidelines apply.[250] Neither the authors of the COT Report nor FWS have disclaimed that the COT Report is not information subject to correction or retraction under the DQA. FWS has disseminated the COT Report by, among others, publication on its website.[251]

B. Third-Party Information

To the extent FWS considers the COT Report, third-party information, the DQA and its Guidelines still apply. Certain third-party information that an agency makes public is also subject to the DQA and the Guidelines. "If third-party submissions are to be used and disseminated by Federal agencies, it is the responsibility of the Federal Government, under the [Data] Quality Act, to make sure that such information meets relevant information quality

[248] 67 Fed. Reg. 8452, 8460 (Feb. 22, 2002).
[249] 67 Fed. Reg. 8452, 8460 (Feb. 22, 2002).
[250] http://www.whitehouse.gov/omb/fedreg_reproducible
[251] http://www.fws.gov/greatersagegrouse/documents/COT-Report-with-Dear-Interested-Reader-Letter.pdf

standards."[252] The Guidelines state third-party information endorsed, adopted, disseminated or relied upon, must meet the quality, objectivity, utility and integrity standards required by the DQA and should be subject to DQA correction. The DOI Guidelines expressly apply to non-departmental parties that develop scientific and technical information on its behalf.[253]

C. If Uncorrected, the COT Report Will Cause Substantial Harm

Here, FWS issued no disclaimers to explain that it did not or will not use, rely upon or endorse the information disseminated. Many DOI and FWS employees contributed to the COT Report and it has been heavily relied upon by FWS and other agencies. Accordingly, the DQA and the Guidelines clearly apply.

Reliance on uncertainties, inaccuracies, bias and misrepresentation in the COT Report will result in dramatic changes across millions of acres of public lands. To avoid actual harm to the Petitioners, western states, local governments, private landowners and stakeholders, FWS must timely respond to this DQA challenge and retract statements and conclusions based on uncertainties and correct bias and misrepresentation of the information disseminated.

Where, as here, Petitioners have provided "significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts," FWS should use existing mechanisms to remedy the situation "such as re-proposing a rule or supplementing a NEPA analysis."[254] Corrective action in this case should include a retraction of the COT Report and its withdrawal from consideration in alternatives in Land Use Plan Amendments and any listing decision on GRSG.

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[252] OMB § 11 "Information Quality: A Report to Congress" (April 30, 2004).
[253] DOI Guidelines II.4; DOI Guidelines V.
[254] DOI Guidelines III.

D. The COT Report is Highly Influential Information

The information disseminated here readily qualifies as influential information. As OMB states, "[T]he more important the information, the higher quality standards to which it should be held . . . ."[255] Ordinary information is distinguished from "influential" information -- that is, scientific, financial and statistical information having a clear and substantial impact on important public policies or important private sector decisions. "Influential" information is subject to higher standards of quality and should be reproducible by qualified third parties. The information disseminated in the COT Report is information of extreme importance to states, landowners, user groups and local conservation efforts.

OMB Guidelines define "influential" requests for correction as those of a substantive nature, which sought "something more than a straightforward webpage or data fix. "Influential" has also been defined to mean "that the agency can reasonably determine that dissemination of the information will have or does have a clear and substantial impact on important public policies or important private sector decisions."[256]

The information disseminated in the COT Report is information of extreme importance. It qualifies under the Guidelines as substantive notices, policy documents, studies and guidance relied upon by the agency to make decisions that could affect multiple federal and state agencies, local governments, tribes and private individuals in eleven western states and on tens of millions of acres of public lands. Conservation measures in Land Use Plan Amendments rely heavily upon the NTT and COT Reports. Many of the action alternatives in the 98 Land Use Plan Amendments were largely derived from the COT Report.[257]

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[255] 67 Fed. Reg. 8452 (Feb. 22, 2002).
[256] 67 Fed. Reg. 8452, 8455 (Feb. 22, 2002).
[257] BLM, *Federal Agencies Announce Initial Step to Incorporate Greater Sage-Grouse Conservation Measures into Land Management Plans* (Dec. 8, 2011) ("Greater sage-grouse currently use as much as 47 million acres of land

This information is clearly "influential scientific, financial, or statistical information" that crosses state and agency boundaries and affects private and public decisions under the DQA and the Guidelines. FWS Guidelines define influential information to be that which "will have or does have a clear and substantial impact on important public policy or private sector decisions, and thus, a decision or action to be taken by the Director."[258] "As a general rule," the document notes, "FWS considers an impact clear and substantial when a specific piece of information or body of information is a principal basis for a FWS position."[259] In this case, the COT Report is the principal basis on which FWS will judge threats to GRSG and measures designed to address them.

An even higher level of scrutiny is applied to highly influential scientific assessments. Highly influential scientific assessments are those that "the agency or the [OMB Office of Information and Regulatory Affairs] Administrator determines . . . could have a potential impact of more than $500 million in any one year on either the public or private sector or that . . . is novel, controversial, or precedent-setting, or has significant interagency interest."[260] Such is clearly the case here. As noted above, BLM and USFS are implementing some 98 Land Use Plan Amendments across eleven western states in substantial reliance upon the COT Report. The economic impact of these regulatory changes will last for potentially decades and will far exceed $500 million. These are clearly controversial, novel, precedent-setting issues of significant interagency and public interest.

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managed by the BLM, and about nine million acres of land managed by the USFS. As many as 98 BLM Resource Management Plans address greater sage-grouse, while the USFS expects to evaluate conservation measures into as many as nine Land and Resource Management Plans considered high priority for the conservation of sage-grouse.").

[258] U.S. Fish and Wildlife Service, *Information Quality Guidelines and Peer Review*, at 5 (2012): http://www.fws.gov/informationquality/topics/InformationQualityGuidelinesrevised6_6_12.pdf.

[259] *Id.*

[260] U.S. Office of Management and Budget, *Final Information Quality Bulletin for Peer Review*, at 23 (2004) (hereinafter *OMB Peer Review Bulletin*): *http://www.whitehouse.gov/sites/default/files/omb/assets/omb/memoranda/fy2005/m05-03.pdf.*

In this case, the COT Report is influential in that it, "will have or does have a clear and substantial impact on important public policy or private sector decisions, and thus, a decision or action to be taken by the Director, FWS…."[261] The COT Report also qualifies as a highly influential scientific assessment such that even more rigorous standards apply.[262] The COT Report is novel, controversial and precedent-setting with significant interagency interest.[263] The economic impact of these regulatory changes will last for potentially decades and will likely far exceed $500 million.

E. Petitioners are "Affected Person(s)" Qualified to Bring a DQA Challenge

OMB's Guidelines also require each agency to establish administrative mechanisms that allow "affected persons" to seek and obtain the correction of information that does not meet the OMB Guidelines.[264] OMB makes clear that the purpose of the administrative mechanism is to "facilitate public review" of agency compliance with the Guidelines.[265] OMB Guidelines concluded that "affected persons are people who may benefit or be harmed by the disseminated information. This includes persons who are seeking to address information about themselves as well as persons who use information."[266] Such a definition provides the public with a right to agency-disseminated information that meets high DQA standards; and with a right to correct any publicly disseminated information that does not meet these standards. FWS Guidelines provide that any individual or person "who may use, benefit from, or be harmed by the disseminated information with a material impact to their interests" is an "affected person."[267]

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[261] *See* FWS Guidelines III-10.
[262] OMB Peer Review Bulletin at 23.
[263] *Id.*
[264] 67 Fed. Reg. at 8452.
[265] *Id.*
[266] 66 Fed. Reg. 49718, 49721 (Sept 28, 2001).
[267] *See* FWS Guidelines III-5.

Petitioners are “affected persons” within the meaning of the Guidelines. Petitioners and their members or constituents have a distinct interest in the conservation of GRSG and rely upon public and private lands within the range of the GRSG for the production of natural resources, agricultural goods and products, for revenues distributed to the states and local governments, for recreation and for wildlife conservation. Petitioners have a reasonable likelihood of suffering actual harm from dissemination of the COT Report unless FWS resolves this complaint prior to the final agency actions and information products at issue herein. There is no separate process or mechanism by which Petitioners can raise these issues or seek redress regarding the fundamental flaws and shortcomings of the COT Report.

Petitioners have used, and will use, the information disseminated to better inform and to guide in their business decisions. Their members and/or constituents are affected by information regarding GRSG numbers, dispersal and distribution as well as alleged threats to the species. Where the species is located, how it disperses, and where it is distributed could have strict regulatory consequences to those that produce agricultural products and energy and natural resources from public lands that could be affected. In addition, the local governments rely upon continued access to public lands for natural resources and recreation and the tax and other revenues they generate. Accordingly, Petitioners could be benefited by, or be harmed by the faulty information at issue.

Petitioners are involved in extensive conservation efforts across the West to conserve the GRSG while also preventing unfounded federal regulatory restrictions from a listing under the ESA, which would prove less effective than the state and local efforts underway. These conservation efforts include the collection of data and the compilation of ongoing state, local and private conservation efforts for the GRSG. Petitioners have established their interests in

ensuring that their members and constituents, as well as the public at large, have the opportunity for open and robust debate regarding the information disseminated.

VI. The COT Report Does Not Comply with Other Federal Standards

While scientific integrity and transparency in agency decision making are enumerated priorities for this administration, the NTT Report falls far short of these goals.

A. The COT Report Does Not Comply with Presidential Direction on Scientific Integrity and Transparency

While scientific integrity and transparency in agency decision making are enumerated priorities for this administration, the COT Report falls far short of these goals. The COT Report also falls short of the President's direction to executive departments and agencies. On March 9, 2009, President Obama issued a Memorandum setting forth principles "for ensuring the highest level of integrity in all aspects of the executive branch's involvement with scientific and technological processes."[268] When scientific or technological information is considered in policy decisions, the information is to be subject to well-established scientific processes, including peer review where appropriate. Agencies are directed to appropriately and accurately reflect that information in complying with relevant statutory standards.[269] Such was not the case here. For example, the COT Report relies heavily on Garton et al. 2011 which, itself, is fraught with issues including significant mathematical errors. *E.g*. Exhibit A at 2.

President Obama committed to "an unprecedented level of openness in Government," by "work[ing] together to ensure the public trust and establish a system of transparency, public

[268] 74 Fed. Reg. 10671, 10671 (March 11, 2009).
[269] *Id.*

participation, and collaboration."[270] President Obama believes that "[o]penness will strengthen our democracy and promote efficiency and effectiveness in Government."[271]

In this case, the COT Report has been far from transparent. FWS failed to disclose virtually any information relative to transparency and the COT Report until forced to do so by the Alliance's FOIA litigation.

President Obama reaffirmed his commitment to scientific integrity as part of his second term's scientific agenda in 2012.[272] More specifically, the president has "insisted that we be open and honest with the American people about the science behind our decisions."[273] Furthermore, "only by ensuring that scientific data is never distorted or concealed to serve a political agenda, making scientific decisions based on facts, not ideology, and including the public in our decision making process will we harness the power of science to achieve our goals – to preserve our environment and protect our national security; to create the jobs of the future, and live longer, healthier lives."[274]

As discussed herein, the COT Report presents a distorted and biased view of threats to GRSG and mechanisms proposed to protect them. The COT Report is rife with misrepresentation, misuse of citations and reliance on opinion rather than the scientific method. *See* Exhibits A and B, *gen*.

B. The COT Report Fails to Comply with DOI Scientific Integrity Standards

The COT Report also runs afoul of DOI direction on scientific integrity. The DOI Manual implemented a secretarial order: Integrity of Scientific and Scholarly Activities

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[270] Barack Obama, *Transparency and Open Government: Memorandum for the Heads of Executive Departments and Agencies*, http://www.whitehouse.gov/the_press_office/TransparencyandOpenGovernment (last visited Dec. 2, 2014, 1:12 PM).
[271] *Id*.
[272] *See* Barack Obama, Science Debate 2012, http://www.sciencedebate.org/debate12/ at No. 11 (Sept. 4, 2012).
[273] *Id*.
[274] *Id*.

(effective Jan. 28, 2011).[275] The Manual defines "scientific and scholarly integrity" to mean, "[t]he condition resulting from adherence to professional values and practices, when conducting and applying the results of science and scholarship, that ensures objectively, clarity, reproducibility, and utility."[276] Unfortunately, the COT Report suffers from a lack of objectivity, clarity, reproducibility and utility. *See* Exhibit A at 1-2, 5, and 8 *see also* Exhibit B at 16-17, 24-27, and 29.

On December 16, 2014, DOI updated and strengthened the policy to "ensure that all Interior employees and contractors uphold the principles of scientific integrity."[277] The policy is to establish the expectations for how scientific and scholarly information is considered and used:

> "Scholarly information considered in Departmental decision making <u>must be robust, of the highest quality, and the result of as rigorous scientific and scholarly processes as can be achieved</u>. Most importantly, it must be trustworthy. This policy helps us to achieve that standard."[278]

The COT Report does not meet the standards of quality and robustness required. It was hardly as "rigorous scientific and scholarly process[es] as can be achieved." *See* Exhibit A, *gen*.

FWS has also failed to meet its charge in OMB Circular A-130, "[A]gencies should inform the public as to the limitations inherent in the information dissemination product (e.g., possibility of errors, degree of reliability, and validity) so that users are fully aware of the quality and integrity of the information."[279] The COT Report has clearly glossed over limitations inherent in the report and the studies cited therein. *See* Exhibit B, *gen*.

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[275] DOI Manual, available at http://elips.doi.gov/elips/browse.aspx.
[276] *Id.*
[277] U.S. Department of the Interior, *Press Release: Interior Department Announces Strengthened Scientific Integrity Policy for Employees and Contractors*,
[278] 305 DM 3.4.; I:\Western Energy Alliance\DQA Challenge\Research\Interior Dept. New Policy\Integrity of Scientific and Scholarly Activities.html (emphasis added).
[279] http://www.whitehouse.gov/omb/circulars_a130

C. Paperwork Reduction Act

We question whether FWS demonstrated in a Paperwork Reduction Act submission to OMB that the proposed collection of information in the COT Report was collected, maintained and used consistent with the DQA Guidelines.[280] **Please confirm.**

VII. Conclusion

The COT Report is a highly influential document, as BLM and USFS are using it to make substantial land use decisions across nearly 60 million acres of public lands throughout eleven western states. As such, it must adhere to the standards of quality, integrity, objectivity and utility in the DQA as well as administration standards of scientific integrity and transparency. Unfortunately, the COT Report fails to meet these requirements. Much of what it presents as "science" has no basis in scientific design or scientific evidence. The most frequently cited sources in the COT Report contain fundamental flaws including gaps in crucial data, data that are not public, recurrent uncertainties, methodological bias, selective presentation of information, misrepresentation of cited studies and suspect peer reviews. *See* Exhibits A, and B, *gen*.

FWS should rely upon data of the highest integrity and accuracy in the COT Report. Opinions must not be represented as fact nor dictate decisions that are required to be based on scientific data. The COT Report violates the DQA, the Guidelines as well as the secretarial, presidential and other authorities cited herein. Much of what it presents as "science" has no basis in scientific design or scientific evidence.

The COT Report is not presented in an accurate, reliable and unbiased manner. The COT Report cherry-picks what scientific papers it wished to discuss, presents misleading information, much of it out of context, and simply ignores large numbers of studies that refute many of its conclusions.

[280] DOI Guidelines VI.

The COT Report does not represent the best available science as required to meet the standards of quality, objectivity and integrity required in the DQA. Rather, the COT Report is comprised of assumptions built upon assumptions. It fails to address the limitations of the underlying data and studies used to reach its conclusions and fails to acknowledge that circumstantial evidence rather than scientific evidence underlies most of the information presented.

FWS cannot rely on the biased opinions and selective presentation of information to support recommendations that are unsupported by data. FWS not only violates BLM's multiple-use mandate, but elevates GRSG concerns above human health, safety, and scientific transparency and integrity. Because the information disseminated in the COT Report is not objective, it also fails to have any utility for those persons making management decisions regarding multiple uses of the public lands. As detailed in the text herein and in Exhibits A and B, the COT Report failed to:

- Use sound analytical methods in carrying out scientific analyses and in preparing risk assessments
- Use reasonably reliable and reasonably timely data and information i.e., collected data such as from surveys, compiled information, and/or expert opinion
- Ensure transparency in its dissemination by identifying known sources of error and limitations in the data
- Evaluate data quality and, where practicable, validate the data against other information when using or combining data from different sources
- Ensure transparency of the analysis, to the extent possible, consistent with confidentiality protections, by
    - Presenting a clear explanation of the analysis to the intended audience
    - Providing transparent documentation of data sources, methodology, assumptions, limitations, uncertainty, computations, and constraints
    - Explaining the rationale for using certain data over other data in the analyses

    - Presenting the model or analysis logically so that the conclusions and recommendations are well supported.

- Clearly identify sources of uncertainty affecting data quality
- Clearly state the uncertainty of final quantitative estimates
- Demonstrate that the data and data collection systems used are of sufficient quality and precision that uncertainty in the final estimates is appropriately reproducible
- Provide an explanation of the nature of uncertainty in the analysis.

The errors contained in the COT Report are improperly influencing BLM and USFS decision-making about management of the public lands. Reliance on this biased and faulty information has and will continue to harm the Petitioners and their members. In addition to the damage to the Petitioners, the public, GRSG and the economy will be negatively impacted based upon the errors in the COT Report.

The Petitioners respectfully request FWS retract the COT Report and all reliance thereon in existing and subsequent Land Use Plans Amendments, as well as applicable decisions on listed status of GRSG and/or on permits and authorizations. Alternatively, FWS could, as required by the DQA and the Guidelines, issue an amended COT Report that uses sound analytical methods and the best data available while ensuring transparency and objectivity. Any amended Report should incorporate all reliable information, not just the data supporting false hypothesis. It should also identify the limitations of data used rather than stating assumptions as fact. Finally, any amended Report should use and include the best available data as discussed herein.

Respectfully submitted this 18th day of March, 2015.

Holsinger Law, LLC

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Attorney for Petitioners

Exhibit A: The COT Report Fails to Meet DQA Standards

A. Science

1) The COT Report is not a scientific document.

1.1) The COT Report is not a scientific document, as it contains no original data or quantitative analyses used in developing the report, nor is there a comprehensive and unbiased review of *all* of the available scientific literature. Instead, the COT Report provides a limited and selective review of the scientific literature and unpublished reports on GRSG as a basis for its conservation objectives and proposed actions. As a result, outdated information and beliefs are perpetuated in the COT Report (i.e. purported impacts are not necessarily representative of actual impacts due to less intensive energy development, newer technologies, and required mitigation measures).

2) The ESA requires that decisions must be based upon best available scientific and commercial data, and not "best available science."

2.1) The COT Report states that, *"All proactive voluntary conservation efforts should use the best available science."* However, to be consistent with the ESA and the IQA, this language needs to be changed to *best available scientific and commercial* ***data***.

2.2) Although the COT Report makes the claim that it lists, *"sources of data used by states to develop Priority Areas for Conservation (PAC) maps for each state,"* no details on the data files were provided. Lacking are the location of where these data are archived, who is responsible for curation, the conditions under which those data were shared with the COT, and attributes of these data (i.e. methods of collection and associated metadata). In short, while the COT Report makes claims about how *"this report delineates reasonable objectives, based upon the best scientific and commercial data available at the time of its release,"* none of the cited sources of data are publicly accessible. It is a violation of the IQA that the underlying data used in such a highly influential document are not specified, or available for independent analysis by informed members of the public.

3) Credit for Restoration is based on substandard data and methods.

3.1) The COT Report proposes that no credit be received for restoration efforts until there is demonstrated sage-grouse use or positive population trend. However, the COT Report says nothing about: 1) how many years of monitoring will be required to show positive trends, 2) how much of a population increase would be required, 3) how these data would be adjusted for natural population fluctuations and the uncertainty of statistically invalid trends estimated from only counting males at a nonrandom sample of leks.

5.2) Of the three issues above, the most critical one that the COT Report does not acknowledge is the fact that male lek counts provide only a crude, non-random, and statistically-invalid estimate of population trends. These issues are well documented

(Walsh et al. 2004; WAFWA 2008). Statistically robust alternative methods exist for estimating population trends (i.e. the sentinel lek count method or stratified random sampling, as proposed and tested by Garton et al. 2007); however, the COT Report makes no mention of this superior method or alternatives. The continued use of this substandard method for gathering data and estimating population trends compromises the ability of any grouse. That lack of resolution translates into the potential for *no credit* to be given for restoration and mitigation efforts (because the resolution is inadequate to determine if these conservation measures result in positive changes to GRSG populations).

B. Threats

4) The COT Report overstates some threats to GRSG while downplaying others.

4.1) The COT Report made a number of dramatic statements about the status of GRSG, however, it failed to acknowledge that in the 2010 ESA-listing decision, data from states revealed that there were an estimated 535,542 GRSG occupying 13 states and provinces in western North America. Moreover, the COT Report omits any mention of hunting as the most well documented source of GRSG mortality, with a documented 207,433 GRSG killed between 2001 and 2007, and on-going GRSG hunting continues to this day. In contrast, proposals are put forth to regulate activities that have never been shown to cause GRSG population decline. The COT Report's approach elevates hypothetical threats to the level of real threats while selectively ignoring known sources of GRSG mortality.

5) The population predictions used in the COT Report's threats analysis were based on an analysis that contains methodological bias and error.

5.1) The COT Report's threats analysis, population definitions, current and projected numbers of males, and probability of population persistence, are entirely based on the paper by Garton et al. (the 2009 and 2011 versions of this paper are virtually identical). It is the most frequently cited paper in the COT Report and the basis of population predictions in the USFWS 2010 listing decision, where it was cited it 62 times. Other scientists who have reviewed Garton et al. (2009, 2011) have reported serious methodological biases and mathematical errors in that paper (see reviews commissioned by the Colorado Division of Wildlife and summarized by CESAR 2012; copies of the reviews and report by CESAR are attached). It is unconscionable, and indicative of an inadequate peer review and editorial process, that all of the reviewer comments were ignored by the USFWS in the 2010 listing decision and in the final published version of Garton et al. (2011). The data and programs used in that highly influential paper are not public, and therefore, the results are not reproducible.

6) The COT Report's ranking of threats to populations and GRSG Management Zones is subjective.

6.1) There is no evidence of any reproducible, quantitative methodology used in assigning rankings to threats in each population and GRSG management zone (Table 2), or in discussion of specific PACs in Appendix 1. Instead, the ranking of threats in the

COT Report is entirely subjective.

6.2) The ranking of threats in the draft COT Report was initially determined by a vote count of opinions of COT members, with the treats ranked from A through H, depending upon the presumed "severity" of the threat and how "imminent" the threat was (Table 1, below). "Unknown" was a category used in both reports for the cases of inadequate information. In the final COT Report however, the ranking system changed. In most cases the draft COT Report threat rankings of A to D (or *"substantial, imminent"* to *"moderate, non-imminent"),* and F to G (or "widespread, low severity" and "slight threat", were collapsed in the final COT Report of "Y" (or *the "threat is present and widespread"*). The draft COT Report threat ranking of "E" (or threat *"localized, substantial"* was made equivalent to "L" (or *"threat present but localized*") in the final COT Report. And a draft COT Report ranking of "H" (or "unthreatened") became "L" (or *"threat present but localized").*

Table 1. Comparison of threat rankings from Table 2 of the draft and final COT Reports.

Draft COT Report	**Final COT Report**
A = Substantial, Imminent	Y = threat is present and widespread
B = Moderate, Imminent	Y = threat is present and widespread
C = Substantial, non-imminent	Y = threat is present and widespread
D = Moderate, Non-imminent	Y = threat is present and widespread
E = Localized, Substantial	Y = threat is present and widespread
F = Widespread, Low Severity	Y = threat is present and widespread
G = Slight threat	Y = threat is present and widespread, or L = threat present but localized
H = Unthreatened	L = threat present but localized, or N = threat is not known to be present
U = Unknown	U = Unknown

6.3) The COT Report does not present any data that could be used in a rigorous evaluation of the threats. There is no evidence that any quantitative methodology was used to assign rankings in the final COT Report such that an independent reevaluation of the rankings would be reproducible. Moreover, these new rankings were not consistently applied. For example, the new ranking of "L" (*"threat present but localized*") in the final COT Report was applied to the Wyoming Basin population for the threats of mining, and conifers, even though the previous category was "H" ("unthreatened"). This arbitrary reassignment of threat ranking between drafts elevated the perceived threat level to this population and others. Similarly, the final COT Report assigned the previous threat category of "G" ("slight threat") to either "Y" (*"threat is present and widespread"*) or to "L" (*"threat present but localized*").

If threats are to be evaluated objectively for each population, then data and reproducible methodologies are required, rather than subjective assessments used in COT Report.

interested party to objectively evaluate the effectiveness of conservation measures undertaken to benefit sage

7) The COT Report uses new, subjective terms to evaluate risks to GRSG.

7.1) The COT Report uses new, subjective terms from the *Significant Portion of the Range Polic*y to qualitatively describe the status of populations of a species being considered for ESA listing: *redundancy*, *resiliency*, and *representation*. To this list, the COT Report added a new, subjective term: *resistance*. None of these terms are quantifiable and all are open to arbitrary interpretation. Others have also recognized this deficiency and have pointed it out to the USFWS. *See* Alaska Oil and Gas Association and American Petroleum Institute's comments on *Draft Policy on Interpretation of the Phrase "Significant Portion of its Range" in the Endangered Species Act's Definitions of "Endangered Species" and "Threatened Species," Docket No. FWS-R9-ES-2011-0031* (Failure to clearly articulate how vulnerability assessment decisions are made undermines their credibility and erodes public confidence in the agencies responsible for developing the assessments. Shelden et al. 2001, USDOI 2007). USFWS must provide quantitative definitions for "redundancy," "resiliency," and "representation" for use in the COT Report.

7.2) Much of the "science" being relied upon by the USFWS and BLM in decision making on GRSG was produced by a small number of researchers. Ironically, the COT Report recommends further investment in research. This equates to the authors recommending further funding for their own work and creates at least the appearance of a conflict. These researchers write papers together and review each other's work (including their own) and subsequently serve on the highly influential NTT and COT teams (CESAR 2012). This is inconsistent with accepted scientific practice and the Department of Interior's Data Quality guidelines. Instead, the COT Report needs to foster greater independence by suggesting *"key research projects"* and then allowing an independent scientific and policy team to prioritize and solicit competitive proposals. Such an approach would avoid any appearance of cronyism.

8) The COT Report does not evaluate any of its proposed conservation actions under the Policy for Evaluation of Conservation Efforts (PECE).

8.1) To date, the COT Report has avoided mention of which conservation measures would meet the PECE requirement or any quantitative criteria by which they could be objectively evaluated. This leaves open to question the effectiveness of numerous conservation actions that have been recommended by the COT Report.

The COT Report is notable in recommending that conservation plans should *"use local data on threats and ecological conditions, including status of local sage-grouse populations and their associated habitats."* However, the COT Report fails to acknowledge the practical limitations of obtaining population trend data and how such data limitations could ultimately have the unintended consequences of justifying *"enforceable temporary measures,"* or preventing the allocation of credit for mitigation

effort, simply because the data do not provide sufficient resolution (or statistical confidence) to detect increasing trends. It is scientifically unreasonable for the COT Report to require population monitoring as the basis of regulation, when it knows full well that the data and methods for estimating population trends are inadequate for the task.

8.2) The COT Report's proposed objective to "*Develop and implement proactive, voluntary conservation actions,"* is consistent with numerous papers by ESA scholars. The COT Report also proposes that *"Sage-grouse conservation strategies should consider using the criteria identified in the FWS/NOAA Fisheries Policy for Evaluation of Conservation Efforts (PECE) when Making Listing Decisions (Federal Register/Vol. 68, No. 60/Friday, March 28, 2003; Appendix B) to help evaluate its likely implementation and effectiveness."* However, the COT Report does not provide a single example of a GRSG conservation plan that is consistent with the PECE Policy. Nor does it appear than any GRSG conservation plans have been approved by the USFWS. To date, the USFWS has not provided specific comment on conservation plans (that this reviewer was able to find), such that local agencies may at least be assured of approval under PECE if the plans are modified in specific ways to suit the USFWS. Thus, there is no reasonable assurance that the substantial investments that state and local governments, or private landowners, have undertaken can be expected to secure a PECE approval.

Similarly, there is no assurance from the USFWS that specific conservation measures recommended in the COT or NTT reports (both of which include USFWS staff as authors), if adopted, would meet the PECE policy. The USFWS should be expected to follow its own policies.

9) The COT Report erroneously evaluates threats using a single category for all energy production, despite substantial differences in the type and permanence of impacts.

9.1) The COT Report does not acknowledge the fact that renewable energy projects (wind, solar, and geothermal) have a uniformly permanent impact on the landscape (solar arrays and wind turbines), while oil and natural gas development has a mix of temporary and permanent impacts. Blending these two vastly different types of energy production into one threat category is contrary to the best available scientific and commercial data because specific threats and their underlying cause and effect mechanisms are not adequately addressed, and counter-productive to GRSG conservation.

9.2) Furthermore, while projected oil and natural gas development were based on *actual* well data, known deposits, and lease sales that overlap GRSG habitat, wind development is primarily based on undeveloped and unleased commercial wind *potential* (i.e. as in Doherty et al. 2011). Thus, it is erroneous for the COT Report to base its threats ranking on a combined analysis of two vastly different types of energy development, one of which is primarily based on speculation.

9.3) In order to be unbiased, the COT Report should have analyzed the two types of

energy development separately, then overlaid their projected impacts to GRSG in a common unit that reflects each development's impact(s) to GRSG.

9.4) In regard to mining, the COT Report purports that dust from surface mining activities indirectly impact sage-grouse. No such study has been conducted on the relationship between dust and sage-grouse. The FWS should be compelled to provide such data or remove this erroneous and unsupported statement from the COT Report.

10)The COT Report relies on erroneous information for priority habitat mapping and evaluation of threats. For example, the Colorado Plateau Management Zone and associated PACs are not well mapped and do not show evidence of connectivity.

Regarding the Colorado Plateau Management Zone and Parachute-Piceance-Roan PAC, the COT Report states, ***"Priority habitats are well mapped and include all high use habitat (which includes breeding, summer, and winter habitat within 4 miles of all known leks) and linkage zones to Management Zone 2 to the north. There is no known connectivity with Utah*** *(Management Zone 3 to the west) due to natural habitat fragmentation and large areas of nonhabitat."* This is in error. There are genetic data that provide evidence of connectivity to Utah contained in Apa (2010). And, as discussed below, the priority habitats are not "well-mapped" but mapped at low resolution and contain large areas of non-habitat and marginal habitat.

The COT Report states, *"The Parachute-Piceance-Roan Basin population appears to be captured within priority areas for conservation, and representation appears to be captured adequately. Priority areas for conservation capture 60 percent of the occupied range in this population and also include 100 percent of all known active leks and all habitats that were modeled "high probability of use" within four miles of a lek that has been active in the last 10 years."* This statement is a misrepresentation of the best available scientific and commercial data. First, the COT Report does not mention the fact that the PAC contains large areas of marginal habitat and non-habitat in a naturally fragmented landscape produced by dense conifer and aspen stands, shrubs, meadows, and rugged topography. High-resolution vegetation mapping (hyperspectral data) and modeling of the PPR GRSG habitat (using habitat parameters specific to the PPR population) by Garfield County (2012), and previously by Heather Sauls in Garfield and Rio Blanco Counties (2008), both concur with this conclusion. These two habitat-mapping efforts were based on best available data in the public domain. When compared to the low resolution PAC map for the PPR population, these analyses show that approximately 80% of the mapped PAC is non-habitat. Second, the location data upon which the low-resolution Preliminary Priority Habitat Map is based (produced by the Colorado Parks and Wildlife), are not in the public domain, and there is no written assurance that they ever will be accessible for independent review and reanalysis. Furthermore, requests for these data under legally binding data-share and non-disclosure agreements have been met with refusal by CPW. Thus, the CPW maps of the PPR and northwestern Colorado used by the COT Report, and by the BLM in its RMP revisions (including maps based upon Rice et al. 2012 where the data are scaled down to 1-km grid cells resulting in a massive 4,000% loss of information, are not reproducible). Use of

these maps by federal agencies as a basis for decision-making is a clear violation of the Information Quality Act requirements.

The COT Report fails to mention the inconsistency in definition of an "active lek" between that used in the scientific literature and that used to map the PPR PAC. The scientific literature defines an active GRSG lek as locations where two or more males have been observed and documented actively courting females in the last two years (Doherty et al. 2011). The "active lek" criteria applied to the PPR for habitat maps used by the COT Report is: a site where at least one male was observed lekking within the *past 10 years* (whether the lek was surveyed or not before or following that observation). Moreover, the COT Report does not acknowledge that the CPW lek-count and lek location data set for the PPR contain numerous missing cells, and that even locations where a single male was observed 7 years ago, with three years of missing data before that, is still considered an "active" lek. It is arbitrary, capricious, and scientifically unreasonable for federal agencies to use inconsistent definitions as a basis for regulatory decisions, and for it to rely on such an arbitrarily low threshold. To further emphasize this point, if no males were in attendance at a lek for potentially nine years, then just how were the un-bred female GRSG going to produce eggs and nest within 4 miles of that "active" lek? Clearly, immaculate conception has not been documented to occur in GRSG.

The COT Report states, *"Redundancy is not captured within this population because it is relatively small (three year running average number of males is 93) and somewhat isolated."* The COT Report provides no genetic or dispersal data with which to conclude that this population is isolated from other nearby populations. The COT Report does not provide any quantifiable definition of "redundancy," nor any data with which to conclude that the population lacks "redundancy." However, genetic data and analyses do exist for northwestern Colorado and Utah that are contrary to this assertion. Those data have an especially large sample size for the PPR population (n=65). Those data and results (Apa 2010), not mentioned by the COT Report, reveal that levels of genetic diversity in mitochondrial DNA and microsatellite markers are comparable to other populations in Colorado, and there is extensive shared variation among populations. That study reported,

> *"This analysis of the PPR population compared with 5 other Greater Sage-grouse populations in Colorado revealed that the genetic make-up of PPR is generally consistent with the other 5 populations. Using mtDNA sequence data, 5 of the 8 haplotypes found in PPR (66% of the PPR birds) were also found in the other populations in Colorado."*
>
> *"The mtDNA neighbor-joining network (Fig. 2), which was constructed using F_{ST} genetic distances among populations, suggests that PPR is more closely related to North Park, Cold Springs, and Blue Mountain, than to Middle Park and Eagle. The fact that PPR is not shown to have branch lengths longer than the other Colorado populations suggests that it is not genetically distinct from all other Colorado Greater Sage-grouse populations."*

Additionally, the levels of genetic variation are comparable to those in other populations in Colorado, and indistinguishable when the most appropriate measure; expected heterozygosity is used (as DNA obtained from feathers are more likely to contain closely related individuals and

bias results towards heterozygote deficiency, making expected heterozygosity based on allele frequencies and more representative parameter).

The COT Report states, *"There is some potential for connectivity to the north to the Wyoming Basin population in Management Zone 2. Linkage habitats have been included in mapping efforts."* The data, however, are contrary to assertions made in the COT Report in justification of its arbitrary linkage habitat maps. Instead, the data reveal a broader genetic linkage, including nearby populations and in Utah. This conclusion is more consistent with recent genetic and GPS tracking studies that show GRSG can disperse over much greater distances and over/around land uses that were previously thought to contribute to fragmentation (i.e. Bush 2009; Bush et al 2011; Tack et al. 2011; Thompson 2012). As noted previously in this review, linkage habitat maps used by the COT Report are purely speculative and cannot be relied upon as a basis for decision-making.

Data on lek locations and attending male numbers from Colorado Parks and Wildlife (CPW) show that currently active (2012) GRSG leks occur on, or immediately adjacent to, roads, pipeline corridors, and well pads in the area. This is a direct contradiction to, and refutation of, assertions in the COT Report that, *"Representation and redundancy are at risk within this population due to its small size, energy development and the associated infrastructure, especially road development."* And, *"Advances in drilling technology and rapid natural gas demand and subsequent rising prices have led to a significant increase in natural gas drilling activity. Road and infrastructure are also ranked high as they are closely related to energy production."* While oil and gas development can contribute to GRSG avoidance and mortality in specific ways (see review by Ramey, Brown, and Blackgoat 2011), it is counter-productive to conservation efforts for the COT Report to make wholesale negative assertions.

The COT Report states, *"A large majority of PACs are privately owned, mostly by energy companies. Energy and mineral development is the highest ranked threat to sage-grouse in this area."* However, the fact that much of the land in the PPR is privately owned by energy companies means that adequate funding is available for implementation of mitigation and habitat restoration efforts to benefit GRSG populations. This has been the case for the Pinedale Planning Area of Wyoming, where oil and gas development, mitigation, *and* GRSG numbers have all increased (lek count data from Wyoming Game and Fish). These are facts not acknowledged by the COT Report.

C. Land Use

11) The COT Report proposes "enforceable temporary measures."

11.1) The COT Report proposed that if adequate regulatory mechanisms cannot be implemented by specific deadlines, *"then enforceable temporary measures should be considered in order to ensure threats will be at least temporarily ameliorated until such time that an effective regulatory mechanism can be implemented."* However, the COT Report fails to mention what those "enforceable temporary measures" would include,

which agency would be charged with enforcing them, if they would be enforced on private land, or the criteria that would be used to determine if they are an *"adequate regulatory mechanism."* The language of the COT Report is similar to that of activists and litigants, who in 2012, called upon the Western Governors for an "*enforceable interstate compact to effectuate their collective commitment to sage-grouse conservation" and "regulate private land uses that threaten Sage-grouse."* And that these enforceable measures be imposed *"to ensure that private land owners meet their stewardship obligations for sage-grouse."*

11.2) An unintended consequence of the COT Report is that it provides an administrative record that litigants can then use in court to argue that additional regulation is needed for GRSG. The fact that the COT Report fails to provide any detail on enforceable measures leaves open their interpretation to the Court. The COT Report, by failing to provide detail and guidance, has effectively abrogated its stated responsibility to *"serve as guidance for federal land management agencies, state sage-grouse teams, and others in focusing efforts to achieve effective conservation for this species."*

Exhibit B: Studies Cited in the NTT and COT Reports Fail DQA Standards

Aldridge et al. 2008.[1] This study is cited three times between the COT Report and NTT Report in support of the flawed presumption that disturbance leads to extirpation. This study is also mis-cited in support of the 50-70% sagebrush threshold in the NTT Report. The NTT Report claims 50-70% of the range must be adequate in order for GRSG to persist. Aldridge et al. 2008 suggests that "preferably" 65% is necessary, but the results of this study give measurements related to range persistence and anecdotally how that might correlate to extirpation. For example, if occupied habitat was converted to a crop field, the population closest to the converted area was less likely to persist than populations located in suitable habitat farther away from the field. These results do not indicate that 70% or even 65% of the habitat must be suitable--only that fringe populations are more likely to be extirpated. Logistic regression, as used in this study, examines combinations of continuous variables to predict a positive or negative outcome. In this case, that was the presence or absence of GRSG at each point on a 5 km grid. However, the predictions of what affects the presence/absence of points on the grid can be completely unrelated to population persistence where the authors have not examined the totality of population response.

Aldridge, C. L., and M. S. Boyce. 2007.[2] The NTT and COT Reports cite this study for the flawed proposition that limited source habitats appear to be the main reason for poor nest success (39%) and low chick survival (12%). It is questionable that this study of GRSG in Alberta can have utility outside of that limited study area at the northern periphery of the species range. The Alberta population is small and has minimal suitable habitat available irrespective of human influence. Rather, ecology and geologic formations are the primary limiting factors in Alberta. Therefore, any impact on this population will appear heightened compared to other populations.

The authors claim many GRSG populations are at risk of extirpation. (page 509.) However, the authors proffer no citations nor authority for that proposition. In their modeling, the authors chose a subjective suite of variables related to habitat or human disturbance that they <u>felt</u> may be important. Id at 510. Such an analysis is readily subject to bias.

Further, they used a one-km^2 window which may be so large as to be meaningless as it is over 33 times larger than the 30m grid size used by the 2001 National Land Cover Data (NLCD 2001, http://www.epa.gov/mrlc/nlcd-2001.html). The 30m grid size has long been in use to develop qualitative models for endangered species critical habitat because it is the resolution of many digital elevation models (e.g. Turner et al. 2004). Some conservation GAP analyses use data with a resolution of 10m. While data resolution may limit analyses in some regions, a more focused evaluation of sage grouse core areas that

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[1] Aldridge, C.L., S.E. Nielsen, H.L. Beyer, M.S. Boyce, J.W. Connelly, S.T. Knick, and M.A. Schroeder. 2008. Range-wide patterns of greater sage-grouse persistence. Diversity and Distributions 14:983–994.

[2] Linking occurrence and fitness to persistence: habitat based approach for endangered Greater Sage-Grouse. Ecological Applications 17:508–526.

utilizes a more informative grid size (e.g. industry standards of 90, 30, or 10 m) would be a more appropriate basis for policy decisions and conservation measures than that offered in this paper.

The authors grossly assume that roads and power lines affect productivity and chick survival saying little more than the generalization that "mortality associated with power lines and roads occurs year-round." The authors cite absolutely no support for this assertion. *See* Messmer Tall Structure Synthesis at 10. This is clearly inappropriate to extrapolate to nest success and chick survival and the NTT reliance upon this proposition should be withdrawn. *See* NTT at 19. Moreover, citations to Aldridge and Boyce 2007 are inappropriate for the proposition that energy development leads to population declines because non actually quantified a population-level demographic response. See NTT at 19.

> "Habitat fragmentation, largely a result of human activities, can result in reductions in lek persistence, lek attendance, population recruitment, yearling and adult annual survival, female nest site selection, nest initiation, and complete loss of leks and winter habitat (Holloran 2005; Aldridge and Boyce 2007; Walker *et al.* 2007; Doherty *et al*. 2008)." COT at 9.

All of the studies cited in support of this were conducted in heavily developed energy fields utilizing older industry technology, thus, these studies are representative only of heavily developed energy fields in Wyoming and Alberta developed several years ago and not more broadly representative of various "human activities," as claimed in the studies. , The study also represents a very small fraction of the range of GRSG, none of which are representative of the Great Basin birds. It can also be argued that the study area/population used by Aldridge and Boyce is not representative of GRSG rangewide. The Alberta population is small and has minimal suitable habitat available irrespective of human influence, but is a result of ecology and geologic formations. Therefore, any impact on this population will appear heightened, then what might happen to a stronghold.

Interestingly, the data in Aldridge and Boyce 2007 suggest the majority of the late brood rearing habitat is already on land that is regulated by BLM.

Blickley et al. (in press). This study reported a population decline in lek attendance when projected sound from recordings at the edges of leks, which were as high as the noise levels occurring within 200m of a busy freeway (as measured across an open field with traffic loads of greater than 50,000 cars per day, or 55-70 decibels as shown in Figure 2 of Reijnen et al. 1995). The subsequent avoidance was then assumed to lead to have a negative effect on the population (i.e. contribute to their decline). Below, is a relevant excerpt from Blickley et al. (in press):

> Drilling-noise recordings were broadcast on experimental leks at an equivalent sound level (L_{eq}) of 71.4±1.7 dBF (unweighted decibels) SPL re 20 µPa (56.1±0.5 dBA [A-weighted decibels]) as measured at 16 meters; on road-noise leks, where

> the amplitude of the noise varied with the simulated passing of vehicles, noise was broadcast at an L_{max} (maximum RMS amplitude) of 67.6±2.0 dBF SPL (51.7±0.8 dBA).

The fact that authors broadcast such high levels of noise in such close proximity to leks biased the results, an error of omission by the authors and the NTT Report that cites them and proposed regulations based upon their recommendations.

The NTT Report cannot have it both ways, claiming a negative effect on sage grouse populations but admitting that there was "low statistical support for a cumulative effect of noise over time" in the study by Blickley et al. (in press). As noted above, there are no data showing a long-term cumulative decline in the sage grouse population in the Pinedale Planning Area.

The cited research was an amateurish attempt to reproduce the sounds of oil and gas development using substandard equipment that was wholly unsuited to the task of accurately recording and playing back traffic and sounds from oil and gas operations. Deficiencies in Blickley et al.'s equipment are detailed below.

Microphone: According to the manufacturer (http://en-us.sennheiser.com/k6-microphone-system), "the ME 62 [microphone used by Blickley et al.] is an omni-directional microphone head suitable for K6 and K6P powering modules. It can be used for reporting, discussions and interviews. The ME 62 is particularly suitable for good reproduction of 'room' ambience and 'spaced omni' stereo recording. Matt black, anodized, scratch-resistant finish."

Recorder: The Marantz model PMD670 used by Blickley et al. does not offer high-resolution (88.2 or 96 KS/s) sampling rates, its metering characteristics are unknown, and it is limited to 16/48 recording and thus is not considered a high-resolution recorder. It retails online for $700.

Playback speakers: The speakers used in the study were standard outdoor speakers camouflaged as rocks and designed for background music playing in home, hotel, and amusement park applications. They were not designed for accurately reproducing industrial sounds. The specifications for the speakers may be found on the manufacturer's website: http://www.ticcorp.com/specifications_tfs14.pdf.

The speakers were powered by 12 volt car batteries rather than 120 volt AC power and a car stereo amplifier of unknown make and model was used to boost the output. Packed into each simulated rock speaker housing was a 10" woofer with an injection molded cone, a 5.5" midrange cone, and 2" soft dome tweeter. The size and quality of the speakers, and the small speaker housing, severely limits the physical capability of the system to accurately reproduce either low or high frequency sound produced by oil and gas operations or traffic.

As a result of substandard equipment and lack of expertise in sound recording and reproduction, Blickley et al. (in press) resorted to placing their speakers at the edge of leks and to playing their systems at high levels in order to elicit a behavioral response. This is a biased approach to obtain a preferred result. The BLM cannot rely on biased research in its decision-making.

The recommended noise levels are not based upon any standardized, repeatable data collection, or accepted methods of sound measurement. The methods used by Blickley et al. (in press), and reported results did not contain any credible, professional analysis of local ambient sound levels or oil and gas noise (e.g. the type, duration, frequencies, sound pressure levels, and power of sound produced by different oil and gas drilling or production operations; equipment being recorded); or employ the use of professionally accepted standards, such as International Organization for Standardization (ISO) standards for quantifying industrial and traffic noise (http://www.iso.org/iso/home/standards.htm).

The standards not followed by the cited studies include, but are not limited to: ISO 1996-1:2003 Acoustics -- Description, measurement and assessment of environmental noise -- Part 1: Basic quantities and assessment procedures; ISO 9613-2:1996 Acoustics -- Attenuation of sound during propagation outdoors -- Part 2: General method of calculation; ISO 4871:1996 Acoustics -- Declaration and verification of noise emission values of machinery and equipment; ISO 532:1975 Acoustics -- Method for calculating loudness level; ISO 7196:1995. Acoustics -- Frequency-weighting characteristic for infrasound measurements; ISO 8297:1994 Acoustics -- Determination of sound power levels of multisource industrial plants for evaluation of sound pressure levels in the environment -- Engineering method; and IEC 61672-1:2002(E) - Electroacoustics, Sound level meters -- Part 1: Specifications).

Blickley et al. did not employ any sound propagation models in their study to quantify the confounding effect of temperature, relative humidity, topography, ground cover and surface porosity, wind direction, the direction noise was generated from, the geographic extent of the noise, its duration, frequency of occurrence, or permanence, (Attenborough 2007). Nor did they provide any correlation of their playbacks compared to the industrial and traffic sources they had attempted to duplicate. Furthermore, no graphic equalizer was used which would have allowed for the adjustment of sound pressures in different frequency ranges (at standardized 1/3 octave band frequencies), and no measurement of sound pressure levels was taken in front of playback speakers, which together would have allowed for the accurate reproduction of the sound at the same frequencies and sound pressure levels as the original noise. Therefore, BLM cannot base regulations upon no data and results based upon arbitrary methods that are not compliant with accepted professional standards in the noise control industry (i.e. Bies and Hansen 2009; ISO).

Carpenter, et al. 2010.[3] This study was cited four times in the NTT Report for the proposition that energy development and disturbance cause negative impacts to GRSG

[3] Carpenter, J., C. Aldridge, and M.S. Boyce. 2010. Sage-grouse habitat selection during winter in Alberta. Journal of Wildlife Management -74:1806-1814.

through avoidance behavior i.e. loss of functional habitat. The NTT Report incorrectly cites this paper in support of no surface occupancy ("NSOs") and four-mile buffers even though such concepts were not discussed therein, and the maximum distance discussed is well short of four miles. While the authors discussed distances from 328 feet to 1.2 miles and ultimately recommended 1.2 miles, this is far from the excessive four-mile buffers recommended in the NTT Report. Despite the representation in the NTT Report, this paper does not support the proposition that disturbance equals population declines. NTT Report at 19. The NTT Report also recommends, "[D]o not allow new surface occupancy on federal leases within priority habitats, this includes winter concentration areas (Doherty et al. 2008, Carpenter et al. 2010) during any time of the year." NTT at 23. The NSO is not supported. First the recommendations of this study are limited to the population in Alberta, and the authors recommend a 1.2 mile buffer, not a categorical prohibition of development.

An important limitation of this study is that it does not differentiate between habitats that were previously used and those that GRSG now avoid. It assumes subjective factors such as moderate sagebrush cover will always lead to use by GRSG even if there is no evidence that GSG ever used these locations. The authors provide no evidence of ground-truthing for their assertions. They assume that GRSG would use this otherwise suitable habitat but for energy development and anthropogenic features. The authors state that "*…winter habitats may be of greater importance in declining populations*" based upon opinion and conjecture. What little evidence they provide, i.e. Swenson 1987 and Beck 1977, is completely outdated. Moreover, GRSG survival is consistently highest over winter, so any population level impact is likely limited by other variables. Other citations used in the study, such as Doherty et al. 2008, are refuted herein.

The authors admit that they merely assumed GRSG avoid landscapes with anthropogenic disturbances. Further, the authors fail to explain how capture sites were chosen and whether ease of winter access may have impacted their results or why they chose 2003 as a model year. In their modeling exercise, they subjectively chose some 86 variables for input. Table 1. Such a model is only as good as the data entered. This study relies on the quality of the techniques used by Aldridge and Boyce 2007--studies with their own serious shortcomings as critiqued and referenced herein. The statement, "[T]hreats such as oil and gas development or cultivation of native habitats could reduce connectivity and disrupt migratory patterns, possibly causing bottlenecks between seasonal ranges or populations" was not adequately assessed in the paper and seems to be based purely on opinion. The results of this study might inform management in Alberta, but not in other parts of the range. Moreover, this study as well as Aldridge and Boyce, and Doherty et al. 2008 all included study areas that were heavily developed, and not representative of conditions range-wide. Furthermore, as discussed herein, more recent studies have shown that the effects of energy development today are much different and much smaller than the dated scenarios for oil and gas development used by the authors.

Cassaza et al. 2010.[4] This study is mis-cited in the COT Report in support of the proposition that pinon juniper needs to be reduced to no more than 5 percent of the landscape. Given the authors considered brood-rearing habitat, it is inappropriate to rely upon this study for the COT Report's recommendation that this proposed pinon juniper threshold be applied across all GRSG habitat.

Doherty et al. 2008.[5] This paper is cited six times in the NTT Report for support of surface use restrictions. This paper is largely based upon professional judgment rather than hypothesis testing. Even then, the NTT Report mischaracterizes the study as support for its recommended 3% disturbance threshold, four-mile buffers and prohibition on leasing in priority habitat. With regard to the proposed four-mile buffer, Doherty et al. 2008 did not test whether four-mile buffers are necessary, or whether GRSG would respond positively to a four-mile buffer. The authors do say that current management is insufficient to protect winter habitat (i.e. 0.5 mi lek buffer.), but do not suggest a wholesale prohibition on leasing. This study did not look at population trends; rather it examined habitat selection and variables impacting it.

The study examined 24 predictor variables over two years to predict female GRSG winter habitat selection. Table 1. For variables that were strongly correlated the authors chose to keep variables they "felt" were strong predictors, and dismissed the others. After deciding on a habitat model the authors conducted a bootstrap analysis (n=5,000) to quantify change in odds of use with the introduction of coalbed methane (CBM) wells. The bootstrap analysis was repeated to quantify how the amount of sagebrush (four square km) affected the odds of use with or without wells. However, instead of conducting analysis with varying degrees of development, the authors assumed full build out at 12.3 wells/km square versus 0 wells/km square. This only provides insight into a worst-case scenario which is not representative of actual conditions or variables across the vast range of GRSG, or newer technologies undertaken in later phased (POD) developments. Topography and sagebrush cover were the best predictors of GRSG use. Ultimately, the authors found that female sage-grouse are more likely to avoid winter habitats with intensive (full build out) CBM development.

While it is well known that GRSG are positively correlated with the amount of sagebrush cover, and Doherty et al. 2008 found that percent cover was a good predictor of occurrence at a coarse (4km sq) scale, the authors improperly state "[C]onversion of sagebrush negatively influences sage-grouse populations" without supporting data. *Id.* at 193. The negative influence that the authors found was avoidance by GRSG. However, the presumption that avoidance leads to population level impacts has not yet been proven, as discussed elsewhere in this challenge.

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[4] Cassaza M.L., P.S. Coates, and C.T. Overton. 2010. Linking habitat selection to brood success in greater sage-grouse, Pp. 151-167 *in* B.K. Sandercock, K.Martin and G. Segelbacher (eds.). Ecology, conservation and management of grouse. Studies in Avian Biology (no.39). University of California Press, Berkeley, CA.

[5] Doherty, K.E., D.E. Naugle, B.L. Walker, and J.M. Graham. 2008. Greater sage-grouse winter habitat selection and energy development. Journal of Wildlife Management 72:187-195.

Importantly, the authors state "Examination of ecological processes at the landscape scale does not eliminate the need to understand habitat relationships at local scales; rather, it will likely require a combination of scales to completely understand how sage-grouse respond to their environment." *Id.* at 194. This statement undermines the NTT's broad one-size-fits-all landscape approach to the exclusion of local data.

Doherty et al. 2010.[6] NTT Report cited Doherty et al. 2010 twice in support of a 50-70% sagebrush landscape cover. However, the Literature Cited section lists two Doherty et al. 2010 studies and fails to differentiate which one stands for the proposition alleged. Neither Doherty et al. 2010a or Doherty et al. 2010b stand for this proposition. Doherty et al. 2010a developed nesting habitat selection models at multiple scales to evaluate the "relative importance and interpretation of local, landscape, and multiscale models." Doherty et al. 2010a did not test what minimum range is necessary for GRSG to persist. Ultimately, Doherty et al. 2010a found that multiscale models were more predictive than local or landscape scale models alone. They also found that both local and landscape scale features influence nesting site selection and that sagebrush cover alone was not predictive of use. Doherty et al. 2010b used lek count data and bird abundance at varying levels of energy development to develop a method for evaluating offsets. Doherty et al. 2010b found that as energy development increased (ie. density of wells) the likelihood of lek loss increased and bird abundance decreased. Like many similar studies, Doherty et al. 2010b does not account for movement of GRSG away from disturbance.

Fedy et al. 2012.[7] This study is cited two times in the COT Report, once in support that areas outside priority areas of conservation ("PACS") may need to be maintained. This is another example of the mistaken assumption that GRSG are unable to bypass unsuitable habitat during migration or other seasonal movements.

Garton et al. 2011.[8] This study is cited 15 times in the COT Report to allegedly demonstrate population declines, existing conditions, and expected persistence. There are significant issues with this study as discussed in detail in Exhibit A to the Petitioner's DQA Challenge on the NTT Report.

Hagen et al. 2007.[9] This study was cited nine times in the NTT Report in support of the proposition that sagebrush cover must meet certain thresholds (15%) and for reclamation

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[6] Doherty, K.E., D.E. Naugle, and B.L. Walker. 2010a. Greater sage-grouse nesting habitat: The importance of managing at multiple scales. Journal of Wildlife Management 74:1544-1553; or Doherty, K.E., D.E. Naugle, and J.S. Evans. 2010b. A currency for offsetting energy development impacts: Horse-trading sage-grouse on the open market. PLoS One 5:e10339. Accessed 19 September 2011.

[7] Fedy B.C., C.L. Aldridge, K.E Doherty, M. O'Donnell, J.L. Beck, B. Bedrosian, M.J. Holloran,G.D. Johnson, N.W. Kaczor, C.P. Kirol, C.A. Mandich, D. Marshall, G. McKee, C. Olson, C.C. Swanson, and B.L. Walker. 2012. Interseasonal movements of Greater sage-grouse, migratory behavior, and an assessment of the core regions concept in Wyoming. Journal of Wildlife Management 76:1062-1071

[8] Garton, E.O., J.W. Connelly, J.S. Horne, C.A. Hagen, A. Moser, and M. Schroeder. 2011. Greater sage-grouse population dynamics and probability of persistence. Pp. 293-382 *in* S.T. Knick and J.W. Connelly (eds). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38). University of California Press, Berkeley, CA.

[9] Hagen et al 2007 A meta-analysis of greater sage-grouse Centrocercus urophasianus nesting and brood-rearing habitats. Wildl. Biol. 13 (Suppl. 1): 42-50.

bonds, brood-rearing characteristics, habitat parameters and fire treatments. Most of the citations in the NTT Report appear to mischaracterize this study. For example, the NTT fails to distinguish between seasonal habitats or recognize that Hagen et al. 2007 only applied these numbers to nesting habitat. The authors support, "[I]n general, a range of 15-25% sagebrush, 10% forb, 15 % grass canopy cover and, a herbaceous height of 18 cm are needed for **breeding habitats** of greater sage-grouse." (Emphasis added). Hagen et al. 2007 at 43 citing Connelly. However, we know based on other work that these parameters are not applicable across seasonal habitats or range-wide, particularly in the Great Basin, discussed in detail below. Moreover, even the authors recognize that many question, "…the applicability of management guidelines (Connelly et al. 2000) across the range of the greater sage-grouse, as well as the techniques used to derive the earlier estimates of vegetative cover and height." *Id.* citing Bates et al. 2004, Schultz 2004)."

Incredibly, the authors later ignore their own statements on the inapplicability range wide and conclude that they apply "throughout the geographic range of [GRSG]". *Id citing* Connelly and Braun 1977. Not surprisingly, the NTT Report seizes on this improper conclusion in the study to support its flawed one-size-fits-all approach. However, we know based on other studies that "other" shrub cover in some management zones and populations plays a more critical role than sagebrush in nesting habitat, thus the conclusion is wrong.

The authors conducted a meta-analysis of vegetation characteristics at 24 nest sites and 8 brood habitats to determine if there was an overall effect of habitat selection and to estimate average canopy cover of sagebrush grass and forbs and height of grass at nest sites and brood-rearing areas, but these results are quite limited. For example, several researchers[10] have conducted significant work in the Great Basin documenting the characteristics of nesting habitats. These studies conflict with the conclusions of Hagen et al. 2007 that more sagebrush cover is required for nest success. Moreover, the sample size used for this study is very small and could be questioned.

While the authors recognize total shrub cover had a larger effect size than sagebrush only for nesting habitat, their conclusion is directly contrary to this finding. The authors note that methods to measure vegetation characteristics have not always been consistent, which is very important because it diminishes the reliability of older studies, and it also makes it difficult to compare data across studies. Five of the studies analyzed in this study did not differentiate between sagebrush and other shrubs which can bias the results in favor of higher sagebrush cover. However, in a later study Kolada[11] found in the Bi-

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[10] Kolada, E. J., Sedinger, J. S. and Cassaza, M. L. (2009), Nest Site Selection by Greater Sage-Grouse in Mono County, California. The Journal of Wildlife Management, 73: 1333–1340. doi: 10.2193/2008-338; Gregg, M., Crawford, M., Drut, M., & DeLong, A. (1994). Vegetational Cover and Predation of Sage-grouse Nests in Oregon. Journal of Wildlife Management, 58:162-166; Coates, P., & Delehanty, D. (2010). Nest Predation of Greater Sage-grouse in Relation to 10 Microhabitat Factors and Predators. Journal of Wildlife Management, 74:240-11 248, Lockyer, Z.B. 2012. Greater sage grouse *(Centrocercus urophasianus)* nest predators, nest survival, and nesting habitat at multiple spatial scales. M.S. thesis. Depratment of Biological Sciences, Idaho State University, Pocatello, ID.

[11] Kolada E.J., J.S. Sedinger, M.L. Casazza. 2009. Ecological Factors Influencing Nest Survival of Greater Sage-Grouse in Mono County, California. The Wildlife Society. DOI: 10.2193/2008-339 See also,

State area that the limiting factor for nesting habitat was not sagebrush cover but rather "other" shrub cover. Hagen et al. 2007 differentiates between early and late brood rearing, and some of the studies analyzed did not, which again can impact the result. For studies that did not differentiate, the authors of this study pooled the effect size.

There are numerous misrepresentations of Hagen et al 2007 in the NTT Report. For example:

"Riparian Areas and Wet Meadows… Within priority and general sage-grouse habitats, manage wet meadows to maintain a component of perennial forbs with diverse species richness relative to site potential (e.g., reference state) to facilitate brood rearing. *Also conserve or enhance these wet meadow complexes to maintain or increase amount of edge and cover within that edge to minimize elevated mortality during the late brood rearing period* (Hagen et al. 2007, Kolada et al. 2009, Atamian et al. 2010)." NTT at 16

- Hagen et al. does not readily support the statement in italics. While the authors report that "[D]uring brood rearing, sagebrush cover decreased from early to late periods, forb cover increased, whereas grass cover and height did not change appreciably," they did not test whether these parameters decreased mortality.

"Within priority sage-grouse habitat, reduce hot season grazing on riparian and meadow complexes to promote recovery or maintenance of appropriate vegetation and water quality. Utilize fencing/herding techniques or seasonal use or livestock distribution changes to reduce pressure on riparian or wet meadow vegetation used by sage-grouse in the hot season (summer) (Aldridge and Brigham 2002, Crawford et al. 2004, Hagen et al. 2007)." *Id.*

- Hagen et al. 2007 does not support the NTT's assertion. This study only looked at selection and vegetative characteristics- other parameters like presence of grazing or other potential pressures were not included in determining use or selection by GRSG.

"Require a full reclamation bond specific to the site. Insure bonds are sufficient for costs relative to reclamation (Connelly et al. 2000, Hagen et al. 2007) that would result in full restoration." *Id.* at 23

- This is clearly not supported by the Hagen et al. study. Perhaps they meant to say restoration to the habitat characteristics described in Connelly and Hagen, but how this sentence is structured implies that the studies support the need for full reclamation, which they do not.

"Fuels treatments…Do not reduce sagebrush canopy cover to less than 15% (Connelly et al. 2000, Hagen et al.2007)" *Id.* at 26.

Kolada E.J., J.S. Sedinger, M.L. Casazza. 2009. Nest site selection by greater sage-grouse in Mono County, California. Management and Conservation Article. DOI: 10.2193/2008-338

- This is only generally supported by Hagen but ONLY for nesting/brooding habitat, not across seasonal habitats.

"Fuels treatments… Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species; Connelly et al. 2000, Hagen et al. 2007, Beck et al. 2009)." *Id.*

- This is not supported by Hagen et al 2007. The NTT completely misrepresents this study.

Appendix B states, "[B]ecause sage-grouse research has been on-going for over 60 years, managers have access to published literature from several studies (metareplication (Johnson 2002)) that includes different years, study areas, methods, and investigators (Johnson 2002) which leads to more certainty in conclusions (for example see Hagen et al. 2007)." *Id.* at 57.

- However, the authors concede they used different methods than earlier studies and fail to explain how the quality of the data they utilized might influence results. The quality of the lek count and location data used is suspect because those data have been collected by different individuals and agencies using different methods for decades without proper data quality checks and/or data migration and curation. Furthermore, the data are not public and therefore the results are not reproducible. That means that purported "confidence" in the results is without a sound scientific basis.

Holloran 2005.[12] This study is cited 14 times between the two reports (NTT/12. COT/2) in support of several flawed propositions and conservation measures, including alleged population declines associated with energy development and the allegation that fragmentation impacts use and ultimately persistence. Holloran 2005 did not acknowledge that the BLM had intentionally waived stipulations on the Pinedale Anticline in order to facilitate research on impacts without these stipulations. This does not correspond to impacts under stipulations required at the time, nor account for current (and dramatically reduced) impacts under more recent and stringent stipulations. Finally, Holloran's (2005) population scenarios and predictions of population decline have simply failed to come true.

As an initial matter, Holloran 2005 was an unpublished dissertation that did not employ any hypothesis testing. Instead, Holloran 2005 used subjective interpretations of his results, or the equivalent of creating "just so stories" to explain results in light of a particular viewpoint. That is not science, it is subjective opinion. Additionally, the following data quality issues are identified in the study by Holloran 2005 that are relevant to BLM's continued reliance on it as a basis for decision making:

[12] Holloran, M.J. 2005. Greater sage-grouse (Centrocercus urophasianus) population response to natural gas field development in western Wyoming. Dissertation, Department of Zoology and Physiology, University of Wyoming, Laramie, Wyoming.

Holloran 2005 only speculated on potential causal mechanisms of population decline, as his data and study design were focused only on localized effects. Additionally, Holloran admitted that, *"Identifying causes of population declines has remained elusive."* And the "displacement theory" favored by Holloran (2005) does not provide any test of the hypothesis that local, temporary displacement of yearling sage grouse from areas under intensive development has led to population-level declines.

Holloran 2005 does not provide any data that population declines have occurred, or that density-dependent effects have occurred in nearby areas, only that the results suggest that these *might* occur or have the *potential* to occur. He wrote,

> The results from this study suggest that dispersal from developed areas could be contributing to population declines. Although the proportion of potentially displaced adult and yearling males and yearling females breeding and nesting in areas removed from gas field infrastructure is unknown, offsite populations could be artificially enhanced by gas development. Because of potential density-dependent influences on breeding and nesting success probabilities (LaMontagne et al. 2002, Holloran and Anderson 2005), maintenance of these enhanced populations could require increasing the carrying capacity of offsite habitats.

The author also stated,

> Adult male displacement and low juvenile male recruitment appear to contribute to declines in the number of breeding males on impacted leks. Additionally, avoidance of gas field development by predators could be responsible for decreased male survival probabilities on leks situated near the edges of developing fields (i.e., lightly impacted leks). Although site-tenacious adult females did not engage in breeding dispersal in response to increased levels of gas development, subsequent generations avoided gas fields, as suggested by the temporal shift in nesting habitat selection and differences in habitat selection by yearling and adult females. This suggests that the nesting population response is delayed avoidance of natural gas development. The results suggest that male and female greater sage-grouse displacement from developing natural gas fields contributes to breeding population declines.

As one can readily see, this "strong science" depends upon speculation, hypothetical worst-case scenarios coming true, and creating just-so-stories to explain results. It does not rely on hypothesis testing.

Holloran (2005, page 82, Table 2) actually reported that the probability of survival was predicted to be *higher* (61.5 +6.4%) in disturbed areas than in less impacted areas (29.6 +18.1%) or control areas (48.5 +14.4%). This result is contrary to Holloran's (2005) own assertions regarding supposed population impacts.

Moreover, the author’s predicted population declines (-8.7 to -24-4% annually) have simply failed to come true. Recent analysis of male lek-attendance trends by the State of

Wyoming has instead found that the GRSG population has been increasing since 1990. It is the litmus test of science that when such predictions fail to come true, the hypotheses/theories they are based upon are simply wrong (Platt 1964). BLM cannot rely on studies cited that have been so clearly falsified.

Holloran 2005 did not provide any data that show consistently lower level of fitness for birds that nested father from roads. Further, the author made very specific recommendations regarding one well per section that were not based upon testing of that threshold in the analysis. Holloran wrote, "[M]aintaining well densities of ≤1 well per 283 ha (approximately 1 well per section) within 2 mi of a lek could reduce the negative consequences of gas field development." However, the author did not test impacts at this density versus other well densities. Instead, he reported on leks affected by different numbers of impacts in each of four quadrants in the cardinal directions and predictions based upon correlations at a scale of 3 km. Data, significance tests, and scatterplots of those correlative analyses were not reported, making the scientific rationale for his one-well-per-section not reproducible. BLM cannot rely on unsupported opinion and irreproducible analyses as the basis for recommendations made in the NTT Report.

Five years after the original Holloran study was released (Holloran 2005), Holloran et al. (2010) did not document any population loss--only temporary displacement of sage grouse. We emphasize, even Holloran et al. did not support their own earlier study, yet the NTT Report uses it uncritically. Holloran et al. (2010) wrote the following about their results,

> "Leks that recruited more than the expected number of males were significantly farther from drilling rigs, producing well pads, and main haul roads compared to leks that recruited fewer males than expected (Table 1). Additionally, leks that recruited more males than expected were significantly farther from main haul roads than leks that recruited the same number of males as expected."

In other words, only leks near the drilling rigs were affected and males from those leks tended to move to leks farther from active development. These missing males did not die off and the population did not crash, no negative demographic effect on the population was found. BLM cannot rely on studies that purport to document a negative effect (i.e. Holloran 2005), yet consistently fail to do produce data that show such a negative effect.

There has been no decline in the GRSG population in the Pinedale Planning Area (Upper Green River Basin). Instead, data and analyses performed by the Wyoming Department of Game and Fish reveal that between 1990 and 2012 there has been a consistent increase as measured by male lek attendance and male density per square mile. Wyoming Game and Fish 2012. The information relied upon by the NTT Report is simply wrong.

Holloran et al. 2010.[13] This study is cited four times in the NTT Report for the proposition that avoidance leads to population declines. As discussed extensively above, local avoidance does not, as the authors speculate, equate to population declines.

Johnson et al. 2011.[14] This study is cited three times in the NTT Report in the context of negative impacts being measured great distance from leks, suggesting support of four-mile buffers, and 3 percent disturbance threshold.

Regarding professional judgment and the 3% anthropogenic disturbance threshold, the cited studies (Johnson et al. 2011, and Naugle et al. 2011a, b) are not as definitive as claimed in the NTT Report with regards to susceptibility of sage grouse to either discrete or diffuse disturbance. First, Johnson et al. 2011 utilized extremely weak statistical inference and there are simply not enough years of data to reliably support inferences with single variables, much less multiple variables analyses produced by Johnson et al. 2011 are not reliable statistical inferences and it is hard to imagine that such a weak paper was ever published. The authors examined 62 different predictor variables, using only 11 years of lek count data for the response variable, in seven different sage grouse management zones. Reliability was further compounded by the fact that 37% of the lek counts used by Johnson et al. (2011), had *only four years of data* associated with them. As a result, Johnson et al. 2011 is an example of an extremely weak approach to statistical inference and a poorly planned "data-fishing expedition."

There are simply not enough years of data to support inferences with single variables, much less several variables, and certainly not the 62 variables studied by Johnson et al. (2011). The study only reported Pearson correlation coefficients (r), rather than r2 and its significance, which is not common practice and illustrates the lack of meaningful signal in the data. The scatterplot figures illustrate the main result: that there are no significant correlations between predictor and response variables. Instead, there were random clouds of points. The authors resorted to LOESS smoothing in an attempt to identify potential patterns in the data that did not otherwise have any statistical significance. LOESS smoothing allows one to portray a pattern or trend, where none exists.

Despite the obvious issues (discussed above), the authors reported on "trends" and discussed the potential importance of these. The fact that Johnson is employed by the USGS raises questions about the independence of this paper. Two of the NTT members (D. Naugle and S. Knick) were also authors on USGS GRSGS Monograph (where this study was published) and S. Knick was one of its editors. This raises issues about the lack of independence of the NTT Report and the validity of the scientific information relied upon to formulate its recommendations.

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[13] Holloran, M.J., R.C. Kaiser, and W.A. Hubert. 2010. Yearling greater sage-grouse response to energy development in Wyoming. Journal of Wildlife Management 74:65–72.

[14] Johnson, D.H., M.J. Holloran, J.W. Connelly, S.E. Hanser, C.L. Amundson, and S.T. Knick. 2011. Influences of environmental and anthropogenic features on greater sage-grouse populations. Pages 407-450 in S.T. Knick and J.W. Connelly, editors. Greater sage-grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology 38. University of California Press, Berkeley, California, USA.

Kaiser 2006.[15] This study is cited four times between the two reports (NTT/3, COT/1). The NTT Report cites this study in the context that birds avoid habitat that might otherwise be suitable and this thus could lead to lek abandonment. The COT Report wrongly concludes this study proves populations decline as a result of oil fields. Lek avoidance does not equate to population declines.[16] For example, Tack et al. 2011 used satellite global positioning system transmitters to reveal dispersal of GRSG over much greater distances (over 100km and some up to 300 km) and more frequently than previously thought. Accordingly, GRSG may fly over or around areas of disturbance.

Kiesecker et al. 2011.[17] The COT Report mis-cites this study. While Kiesecker et al. mention that ecological zoning is an admission that conservation of all habitat is improbable (See p. 167), this is not what the study is about. Kiesecker et al. propose what they believe to be a better way to implement, track, assess the mitigation hierarchy, which they assert will be more effective at conserving key habitat, while "allowing" continued energy development.

The authors propose that offsets (mitigation) are ecologically equivalent to impacts resulting in net neutral or positive outcomes, but fail to suggest how this would be measured. In addition, the authors fail to recognize the many uncertainties and variables within GRSG habitat. The authors proposed strategy for accounting for offsets will punish those who seek offsets in restoration activities as opposed to protective offsets, by making the cost of restorative offsets more costly. Obviously, this deters any incentive to restore habitat, but it also forces an increase in areas that would be off limits to future development.

As part of the accounting approach when deciding on the appropriate ratio, the probability of success must be determined, as seems reasonable. However, if for example the scientific literature is lacking or uncertain on restoration activities/success, then the cost of offsets will increase. In other words, if a given restoration practice is only marginally successful, this would be favored in the calculation over newer innovative technology because the new methods success odds are not yet proven. This will stifle technological advances in restoration and ultimately would harm habitat by preventing any incentive to try and improve it.

Knick et al. 2003.[18] The very title of this piece evidences extreme bias, "Teetering on the edge or too late?...." This study is cited 15 times between the two reports (NTT/1,

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[15] Kaiser, R.C. 2006. Recruitment by greater sage-grouse in association with natural gas development in western Wyoming. M.S. Thesis, University of Wyoming, Laramie, WY. 102pp.

[16] *See* Ramey, Thurley and Ivey 2014.

[17] Kiesecker J.M., H.E. Copeland, B.A. McKenney, A. Pocewicz and K.E. Doherty. 2011. Energy by design: Making mitigation work for conservation and development. Pp. 159-181 *in* D.E. Naugle (ed). Energy Development and Wildlife Conservation in Western North America. Island Press, Washington, D.C. This paper was note cited in the NTT or COT Reports, but has fundamental flaws which weigh against agency reliance upon it in Land Use Plan Amendments or otherwise.

[18] Knick, S.T., D.S. Dobkin, J.T. Rotenberry, M.A. Schroeder, W.M. Vander Haegen, and C. Van Riper III. 2003. Teetering on the edge or too late? Conservation and research issues for avifauna of sagebrush habitats. Condor 105:611-634

COT/14). Both the NTT and COT Reports cite this paper in support of the proposition that sagebrush ecosystems are beyond recovery thresholds and the amount of habitat lost or degraded as a result of human settlement. There is a likely conflict of interest as Schroeder, a co-author is a COT team member, and Knick is an NTT member. While reflected in the NTT and COT Reports for mistaken propositions on hindrances to restoration, this paper represents the opinions of the authors and is not based on actual data or hypothesis testing.

The authors provide no evidence for their assertion that "disruption" leads to the inability to restore habitats, and does not present data to support its assertions that restoration could take decades or centuries. Knick et al.do not indicate whether their assertions are based on passive or active restoration, and most importantly fails to recognize that there are many factors that impact resilience and thus restoration of habitats. Numerous publications suggest that restoration is possible, but it takes active as opposed to passive management.

Furthermore, even if it does take decades or longer to fully recover sagebrush habitats Knick et al. 2003 assumes that GRSG require climax communities in all life stages and seasons, and also assumes that after loss of a patch there is none available for GRSG to disperse to. GRSG can walk and fly and bypass unsuitable habitats for suitable habitat.

Knick et al. 2003 continues to espouse and assume that because not all sagebrush can be effectively restored this equates to an overall lack of effectiveness of restoration efforts. This notion is false. The authors have not quantified the amount of habitat that has reached a change in state that precludes effective restoration, which may be small. There have been numerous studies published as part of the Sagebrush Steppe Treatment Evaluation Project (SageSTEP) that have demonstrated how proper management, and different restoration methods can positively influence resilience in a cost-effective manner.[19] For instance, transplanting sagebrush is significantly more effective and is also

[19] *See* David A. Pyke, Scott E. Shaff, Andrew I. Lindgren, Eugene W. Schupp, Paul S. Doescher, Jeanne C. Chambers, Jeffrey S. Burnham, and Manuela M. Huso (*2014*) Region-Wide Ecological Responses of Arid Wyoming Big Sagebrush Communities to Fuel Treatments. Rangeland Ecology & Management: September 2014, Vol. 67, No. 5, pp. 455-467; Richard F. Miller, Jaime Ratchford, Bruce A. Roundy, Robin J. Tausch, April Hulet, and Jeanne Chambers (*2014*) Response of Conifer-Encroached Shrublands in the Great Basin to Prescribed Fire and Mechanical Treatments. Rangeland Ecology & Management: September 2014, Vol. 67, No. 5, pp. 468-481; Bruce A. Roundy, Richard F. Miller, Robin J. Tausch, Kert Young, April Hulet, Ben Rau, Brad Jessop, Jeanne C. Chambers, and Dennis Eggett (*2014*) Understory Cover Responses to Piñon–Juniper Treatments Across Tree Dominance Gradients in the Great Basin. Rangeland Ecology & Management: September 2014, Vol. 67, No. 5, pp. 482-494; Bruce A. Roundy, Kert Young, Nathan Cline, April Hulet, Richard F. Miller, Robin J. Tausch, Jeanne C. Chambers, and Ben Rau (*2014*) Piñon–Juniper Reduction Increases Soil Water Availability of the Resource Growth Pool. Rangeland Ecology & Management: September 2014, Vol. 67, No. 5, pp. 495-505; Benjamin M. Rau, Jeanne C. Chambers, David A. Pyke, Bruce A. Roundy, Eugene W. Schupp, Paul Doescher, and Todd G. Caldwell (*2014*) Soil Resources Influence Vegetation and Response to Fire and Fire-Surrogate Treatments in Sagebrush-Steppe Ecosystems. Rangeland Ecology & Management: September 2014, Vol. 67, No. 5, pp. 506-521; Richard F. Miller, Jaime Ratchford, Bruce A. Roundy, Robin J. Tausch, April Hulet, and Jeanne Chambers (*2014*) Response of Conifer-Encroached Shrublands in the Great Basin to Prescribed Fire and Mechanical Treatments. Rangeland Ecology & Management: September 2014, Vol.

significantly cheaper than seeding. Others have shown that if seeding is chosen then it is significantly more effective if it is covered with organic matter, and has shown that by seeding with herbs after a fire or pinyon juniper treatment, it can suppress the spread and establishment of cheatgrass.

This paper lacks any useful scientific findings and seems basically a biased call to arms for environmental groups. For example, the authors complain about a lack of political agenda and advocate that public lands be "Protect[ed] from economic use." Other incredibly biased statements include,

> "[O]ur primary challenge, presented over a quarter of a century ago (Braun et al. 1976), may be to convince our society of the intrinsic value of sagebrush ecosystems and their unique biodiversity. This change in mindset will have to be followed by a firm commitment by federal and state agencies to provide the resources necessary to resolve issues presented in this paper. Only with this concerted effort and commitment can we afford to be optimistic about the future of sagebrush ecosystems and their avifauna."

Further, the purpose of this study is said to be to "emphasize the urgency for conservation and research actions, and synthesize existing information…" It is clear that this study was not designed objectively, and it is truly an opinion paper of where the authors perceive there to be gaps in research. There is no hypothesis testing, and no real data presented.

Because this is a review of existing conditions in 2003, the information is outdated. Significant work and conservation efforts have taken place since the publication of this paper which have reduced threats. Throughout the paper the authors make the assertion that habitat has been disturbed or disrupted *"beyond a threshold at which natural recovery is unlikely*" a bold and biased statement which is not supported by data but reflects the opinions of the authors and those they cite, many of which are also outdated.

The authors cite anthropogenic disturbances like mining, grazing, oil and natural gas, and infrastructure as fragmenting and degrading habitat. West and Young 2000 (advocates of listing Gunnison sage) are frequently cited in support of the amount of habitat lost since pre-European settlement and that most of the range is beyond what can be restored. The authors then go on to cite Braun 1997, 1998, a paid consultant to listing proponents and a biased advocate of listing Gunnison and GRSG, as well as Connelly, and Schroeder et al. 2000, in support of their mistaken view of long-term population declines:

- "numbers of sage-grouse (*Centrocercus* spp.) have continued to decline throughout their range (Connelly and Braun 1997, Braun 1998, Connelly, Schroeder, et al. 2000) and individual populations have become increasingly separated (Schroeder,

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67, No. 5, pp. 468-481; Herriman, Kayla R. 2009. Wyoming big sagebrush: Efforts towards development of target plants for restoration. Moscow, ID: University of Idaho. 63 p. Thesis.

Hays, Livingston, et al. 2000, Beck et al. 2003)." This evidences bias and has been refuted by Zink 2014.

- "In addition to the challenge of understanding shrub-steppe bird-habitat dynamics, *conservation of sagebrush landscapes depends on our ability to recognize and communicate their intrinsic value and on our resolve to conserve them*." This shows serious lack of objectivity.

Knick et al. 2011.[20] This lengthy 162-page paper presents another cumulative effects analysis that covers nearly every conceivable deleterious human activity on sagebrush and sage grouse. This study is cited a total of eight times between the two reports (NTT/6, COT/2). The NTT's use of this study in support of the proposition that various anthropogenic disturbances results in population declines is the most problematic. The NTT Report cites it in support of withdrawals, and suggests draconian restrictions are necessary because increased development on private lands is not subject to mitigation and thus there is "greater need for conservation of sage-grouse and sagebrush on public lands (Knick et al. 2011)." NTT Report at 12.

Notably absent from this one-sided analysis is any mention of the effects of hunting harvest, even though this is a major, documented source of sage grouse mortality with 207,430 grouse killed just between 2001 and 2007, and higher annual take in the preceding years. Instead, the authors devote pages of attention to a number of hypothetical effects:

> "Even activities, such as hiking and mountain biking, which often are perceived as low impact or benign, have an influence wildlife (Miller et al. 1998, Taylor and Knight 2003). Any human activity of high frequency along established roads or corridors, whether motorized or non-motorized, can affect wildlife habitats and species negatively through habitat loss and fragmentation, facilitation of exotic plant spread, population displacement or avoidance, establishment of population barriers, or increased human-wildlife encounters that increase wildlife mortality (Gaines et al. 2003). These effects appear to be common across a variety of habitats and species that span the full range of forested to arid terrestrial environments (Gaines et al. 2003, Ouren et al. 2007)."

However, when one looks closely at the cited literature, these supposed population-level effects are speculative. The omission of documented sources of mortality and inclusion of speculative sources, indicate a less than objective analysis.

To quantify the influence of human activities on patterns and processes of sagebrush habitats and sage-grouse populations, the authors rely on the previously designated Sage-Grouse Conservation Area or the pre-settlement distribution of sage-grouse buffered by 50 km (Connelly et al. 200; Schroeder et al. 2004). As noted below in the discussion of

[20] Knick S.T., S.E. Hanser, R.F. Miller, D.A. Pyke, M.J. Wisdom, S.P. Finn, E.T. Rinkes and C.J. Henny. 2011. Ecological Influence and Pathways of Land Use in Sagebrush. Pp. 203-251 in S.T. Knick and J.C. Connelly (editors), Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkley, CA.

Schroeder et al. (2004), the pre-settlement distribution was a subjective assessment of pre-European GRSG distribution that included both habitat and non-habitat, and selectively excluded some areas of documented occupancy. The widening of the pre-settlement range by a 50km "buffer" (by Knick et al.) inflates the size of the area affected by human activities, even though GRSG may have never occurred there.

As with other disturbances in sage grouse habitat, Knick et al. quantify the "effect area" that surrounds any kind of development based on other studies. In the case of oil and natural gas wells, the effect area includes a 3km buffer around each well pad, and the affected area of a pipeline was 3km in total width because of presumed spread of invasive plants (although Table 16 shows in many cases the authors used a higher figure). A 3km effect area was also applied to all transmission lines. These effect areas were applied across the study area, substantially inflating the effects of these activities, even if mitigation, such as conservation offsets, had been implemented. However, the cited paper for oil and natural gas construction (Lyon and Anderson 2003) made no such 3km recommendations. They simply recommended that the BLM regulations in place at the time be "reexamined." Knick also misrepresented cited studies regarding the affected area of roads, pipelines, and transmission lines. For example, the following studies do not support the one-size-fits-all approach as Knick avers:

1) Lyon and Anderson (2003) also reported observations contrary to the one-size-fits-all effect areas used by Knick et al. For example, Lyon and Anderson (2003) (discussed in detail below) reported that:

> "On the Pinedale Mesa, potential disturbances associated with natural gas development were restricted to vehicular traffic on the pre-existing main haul road. All males from the 3 disturbed leks in our study strutted either on or within 15 m of this road. However, the mean number of vehicles using the mesa road in a 24-hour period during spring and summer of 1998 and 1999 was <12."

2) Instead of reporting a 3km effect area, Bradley and Mustard (2006) reported limited effects from roads and transmission lines:

> "In 2001, cheatgrass was 20% more likely to be found within 3 km of cultivation, 13% more likely to be found within 700 m of a road, and 15% more likely to be found within 1 km of a power line."

3) Similarly, instead of finding a 3km effect area, Gelbard and Belnap (2003) reported:

> "…we observed anecdotally that sites isolated (1000 m) from roads tended to contain fewer exotic species than sites near (50 m from) road… We found a significant effect of road improvement on both exotic and native species richness in interior communities 50 m beyond the edge of the road cut, suggesting that road improvement influences the distribution of both exotic and native species in lands beyond the influence of roadside disturbance. Exotic species richness tended to be greater and native species richness tended to be lower next to more improved roads,

although we caution that our measurements of richness were a snapshot."

Knick et al. stated that, "We used an ecological rationale for estimating the area around points, lines, or polygons from which land use potentially influenced land cover or sage-grouse populations. Estimates for effect sizes into surrounding areas were based on foraging movements of human-subsidized predators, distance of exotic plant species spread, or on distribution data relative to land use." However, because of the misrepresentations detailed above, the other "effect sizes" and "ecological rationale" used by Knick et al. should be closely reexamined.

According to Knick et al. "All nonproprietary and nonsensitive spatial data sets used in our analysis are available for download on the SAGEMAP website http://sagemap.wr.usgs.gov; United States Department of the Interior 2001a). Each data set is accompanied by a metadata record documenting original source and GIS procedures." It is presently unknown how much of the data are proprietary or sensitive.

Further, the NTT cited Knick for the proposition that:

> "Human land use, including tillage agriculture, historic grazing management, energy development, roads and power line infrastructure, and even recreation have contributed both individually and cumulatively to lower numbers of sage grouse across the range (75 FR 13910, Knick et al. 2011)." NTT at 6.

While the above land uses "may" impact GRSG numbers, Knick et al.2011 quantified alleged effects—not population numbers. The NTT Report misrepresents the findings of the study and attempts to tie effect size to population decline which was not tested. Knick et al. do attempt to tie effect size to distribution of GRSG, however, the assumed historical distribution is based on flawed studies which subjectively calculate historic distribution. Other issues include:

- Travel and transportation: "Within the sage grouse range, 95% of the mapped sagebrush habitats are within 2.5 km (1.55 miles) of a mapped road; density of secondary roads exceeds 5 km/km2 (3.1 miles/247 acres) in some regions (Knick et al. 2011)... The effect of roads can be expressed directly through changes in habitat and sage- grouse populations and indirectly through avoidance behavior because of noise created by vehicle traffic (Lyon and Anderson 2003, 75 FR 13910)." NTT at 11. However, the effect size reported/calculated by Knick et al. 2011, is flawed, partially due to their misrepresentation of previous studies.

- Lands and Realty: "In addition, land acquisitions and withdrawals may be important conservation strategies because increased development on private lands, which is not subject to mitigation, will focus greater needs for conservation of sage- grouse and sagebrush on public lands (Knick et al. 2011)." NTT at 12. This is an opinion and is not a tested hypothesis. In addition, it is not accurate to broadly assert private lands are not subject to mitigation. Any activity on private

land, for example split-estate lands, or those requiring a Federal permit or approval would be subject to mitigation.

- ROWs: "Sage-grouse may avoid power lines because of increased predation risk (Steenhof et al. 1993, Lammers and Collopy 2007). Power lines effectively influence (direct physical area plus estimated area of effect due to predator movements) at least 39% of the sage-grouse range (Knick et al. 2011)." NTT at 13. However, Knick et al. conceded 50% of GRSG conservation areas are already impacted by power lines. Knick et al. at 213.

- Livestock: "Treatments used to manipulate vegetation ultimately may have far greater effect on sage-grouse through long-term habitat changes rather than direct impacts of grazing itself (Freilich et al. 2003, Knick et al. 2011)." NTT at 14. This is only loosely supported. See discussion at 228-230.

- Urbanization: "Conversion of sagebrush habitats for agriculture, the expanding human populations in the western United States and the resulting urban development in sagebrush habitats." NTT at 14. Neither Knick nor the NTT provide evidence that urbanization impacts but a small fraction of sagebrush habitat nor that it is a current issue.

Knick, S.T. and S.E. Hanser. 2011.[21] This study is cited a total of 14 times between the two documents (NTT/6, COT/8). The NTT cites this study in the context of the importance of connectivity, which wrongly assumes that sage-grouse cannot bypass unsuitable habitat, but rather habitat must be expansive and connected. This notion has been refuted by Tack et al. 2011 and Ramey, Thurley and Ivey 2014. This study wrongly assumes disturbance equates to declines in population persistence.

A fundamental problem with the Knick and Hanser analysis is that lek persistence data are used in lieu of actual population data, and the analysis rests on the critical assumption that population persistence and lek persistence are strongly correlated. For example, if leks had simply moved because of disturbance (e.g. fire) then the analysis would treat the lek as extirpated when the subpopulation birds that comprise it were not extirpated.

Although the data were originally at a 30m resolution, the authors resampled at a 540m resolution, claiming that they "were able to detect relatively fine-scale patterns at this resolution when considered at the spatial extent of the SGCA **[sage grouse conservation area]**." The authors do not acknowledge that this rescaling could be expected to inflate the effects of disturbance.

The authors' belief that "little is known about the connectivity and ability for spatially

[21] Connecting pattern and process in greater sage-grouse populations and sagebrush landscapes. Pp. 383-406 *in* S.T. Knick and J.W. Connelly (eds). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38). University of California Press, Berkeley, CA

structured populations to exchange individuals," is contrary to the abundant field and genetic data showing ongoing long distance dispersal (>18km). (This aspect is discussed extensively in the reviews of Chapter 16 of this monograph, Garton et al.)

The authors were "unable to identify a specific source of human disturbance because the score represented a summed influence of all anthropogenic features." Thus, they concluded that "the cumulative effect of human activities may have a greater influence on persistence of sage-grouse populations than single land uses." This ignores the relative influence (effect size) of specific types of disturbance on sage grouse populations and assumes that they all contribute to sage grouse decline, when in fact some do not. This is not a sound epistemological basis for informed management decisions.

A more robust analysis would include a logistic regression approach to model population presence/absence. If lek presence/absence data were substituted, then the analysis could only refer to factors leading to the extirpation of leks, and that would best be done at a more limited, regional scale (e.g. sage grouse management zone). Results would be compared to a range wide analysis. Ideally, the variables selected for analysis should be winnowed down on the basis of plausible cause and effect mechanisms, and those likely to have the largest effect sizes. In that way, variables can be treated as testable hypotheses.

Leu and Hanser 2011.[22] This study is cited three times in the COT Report in support that fragmentation is the primary cause of population declines/primary threat, and that sage-grouse avoid anthropogenic disturbances opposed to natural disturbances. This is something that Knick 2013 (the study which claims disturbance should be limited to less than 3%) wrongly suggests.

This paper utilizes a complex spatial analysis to predict impact of the "human footprint" on sagebrush habitat (termed "sagebrush landscape" by the authors). This is the same approach used previously to describe the "human footprint" across the west, by two of the same authors as Leu et al. (2008). The third author of Leu et al. (2008), is Knick, also an editor and frequent contributor to this sage grouse monograph.

The paper contains considerable jargon, making a comprehensive read a time-consuming task.

The model used to study the "human footprint" is dependent upon the inputs of other models, but the error associated with these inputs, and their effect on results, were not addressed by Leu and Hanser. Use of the terms "error," "uncertainty," and "confidence interval" are absent from this paper. The authors did not appear to us statistical methods that deal with stochastic variation to estimate the magnitude of the error variance and propagate it through to the confidence intervals.

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[22]Leu, M. and S.E. Hanser Influences of the human footprint on the sagebrush landscape patterns: implications for sage-grouse conservation. Pp. 253-272 *in* S.T. Knick and J.W. Connelly (eds). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38). University of California Press, Berkeley, CA.

The significance of this paper lies in its likely utilization by the USFWS for a range wide or regional "cumulative effects analysis" of various human land uses and activities on sage grouse. Therefore, a more in-depth review of this paper may be desirable. The authors describe their approach as: "The cumulative effects of human actions on landscapes, the human footprint, can be delineated as the physical and/or ecological human footprint."

In this paper, as with Leu et al. (2008) no hypotheses are tested. Instead, the authors rely on a *post hoc* interpretation of results and make recommendations derived from their complex spatial analysis. That paper interprets the results using a descriptive, story-telling approach. The authors recommend that certain landscapes in a given human footprint class be "carefully evaluated," although the criteria by which such an evaluation would be objectively conducted is not described. The results are deemed supportive of those obtained by other authors in the monograph, however no criteria were provided that would potentially falsify previous conclusions. The authors believe raven control to be ineffective and suggest that all future transmission lines follow existing high impact corridors, an expensive proposition to be based on surmise.

The size of the affected area surrounding each type of land use was developed from one or few studies, and applied across the range of sage grouse. This is a questionable one-size-fits-all approach to quantifying potential disturbance. For example, the corvid (e.g. raven, crow, and magpie) and domestic cat and dog predator risk models (regressions of probability of occurrance vs. distance from human habitations) were based on extremely limited data (4, 2, and 3 data points respectively) and with no tests of significance or confidence intervals. Such poorly supported inferences cannot be viewed as reliable. (The impact of oil and gas wells is treated as a disturbance area around fixed points and their supporting infrastructure (roads and transmission lines) is quantified separately.) The authors provided a handful of citations including an unpublished masters thesis in support of data used to develop input models.

The authors analysis rests on the use of fractals (as opposed to Euclidean geometry) and modeled artificial landscapes, to summarize aspects of habitat fragmentation, including patch shape, edge, and size in terms of *lacunarity*. A concise definition of *lacunarity* used in ecology may be found in Halley et al. (2004):

> In general terms, however, lacunarity is an index of texture or heterogeneity [of a fractal object]. Highly lacunar objects possess large gaps or low-density holes, while low-lacunarity objects appear homogeneous. Thus, for example, in observations of vegetation cover using quadrats, lacunarity is low if we find very similar levels of cover in every quadrat (Plotnick et al. 1993). More precise definition of lacunarity has been problematic.

Leu and Hanser's rationale for using this method is as follows:

> We analyzed artificial landscapes due to the lack of previous research evaluating

lacunarity in natural landscapes demarcated by convoluted patch boundaries and to aid interpretation of lacunarity analyses from natural landscapes (Elkie and Rempel 2001).

Lacunarity has several advantages over other more common fixed-scale landscape metrics because it consists of a single metric evaluated at multiple scales, is not influenced by edge effects, nor restricted to landscapes with high occurrence of habitat of interest (Plotnick et al. 1993). Lacunarity metrics can also be used to assess degree of relative fragmentation across diverse landscapes (Wu et al. 2000).

Despite its ease in calculation, l<u>acunarity analyses have been rarely used to study patterns of natural landscapes</u> (but see Wu et al. 2000, Derner and Wu 2001, Elkie and Rempel 2001) perhaps, because interpretation of lacunarity curves can be difficult. However, we found that using lacunarity analyses of simulated landscapes, where degree of fragmentation and proportion of land cover reflect the range of values of landscapes studied, greatly aids in the interpretation of lacunarity functions of landscape patterns.

Other authors have raised issues as to whether these models accurately represent real-world situations, and the conditions under which its use may be questionable. The uses and abuses of fractals in ecology are thoroughly discussed in Halley et al. (2004).

The original paper (Leu et al. 2008), a general description of the approach used in this paper, and data appendicies may be found at the following websites:

- http://www.esapubs.org/archive/appl/A018/039/default.htm

http://sagemap.wr.usgs.gov/HumanFootprint.aspx

Lyon and Anderson 2003.[23] This study is cited seven times in the NTT Report in alleged support of four-mile NSO buffers and 3% surface disturbance thresholds based on the erroneous assumption that a temporary disturbance of sage grouse from a local area under development equates to a population decline.

Lyon and Anderson's (2003) data were inadequate for: 1) achieving statistical significance in comparisons of nest initiation and nest success in disturbed versus undisturbed areas, and 2) demonstrating a population decline. Instead, the presumed biological significance of their statistically insignificant results were based upon belief, as the following excerpt from Lyon and Anderson (2003) shows:

> "Finally, even though nest initiation between disturbed and undisturbed hens was not statistically significant, we believe lower initiation rates for disturbed hens were biologically significant and could result in lower overall sage grouse productivity."

[23] Lyon, A.G. and S.H. Anderson. 2003. Potential gas development impacts on sage grouse nest initiation and movement. Wildlife Society Bulletin 31: 486-491.

Lyon and Anderson (2003) also stated that,

> "Hens captured on disturbed leks demonstrated greater movements from capture lek to nest than hens from undisturbed leks. Hens from disturbed leks nested approximately twice as far from capture leks as did hens from undisturbed leks. Our random nest vegetation analysis indicated no significant differences in nesting habitat between disturbed and undisturbed areas, suggesting that nest habitat was not influencing sage grouse hen movements."

This is expected, as animals that are disturbed by human activity will sometimes move away from it. However, it does not mean that the result will be a population decline.

Naugle et al. 2011a.[24] This study is one of twelve chapters found in the publication, "Energy development and wildlife conservation in western North America" (Island Press, hereinafter Naugle's Book). This chapter is cited three times in the NTT Report and once in the COT Report for the proposition that cumulative impacts of mineral development leads to landscape level impacts on GRSG. Naugle acted as the editor of his own book and authored or co-authored three of the chapters.

Correspondence between Naugle and BLM official and NTT Team Leader Raul Morales obtained via FOIA also evidence a lack of objectivity on the part of Naugle. Further evidence of bias comes from the introductory chapter of Naugle's book itself: "Everyone has a stake in the future of the West. The *world* expects the historical West to retain its wildness and wildlife, even if only a fraction of those people ever come to see it. The mere knowledge of its existence is a comfort." Naugle and Copland (2011) at 6.[25]

This quote is representative of the uniform and continued bias of the main contributors to the book, whom are also frequently cited in both the NTT and COT Reports. Their personal bias against land use and oil and natural gas has adversely influenced the design, interpretation, and ultimately the conclusions resulting in a lack of objectivity. Moreover, the fact that the BLM is the primary funding source not only for the entire book but specifically for this paper, and the primary author and editor, Naugle, is an NTT member, shows a clear conflict of interest.

The authors conclude: "[F]oregoing development in priority landscapes is the obvious approach to conserve large populations." *Id.* at 70. This notion is legally impossible without an Act of Congress given the multiple-use mandates of BLM and the US Forest Service. Moreover, this policy conclusion is based on opinion rather than science or data. These facts alone should disqualify this incredibly biased and one-sided work.

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[24] Naugle, D.E., K.E. Doherty, B.L. Walker, H.E. Copeland, M.J. Holloran, and J.D. Tack. 2011a. Sage-grouse and cumulative impacts of energy development. Pages 55-70 in D.E. Naugle, editor. Energy development and wildlife conservation in western North America. Island Press, Washington, D.C., USA.

[25] Naugle and Copland. 2011. Introduction to Energy Development in the West. Pp. 3-6 *in* D.E. Naugle (ed). Energy Development and Wildlife Conservation in Western North America. Island Press, Washington, D.C.

Incredibly, the NTT Report appears to adopt pages of this chapter verbatim on pp. 19-21 without any attribution or citation.

This study cherry-picks studies and interprets them to support the authors' pre-ordained conclusions. The authors selectively reviewed and reinterpreted studies, many of which were authored by co-authors on this publication, that they "feel" are important while blatantly excluding others, such as Ramey, Brown and Blackgoat 2011.[26] Their premise that impacts from energy development are "universally negative and typically severe" and cause population declines is fundamentally and deeply flawed.

In this study, the authors wildly surmise that "world demand" for energy will lead to "unprecedented pressure" on wildlife in the western U.S. The authors assume inappropriately that conservation must be equal to the amount of development, which is not based on data or tested to determine if it is reasonable, achievable, or necessary. Instead it is based on the opinion of the authors, not based in science.

Here, the authors "synthesized" 14 studies which looked at the effects of energy development on GRSG using various methods described in Naugle et al 2011b[27] in the GRSG Monograph. This chapter is really just another publishing of the Naugle et al. 2011b. The authors of this paper are the same authors of 2011b monograph chapter with the exception of Tack.

The authors did not conduct an objective review of the literature. Eleven of the studies were conducted either in the Pinedale Anticline, Powder River Basin, or Alberta. None of these study areas are representative of conditions range-wide, and instead represent studies with areas of intensive energy development using technology of yesteryear. Recent publications such as Ramey, Brown and Blackgoat 2011, Kirol et al. in preparation,[28] and Applegate and Owens 2014[29] demonstrate that with improved technological advances, resource management, and best management practices, sage-grouse have responded positively to mitigation and other conservation efforts. Further, eight of the 14 papers are journal articles, dissertations, and theses of the chapter's authors. Of the remaining studies, there appears to be significant misrepresentation.

Of the studies included in this chapter, only eight had data for six or more years. Kaiser 2006 for example had just one year of data and an extremely small sample size. This leads to limited confidence in the findings of this study, such as lack of trend data, discussed elsewhere in this challenge.

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[26] Ramey, R.R., L. Brown, F. Blackgoat 2011.

[27] Naugle, D.E., K.E. Doherty, B.L. Walker, M.J. Holloran, and H.E. Copeland. 2011b. Energy development and greater sage-grouse. Pages. 489-503 in S.T. Knick and J.W. Connelly, editors. Greater sage-grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology 38. University of California Press, Berkeley, California, USA.

[28] Kirol C.P., A.L. Sutphin, L. Bond, M.R. Fuller, T.L. Maechtle. Mitigation effectiveness for improving productivity of greater sage-grouse nesting in natural gas development areas. International Sage-Grouse Forum, Salt Lake City, Utah (November 13-14, 2014).

[29] Applegate D., N. Owens. 2014. Oil and gas impacts on Wyoming's sagegrouse: summarizing the past and predicting the foreseeable future. Human–Wildlife Interactions 8(2):284–290

A key objective of the study is to provide landscape-level recommendations. The authors state, "the size of sage-grouse breeding populations is often used as an indicator of the overall health of sagebrush ecosystems." Naugle et al. 2011a at 56 citing Hanser and Knick 2011. The results of Hanser and Knick 2011 appear to be misrepresented in Naugle et al 2011a. Hanser and Knick evaluated whether treating GRSG as an umbrella species would benefit other species that use sagebrush to varying degrees. They did not estimate whether the GRSG would be an effective umbrella for the other 95% of the species that use sagebrush environments. Thus, to surmise that GRSG health is an indicator of ecosystem health is an overly narrow view in light of the remaining 95% of species present in the sagebrush biome.

One of the most egregious conclusions of this study is the false assumption that "sage-grouse populations decline when birds avoid infrastructure in one or more seasons." *Id.* at 61, *citing* Doherty et al 2008; Carpenter et al 2010. Among other issues, the findings of these studies were misrepresented in Naugle et al 2011a. Doherty and Carpenter examined impacts on winter habitat selection. They did not model or collect data on population decline/persistence. The negative impacts that the authors report are based on the assumption that avoidance leads to population declines. This mistaken concept has never been tested or proven; it is purely speculative.

The authors also assume that loss of a lek near energy development equates to a population decline and that the birds then cease to reproduce all together. Instead it could be hypothesized that the birds simply relocate/move to other leks or a new lek might form somewhere else. *See* Tack et al. 2011. Lek data obtained from Wyoming Game and Fish indicates that populations are stable to increasing, which refutes the notion that GRSG are undergoing population decline as a result of avoidance to energy infrastructure.

Citations for the false assumption of population declines of Holloran and Anderson 2005, Aldridge and Boyce 2007 and Holloran et al. 2010 are misplaced as described elsewhere herein. *Id.* at 62. And the notion that site fidelity combined with disturbance leads to declines based upon Yoder et al. 2004 is also suspect. The Yoder study was conducted on ruffed grouse and addressed how predation is a function of movement or dispersal. Reliance on Holloran 2005 at pp. 62-63 is also misplaced. As discussed herein, the alarmist population predictions made in Holloran 2005 failed to come true.

Notwithstanding the above, at least the authors recognize, "[T]ools to manage sage-grouse populations will vary across the species range with biotic and abiotic characteristics of different landscapes and local constraints to populations." *Id.* at 68. This statement undermines the NTT and COT Reports' one-size-fits-all approach.

Patricelli et al. 2010. This study was one of the first of its kind in attempting to discern potential effects of noise on GRSG. However, it was fraught with errors in documentation of methods, lack of data, assumptions, and erroneous interpretation of results. Clearly lacking was any involvement by professional acousticians, or use of professional data collection and reporting standards in the industry. As a result, the study

cannot be viewed as anything more than preliminary and cannot be used as the basis of regulations.

The cited studies provided no evidence of GRSG population declines as the result of anthropogenic sound produced by the oil and gas industry.

Only a transient period of disturbance to GRSG at leks where the playbacks occurred was observed. There was no data reported that the levels of fecal corticosteroid metabolites in male GRSG at the affected leks had resulted in reduced fitness (e.g. decreased reproductive capabilities and/or decreased survivorship that have led to any detectable population decline in the study area). Rather, population trends in male lek attendance and density in the study area (Upper Green River Basin portion of the Wyoming basin population) have been consistently above state average and increasing since 1990 (data from Wyoming Game and Fish 2013).

The data used are not public and results are not reproducible. No data were reported from: 1) objectively-measured noise generated during various phases of drilling activities, 2) noise generated during production, 3) road noise, or 4) the occurrence of these over a 24 hour period. No data were reported on the environmental parameters under which any data were collected, or the ambient sound levels in the study area based upon professional standards (which include wind). Instead, the authors cited "unpublished data" and speculation about the accuracy of their playback noise levels, in support of their claims (emphasis in **bold** below):

> "We played drilling noise and road noise on leks at 70 dB(F) sound pressure level (unweighted decibels) measured 16 m directly in front of the speakers (Fig. 1 & Supporting Information). **This is similar to** noise levels measured approximately 400 m from drilling rigs and main access roads in Pinedale, Wyoming (J.L.B and G.L.P., **unpublished data**).
>
> "To minimize disturbance, we took propagation measurements during the day. Daytime ambient noise levels are typically 5-10 dBA higher than those in the early morning (J.L.B and G.L.P., **unpublished data**) and **are likely higher** than those heard by birds at a lek."
>
> "For leks treated with drilling noise, recordings from 3 drilling sites were spliced into a 13-minute mp3 file that played on continuous repeat. On leks treated with road noise we randomly interspersed mp3 recordings of 56 semi trailers and 61 light trucks with 170 30-second silent files to simulate average levels of traffic on an access road (Holloran 2005). Noise playback on experimental leks continued throughout April in 2006, from mid February or early March through late April in 2007, and from late February through late April in 2008. **We played back noise on leks 24 hours/day because noise from deep natural-gas drilling and vehicular traffic is present at all times."**

(emphasis added). There was no data presented that the playback sound was an accurate rendition of actual frequencies and sound pressure levels from oil and gas operations as measured at set-back distances required by the BLM, or that it occurred at the same levels 24 hours a day. Instead, the authors relied upon "unpublished data" or speculation.

While a 0.25 mile buffer has been the minimum set back distance required by the BLM, most oil and gas operations are found at far greater distances from leks (Wyoming Oil and Gas Conservation Commission well data and Wyoming Game and Fish lek count and location data). Thus, the reported effects on GRSG were biased in the cited studies to achieve a negative response rather than measure responses from sound pressure levels as they would occur at the required set back distances.

Pyke, D.A. 2011.[30] This study is cited four times in the NTT Report and five times in the COT Report. The use of this study is more concerning in the COT Report as the COT Report mis-cites Pyke for the misplaced assumption that restoration is very difficult across the landscape and that 4,000ha are required to sustain a population. The mistaken notion that restoration is too difficult and thus habitat should be left undisturbed is addressed elsewhere herein.

Pyke discusses both the pros and cons of grazing, and discusses when grazing might be a benefit and when reduction or removal would be better. Pyke discusses appropriately that grazing is not black and white and that appropriate grazing during certain times of the year may maximize the benefits in reducing invasive species. Pyke 2011 at 538-539.

Pyke is quite clear that several factors must be considered prior to making any decision on how or whether to restore/rehabilitate. To make the above assertion is premature. Pyke also indicates that depending on the habitat component that needs restoring, it may only take 3-5 years, in some instances.

There is extensive research being conducted on restoration and treatment of degraded sagebrush habitats.[31] Several factors influence the efficacy of restoration including soil moisture, elevation, seed mix, type pre-treatment/disturbance conditions, distance between stands, to name a few. To say that restoration is impossible is inaccurate because there is very little long-term data available on sites where active restoration activities exceeded the typical three year emergency stabilization and rehabilitation (ES&R) policies of land management agencies. Moreover, it has been common practice to defer to passive management if the first re-seeding event failed. Moreover, GRSG habitat parameters at these older ES&R sites were not necessarily considered. Thus, what long-term data is available is not representative of newer restoration techniques and technologies.[32] On the other hand, short-term studies show that with the right

[30] Restoring and rehabilitating sagebrush habitats. Pp. 531-548 *in* S.T. Knick and J.W. Connelly (eds). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38). University of California Press, Berkeley, CA.
[31] *See* footnote 25, *infra*.
[32] Id.

type/mixture of management of habitats, tailored to the specific needs of the plot undergoing restoration, habitats do respond positively.[33]

Finally, with regards to restoration generally and after fire, Pyke describes the reason for difficulty seems to be land manager choices in seed mix. It follows that it is inaccurate to claim that restoration is impossible as suggested in the COT Report. The primary recommendation made in Pyke is that native seed mixes should be used whenever possible, with the use of non-native seeds when there is limited native seed mix available. If land managers simply shifted their seed mixture to that of natives implemented known BMPs that increases seed establishment, and the land was managed to control invasives, then it could be hypothesized that the restoration would be more successful. The conclusion to draw from Pyke is that current restoration practices are flawed, not that restoration is not possible and therefore, habitat must be left undisturbed.

Schroeder et al. 2004.[34] This study was cited once in the NTT Report, six (6) times in the COT Report and 18 times in the FWS' 2010 listing decision. Contrary to the position presented in Schroder et al. 2004, the pre-European distribution of GRSG is far more uncertain—particularly where the historic record is an incomplete estimate at best. The author's estimate of the potential habitat of sage grouse from pre-European settlement through the present based on historic distribution maps, museum records, published accounts, and other information was neither well explained nor objective. Beyond the limitations of an incomplete historic record, GRSG have a much broader habitat tolerance than asserted in this study. GRSG can and have lived in riparian meadows, agricultural land, steppe dominated by native grasses and forbs, shrub willow, and sagebrush habitat with conifer and aspen trees. This study subjectively excludes observations and specimens outside of sagebrush habitat to claim that GRSG are confined to and wholly dependent on sagebrush territory. The author failed to acknowledge the inherent uncertainty associated with such blanket statements after reviewing limited data along with a fragmented and questionable historic record. These serious flaws make reproducibility nearly impossible.

The pre-settlement habitat extends from 1400 to 1850 A.D., and encompasses the Little Ice Age (which averaged .5-.9 degrees Celsius lower than current temperatures). Since the weather was colder, and more arid, vegetation and climate were simply different than in modern times. Natural fluctuations in climate have a profound impact on sagebrush habitat.

Reliance on Kuchler's (1964) PNV for historic climate estimates is similarly problematic as they are qualitative, generalized descriptions of vegetations communities which are not suitable for extrapolation. Kuchler's PNV models could be characterized as "informed guesswork," and a summary of prevalent opinion as to the likely ecological status of many different types of American vegetation, but not as "a reliable predictive tool." Schroder also failed to account for the effect of Native Americans on sage grouse and their habitat prior to 1800. Native American populations are estimated between 40 and

[33]Arkle et al. 2014.
[34] Schroeder et al. 2004, Distribution of sage-grouse in North America, Condor 106:363-376.

112 million people prior to European contact, most of whom lived in temperate regions. Native Americans hunted sage-grouse, and started range fires to improve edible forage and game. These and other highly disruptive activities had an unquantifiable but assured impact on GRSG populations.

Walker, et al. 2007.[35] This paper is cited eight times in the NTT Report and two times in the COT Report in support of lek buffers, impacts to habitat selection, and the proposition that energy development leads to declines in population numbers. However, neither the NTT nor the COT Report mentions the methodological issues with these studies or the fact that none reported a population-level decline in sage grouse rather than a localized effect on rates of male lek attendance near the disturbance.[36]

The authors concede speculation as the premise for their alleged conclusions even in the abstract of the paper. The paper suffers from subjective interpretation of results where no hypothesis testing was used. Avoidance of disturbance is not uniform among locations as the authors suggest. Rather, it can be site-dependent for factors such as density of development and age of the oil and natural gas field impact of oil and natural gas operations on GRSG is not as clear-cut nor as negative as the authors of this paper and the NTT report claims.[37]

In addition, data show that GRSG behavior can be affected by certain types of anthropogenic disturbance more than others, which can result in localized avoidance, but the effect of any of these disturbances or development on migration rates is unknown. Data from Lyon (2000), Bush (2009), Tack et al. (2011), and more recent papers, all reveal that GRSG traverse (fly) over or around roads, agricultural areas, and oil and natural gas development, at distances up to 300 km from their natal leks.

However, the author advocates for disturbance caps, yet the authors did not <u>test</u> any percent disturbance caps. Instead they modeled response in lek attendance in terms of <u>distance(s)</u> from potential sources of disturbance. Therefore, Walker et al.'s (2007) support for a 3% disturbance cap, represents nothing more than the opinions of the authors.

While citing this paper for support for its proposed four-mile buffers and 3% disturbance caps, the NTT Report fails to recognize any of the methodological issues with Walker et al, or the fact that none reported a population-level decline in GRSG rather than a localized effect on rates of male lek attendance near the disturbance.
Walker et al. (2007) used model selection procedures that were not statistically reliable because they used nine predictor variables, with just nine years of data, to compare 19 models, in an attempt to identify combinations of predictor variables that would potentially explain patterns in the data. However, for model selection to work properly,

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[35] Greater sage-grouse population response to energy development and habitat loss. Journal of Wildlife Management 71:2644-2654**.**
[36] *See* Ramey, Thurley and Ivey 2014.
[37] *See* Harju et al. 2010; Taylor et al. 2010; Ramey, Brown and Blackgoat 2011. The

the number of predictor variables must be smaller in comparison to the number of observations, in this case, the number of years of data.

Additionally, for model selection to be scientifically defensible, the predictor variables are best narrowed down in advance based on plausible cause and effect mechanisms and tests for independence among variables, procedures that Walker et al. (2007) did not employ. Finally, the results of Walker et al. (2007) were confounded by the obvious location of at least nout of 35 inactive leks immediately adjacent to Highway 14, Highway16, and Interstate 90. Walker et al. (2007) is not a scientifically sound basis for precise predictions about GRSG population responses.

Exhibit C: Studies that Were Not Included in the NTT and COT Reports

I. Tall Structures

The NTT and COT Reports do not reflect the current understanding of the impacts of tall structures to GRSG. The studies cited below are those which either should have been considered or have changed the understanding of impacts to GRSG.

A. Studies Ignored

Messmer, T. A., R. Hasenyager, and J. Burruss. 2010. Contemporary Knowledge and Research Needs Regarding the Effects of Tall Structures on Sage-grouse (*Centrocercus urophasianus* and *C. minimus*). Utah Wildlife in Need Foundation. Salt Lake City, Utah.

Messmer, T.A. 2011. Protocols for Investigating the Effects of Tall Structure on Sage-grouse (*Centrocercus urophasianus*). Utah Wildlife in Need Foundation. Salt Lake City, Utah.

Utah Wildlife in Need (UWIN). 2010. Contemporary Knowledge and Research Needs Regarding the Potential Effects of Tall Structures on Sage-grouse (*Centrocercus urophasianus and C. minimus*). http://www.utahcbcp.org/htm/tall-structure-info

B. Additional Studies that Must be Considered

LeBeau, C.W. 2012. Evaluation of Greater Sage-Grouse Reproductive Habitat and Response to Wind Energy Development in south-Central Wyoming, MS Thesis, Department of Ecosystem Science and Management, University of Wyoming. August 2012.

Messmer, T., A., R. Hasenyager, J. Burruss, and S. Liguori. 2013. Stakeholder contemporary knowledge needs regarding the potential effects of tall structures on sage-grouse. *Human-Wildlife Interactions* 7(2):273-298.

Nonne, D., E. Blomberg, and J. Sedinger. 2013. Dynamics of Greater Sage-grouse (*Centrocercus urophasianus*) populations in response to transmission lines in central Nevada. Progress Report: Year 10. February 2013. Department of Natural Resources and Environmental Sciences, University of Nevada, Reno. 75pp.

Walters, K., K. Kosciuch, and J. Jones. 2014. Can the effect of tall structures on birds be isolated from other aspects of development? *Wildlife Society Bulletin* doi: 10.1002/wsb.394.

II. Habitat Components

The NTT and COT Reports do not adequately address the variance of habitat components between seasons or across the range of the GRSG. The following studies are those that, if they had been used, would reflect a more accurate picture of the habitat conditions across the range of

the GRSG and the differences in GRSG occupancy and use of those habitats within populations, which would better inform management of the habitats and the species.

A. Studies Ignored

Baxter, R.J., J.T. Flinders, and D.L. Mitchell. 2008. Survival, movements, and reproduction of translocated Greater Sage-Grouse in Strawberry Valley, Utah. *Journal of Wildlife Management* 72(1):179-186.

Chambers J.C., B.A. Roundy, R. R. Blank, S.E. Meyer, and A. Whittaker. 2007. What makes great basin sagebrush ecosystems invasible by *Bromus tectorum*? *Ecological Monographs* 77:117–145. http://dx.doi.org/10.1890/05-1991.

Dzialak MR, C.V. Olson, S.M .Harju, S.L .Webb, J.P Mudd. 2011. Identifying and Prioritizing Greater Sage-Grouse Nesting and Brood-Rearing Habitat for Conservation in Human-Modified Landscapes. *PLoS ONE* 6(10): e26273. doi:10.1371/journal.pone.0026273.

Dahlgren D. K., R. Chi, and T. A Messmer. 2006. Greater Sage-Grouse Response to Sagebrush Management in Utah. *Wildlife Society Bulletin* 34:975–985. doi: 10.2193/0091-7648(2006)34[975:GSRTSM]2.0.CO;2.

Gregg, M. A. and J. A. Crawford. 2009. Survival of Greater Sage-Grouse Chicks and Broods in the Northern Great Basin. *The Journal of Wildlife Management* 73: 904–913. doi: 10.2193/2007-410.

Gregg M.A., J. K. Barnett, and J.A. Crawford . 2008. Temporal Variation in Diet and Nutrition of Pre-incubating Greater Sage-Grouse. *Rangeland Ecology & Management* 61(5):535-542.

Guttery M.R. 2010. Ecology and Management of a High Elevation Southern Range Greater Sage-Grouse Population: Vegetation Manipulation, Early Chick Survival, and Hunter Motivations. *All Graduate Theses and Dissertations.* Paper 842. http://digitalcommons.usu.edu/etd/842

Schultz, B. 2004: Analysis of studies used to develop herbaceous height and cover guidelines for sage grouse nesting habitat. - Cooperative Extension Special Publication SP-04-11, University of Nevada, Reno,USA, 25 pp.

B. Additional Studies that Must be Considered

Fedy B.C., K.E. Doherty, C.L. Aldridge, M. O'Donnell, J.L. Beck, B. Bedrosian, D. Gummer, M.J. Holloran, G.D. Johnson, N.W. Kaczor, C.P. Kirol, C.A. Mandich, D. Marshall, G. McKee, C. Olson, A.C. Pratt, C.C. Swanson, and B.L. Walker. 2014. Habitat prioritization across large landscapes, multiple seasons, and novel areas: An example using Greater Sage-Grouse in Wyoming. *Wildlife Monographs* 190(1): 1-39.

III. Population Trends

The NTT and COT Report do not adequately address the variance in population trends or the cause of those population trends. The following studies are those that, if they had been used, would reflect a more accurate picture of the cause and effect mechanisms impacting populations.

A. Additional Studies that Must be Considered

Fedy B.C., K.E. Doherty, C.L. Aldridge, M. O'Donnell, J.L. Beck, B. Bedrosian, D. Gummer, M.J. Holloran, G.D. Johnson, N.W. Kaczor, C.P. Kirol, C.A. Mandich, D. Marshall, G. McKee, C. Olson, A.C. Pratt, C.C. Swanson, and B.L. Walker. 2014. Habitat prioritization across large landscapes, multiple seasons, and novel areas: An example using Greater Sage-Grouse in Wyoming. *Wildlife Monographs* 190(1): 1-39.

Blomberg E.A., J.S. Sedinger, M.T. Atamian, and D. V. Nonne. 2012. Characteristics of climate and landscape disturbance influence the dynamics of greater sage-grouse populations. *Ecosphere* 3:art55. http://dx.doi.org/10.1890/ES11-00304.1.[1]

Caudill D., M. R. Guttery, B. Bibles, T. A. Messmer, G. Caudill, E. Leone, D. K. Dahlgren, and, R. Chi. 2014. Effects of climatic variation and reproductive trade-offs vary by measure of reproductive effort in greater sage-grouse. *Ecosphere* 5:art154. http://dx.doi.org/10.1890/ES14-00124.1

Guttery M.R, D.K .Dahlgren, T.A. Messmer, J.W.Connelly, and K.P. Reese. 2013. Effects of Landscape-Scale Environmental Variation on Greater Sage-Grouse Chick Survival. PLoS ONE 8(6): e65582. doi:10.1371/journal.pone.0065582

Guttery, M. R., T. A. Messmer, E.T. Thacker, N. Gruber, and C. M. Culumber. 2013. Greater sage-grouse sex ratios in Utah: Implications for reporting population trends. *The Journal of Wildlife Management* 77:1593–1597. doi: 10.1002/jwmg.620

Zink R.M. 2014. Comparison of Patterns of Genetic Variation and Demographic History in the Greater Sage-Grouse (*Centrocercus urophasianus*): Relevance for Conservation. *The Open Ornithology Journal* 2014, *7*, 00-00.

IV. Restoration

The issue of restoration was only addressed in a cursory manner. Considerable research has been conducted regarding restoration which would inform the agencies in Emergency Stabilization and Burn Rehabilitation Programs, as well as inform GRSG habitat restoration policy.

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[1] This study is relevant to the NTT Report but not the COT Report.

A. Studies Ignored

Herriman K. R. 2009. Wyoming big sagebrush: Efforts towards development of target plants for restoration. Moscow, ID: University of Idaho. 63 p. Thesis.

B. Additional Studies that Must be Considered

Chambers J. C., D.A. Pyke, J.D.Maestas, M. Pellant, C.S. Boyd, S. B.Campbell, S. Espinosa, D.W. Havlina, K.E. Mayer, A. Wuenschel. 2014. Using resistance and resilience concepts to reduce impacts of invasive annual grasses and altered fire regimes on the sagebrush ecosystem and greater sage-grouse: A strategic multi-scale approach. Gen. Tech. Rep. RMRS-GTR-326. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 73 p.

Davies G. M., J. D. Bakker, E. Dettweiler-Robinson, P. W. Dunwiddie, S. A. Hall, J. Downs, and J. Evans. 2012. Trajectories of change in sagebrush steppe vegetation communities in relation to multiple wildfires. *Ecological Applications* 22:1562–1577.

Davies K. W., C. S. Boyd, and A.M. Nafus. 2013. Restoring the sagebrush component in crested wheatgrass-dominated communities. *Rangeland Ecology & Management* 66:472–478.

Dettweiler-Robinson E., J.D. Bakker, J.R. Evans, H. Newsome, G.M. Davies, T.A. Wirth, D.A. Pyke, R. T. Easterly, D. Salstrom, and P.W. Dunwiddie. 2013. Outplanting Wyoming big sagebrush following wildfire: stock performance and economics. *Rangeland Ecology & Management* 66(6,):657-666.

Fedy B.C., K.E. Doherty, C.L. Aldridge, M. O'Donnell, J.L. Beck, B. Bedrosian, D. Gummer, M.J. Holloran, G.D. Johnson, N.W. Kaczor, C.P. Kirol, C.A. Mandich, D. Marshall, G. McKee, C. Olson, A.C. Pratt, C.C. Swanson, and B.L. Walker. 2014. Habitat prioritization across large landscapes, multiple seasons, and novel areas: An example using Greater Sage-Grouse in Wyoming. *Wildlife Monographs* 190(1): 1-39.

McAdoo J. K., C. S. Boyd, and R. L. Shelley. 2013. Site, competition, and plant stock influence transplant success of Wyoming big sagebrush. *Rangeland Ecology & Management* 66:305–312.

Miller R.F., J. Ratchford, B.A. Roundy, R. J. Tausch, A. Hulet, and J.C. Chambers. 2014. Response of Conifer-Encroached Shrublands in the Great Basin to Prescribed Fire and Mechanical Treatments. *Rangeland Ecology & Management* 67(5):468-481.[2]

Miller R.F., J. Ratchford, B.A. Roundy, R. J. Tausch, A. Hulet, and J. C. Chambers. 2014. Response of Conifer-Encroached Shrublands in the Great Basin to Prescribed Fire and Mechanical Treatments. *Rangeland Ecology & Management* 67(5):468-481.

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[2] This study is relevant to the NTT Report but not to the COT Report.

Pyke D.A., S.E. Shaff, A.I. Lindgren, E.W. Schupp, P. S. Doescher, J. C. Chambers, J.S. Burnham, and M.M. Huso. 2014. Region-wide ecological responses of arid Wyoming big sagebrush communities to fuel treatments. *Rangeland Ecology & Management* 67(5): 455-467.

Rau B.M., J. C. Chambers, D.A. Pyke, B.A. Roundy, E.W. Schupp, P. Doescher, and T. G. Caldwell. 2014. Soil Resources Influence Vegetation and Response to Fire and Fire-Surrogate Treatments in Sagebrush-Steppe Ecosystems. *Rangeland Ecology & Management* 67(5):506-521.

Roundy B.A., R.F. Miller, R. J. Tausch, K. Young, A. Hulet, B. Rau, B. Jessop, J.C. Chambers, and D. Eggett. 2014. Understory Cover Responses to Piñon–Juniper Treatments Across Tree Dominance Gradients in the Great Basin. *Rangeland Ecology & Management* 67(5):482-494.

Roundy B.A., K. Young, N. Cline, A. Hulet, R.F. Miller, R. J. Tausch, J. C. Chambers, and B. Rau. 2014. Piñon–Juniper Reduction Increases Soil Water Availability of the Resource Growth Pool. *Rangeland Ecology & Management* 67(5):495-505.

V. Other Studies

The studies listed below are studies that change the understanding of impacts to GRSG from energy development.

A. Studies Ignored

Ramey, R.R., L.M. Brown, and F. Blackgoat. 2011. Oil and gas development and greater sage grouse (*Centrocercus urophasianus*): a review of threats and mitigation measures. *The Journal of Energy and Development* 35(1):49-78.

Taylor, R.C., B. Russell, B.P. Taylor. 2010. Greater sage-grouse populations and energy development in Wyoming.

B. Additional Studies that Must be Considered

Applegate D., N. Owens. 2014. Oil and gas impacts on Wyoming's sage-grouse: summarizing the past and predicting the foreseeable future. *Human-Wildlife Interactions* 8(2):284-290.

Kirol C.P., A.L. Sutphin, L. Bond, M.R. Fuller, T.L. Maechtle. 2014. Mitigation effectiveness for improving productivity of greater sage-grouse nesting in natural gas development areas. *Wildlife Biology*. http://www.wildlifebiology.org/accepted-article/mitigation-effectiveness-improving-nesting-success-greater-sage-grouse-influenced

Kirol C.P., J.L. Beck, S.V. Huzurbazar, M.J. Holloran, S.N. Miller. in press. Identifying greater sage-grouse source and sink habitats for conservation planning in an energy development landscape. *Ecological Applications*.

Ramey, R.R. and L. Ivey. 2014. Spatial and Temporal Analysis of Oil and Gas Development,

Mitigation, and Sage Grouse Lek Attendance in the Pinedale Planning Area, Wyoming: 1990-2012. Unpublished report. Wildlife Science International.

Ramey, R.R., J. Thorley and L. Ivey. 2014. Hierarchical Bayesian Analyses of Greater Sage Grouse Population Dynamics in the Pinedale Planning Area and Wyoming Working Groups: 1997-2012. Wildlife Science International.

VI. Raven predation

The NTT and COT Reports largely ignore the tremendous impacts to GRSG from predation.

A. Studies Ignored

Bedrosian, B and D. Craighead 2010. Anthropogenic influences on Common Ravens in the Greater Yellowstone Ecosystem. Unpublished poster presentation. Available at: http://beringiasouth.org/ecology-of-the-common-raven. Accessed 10 August 2013.

Boarman, W. I. 1993. When a native predator becomes a pest: a case study. Pages 191–206 in S. K. Majumdar, E. W. Miller, D. E. Miller, E. K. Brown, J. R. Pratt, and R. F. Schmalz, editors. Conservation and resource management. Pennsylvania Academy of Science, Philadelphia, USA.

Boarman, W. I. 2003. Managing a subsidized predator population: reducing common raven predation on desert tortoises. *Environmental Management* 32:205–217.

Boarman, W.I., R. J. Camp, M. Hagan, W. Deal. 1995. Raven abundance at anthropogenic resources in the western Mojave Desert, California. Report to Edwards Air Force Base, CA. National Biological Service, Riverside, CA.

Boarman, W. I., and B. Heinrich. 1999. Common raven (*Corvus corax*). Account 476 in A. Poole and F. Gill, editors. The birds of North America. The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C., USA. Account 476 in A. Poole and F. Gill, editors. The birds of North America. The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C., USA.

Boarman, W. I., M. A. Patten, R. J. Camp, and S. J. Collis. 2006. Ecology of a population of subsidized predators: common ravens in the central Mojave Desert, California. Journal of Arid Environments 67:248–261.

Bui, T.D. 2009. The effects of nest and brood predation by common ravens (*Corvus corax*) on greater sage-grouse (*Centrocercus urophasianus*) in relation to land use in western Wyoming. M.S. Thesis, University of Washington. 48 pp.

Coates, P.S. 2007. Greater sage-grouse (*Centrocercus urophasianus*) nest predation and incubation behavior. Ph.D. Thesis, Idaho State University, Boise, ID. 191 pp.

Coates, P.S. and D.J. Delehanty. 2004. The effect of raven removal on sage grouse nest success.

Proc. 21st Vertebrate Pest Conference (R.M. Timm and W.P. Gorenzel, Eds.) Published by the University of California, Davis. pp12-20.

Coates, P.S., J.W. Connelly, and D.J. Delehanty. 2008. Predators of greater sage-grouse nests identified by video monitoring. Journal of Field Ornithology 79:421-428.

Coates, P.S. and D.J. Delehanty. 2010. Nest predation of greater sage-grouse in relation to microhabitat factors and predators. *Journal of Wildlife Management* 74(2):240-48.

Conover, M.R., J.S. Borgo, R.E. Dritz, J. B. Dinkins and D. K. Dahlgren. 2010. Greater sage-grouse select nest sites to avoid visual predators but not olfactory predators. *The Condor* 112(2):331-336.

Cote, I.M. and W.J. Sutherland. 1997. The effectiveness of removing predators to protect bird populations. *Conservation Biology* 11:395-405.

DeLong, A.K., J.A. Crawford, and D. C. DeLong. 1995. Relationship between vegetational structure and predation of artificial sage grouse nests. *Journal of Wildlife Management* 59:88–92.[3]

Heinrich, B., D. Kaye, T. Knight and K. Schaumburg 1994. Dispersal and Association among Common Raven. *The Condor* 96(2):545-551.

Lockyer, Z. B., P. S. Coates, M. L. Casazza, S. Espinosa, and D. J. Delehanty. 2013. Greater Sage-Grouse nest predators in the Virginia Mountains of northwestern Nevada. *Journal of Fish and Wildlife Management* 4(2):242-254.

Moynahan, B. J., M. S. Lindberg, J. J. Rotella, and J. W. Thomas. 2007. Factors affecting nest survival of greater sage-grouse in northcentral Montana. *Journal of Wildlife Management* 71:1773–1783.

Preston, M.L. 2005. Factors Affecting Winter Roost Dispersal and Daily Behaviour of Common Ravens (*Corvus corax*) in Southwestern Alberta. Northwestern Naturalist, Vol. 86, No. 3 (Winter, 2005), pp. 123-130.

Snyder, N.F.R., R.R. Ramey, and F.C. Sibley. 1986. Nest-site biology of the California condor. *Condor* 88:228–241.

Watters, M.E., T.L. McLash, C.L. Aldridge, and R.M. Brigham. 2002. The effect of vegetation structure on predation of artificial greater sage grouse nests. *Ecoscience* 9:314–319.

Webb, W.C., W.I. Boarman, and J.T. Rotenberry. 2009. Movements of juvenile common ravens in an arid landscape. *Journal of Wildlife Management* 73(1):72-81.

[3] This study is relevant to the NTT Report but not the COT Report.

B. Additional Studies that Must be Considered

USDA/APHIS/Wildlife Services. 2013. Letter from R.J. Merrell, District Supervisor, SW District Wyoming, USDA/APHIS/WS to Whom it may concern. 2pp.

Wyoming Game and Fish. 2012b. Letter from S. Talbott, Wyoming Game and Fish Director to R. Krischke, Wyoming State Director, USDA/APHIS Wildlife Services. Dated 3 April 2012. 3pp.

VII. Dispersal Ability, Habitat Fragmentation, and Population Persistence

While dispersal ability and population persistence is virtually unrecognized, habitat fragmentation is overstated as a threat.

A. Studies Ignored

Bush, K. 2009. Genetic diversity and paternity analysis of endangered Canadian Greater Sage-Grouse (*Centrocercus urophasianus*). Ph.D. dissertation, University of Alberta, Edmonton, Alberta, Canada.

Bush, K.L., C.L. Aldridge, and J.E. Carpenter, et al. 2010. Birds of a feather do not always lek together: genetic diversity and kinship structure of greater sage-grouse (Centrocercus urophasianus) in Alberta. *The Auk* 127(2):343−353.

Bush, K.L., C.K. Dyte, B.J. Moynahan, C.L. Aldridge, H.S. Sauls, A.M. Battazzo, B.L. Walker, K.E. Doherty, J. Tack, J. Carlson, D. Eslinger, J. Nicholson, M.S. Boyce, D.E. Naugle, C.A. Paszkowski, and D.W. Coltman. 2011. Population structure and genetic diversity of greater sage-grouse (*Centrocercus urophasianus*) in fragmented landscapes at the northern edge of their range. *Conservation Genetics* 12:527–542.

WAFWA. 2008. "Greater Sage-Grouse Population Trends: An Analysis of Lek Count Databases 1965-2007". Unpublished report by the Sage- and Columbian Sharp-tailed Grouse Technical Committee. Cheyenne, Wyoming: Western Association of Fish and Wildlife Agencies.

B. Additional Studies that Must be Considered

Thompson, T.R. 2012. Dispersal ecology of greater sage-grouse in northwestern Colorado: evidence from demographic and genetic methods. Doctoral dissertation, University of Idaho.

Wyoming Game and Fish. 2012a. Wyoming Sage-Grouse Population Trends 1995-2012. Unpublished presentation of analyses by Tom Christiansen, Wyoming Game and Fish, Sage-Grouse Program Coordinator, Cheyene, Wyoming. 14pp.

Zink, R. M. 2014. Comparison of patterns of genetic variation and demographic history in the Greater Sage-Grouse (*Centrocercus urophasianus*): Relevance for conservation. *The Open*

Ornithology Journal. 7:19-29.

VIII. State, Local and Private Land Conservation

The NTT and COT Reports give scant attention to state, local and private land conservation efforts.

A. Studies Ignored

Adler, J.H. 2008. Money or nothing: the adverse environmental consequences of uncompensated land use controls. *Boston College Law Review* 49:301-366.

Adler, J.H. 2011. The Leaky Ark. The American. October 5, 2011. Available at http://www.american.com/archive/2011/october/the-leaky-ark/

Baur, D.C., M.J. Bean, and W. R Irvin. 2009. A Recovery Plan for the Endangered Species Act. *Environmental Law Reporter* 39:10006-10011

Bean, M.J. 2002. *Overcoming Unintended Consequences of Endangered Species Regulation.* Idaho L. Rev. 38:409-414.

Bean, M.J. 1999. Testimony before the House Resources Committee on Implementation of the Endangered Species Act. May 26, 1999.

Bean, M.J. *The Endangered Species Act and Private Land: Four Lessons Learned From the Past Quarter Century*, 28 Envtl. L. Rep. (Envtl. Law Inst.) 10,701, 10,706 (1998)

Keystone Center. 2006. The Keystone Working Group on Endangered Species Act Habitat Issues, Final Report. Available at http://www.keystone.org/spp/documents/ESA Report FINAL 4 25 06 (2).pdf.

Paulich, N. 2010. Increasing private conservation through incentive mechanisms. *Stanford Journal of Animal Law & Policy* 3:106-158.

B. Additional Studies that Must be Considered

Ruhl, J.B. 2012. The Endangered Species act's fall from grace in the Supreme Court. *Harvard Environmental Law Review*. 36:487-532.

IX. Noise

The NTT and COT Reports rely upon questionable authority and overstates impacts of noise from human activities.

A. Studies Ignored

Attenborough, K. 2007. Sound Propagation in the Atmosphere. *In* Springer Handbook of Acoustics, ed. T.D. Rossing (New York: Springer), pp. 113–48.

Barber, J., K. Crooks, and K. Fristrup. 2010. The costs of chronic noise exposure for terrestrial organisms. *Trends in Ecology and Evolution* 25:180–189.

Bies, D.A. and C.H. Hansen. 2009. Engineering Noise Control: Theory and Practice, Fourth Edition. Spon Press (Taylor and Francis, NY, NY).

Fristrup, K., D. Joyce, and E. Lynch. 2010. Measuring and monitoring soundscapes in the national parks. Park Science, 26(3):1-8. Winter 2009-2010. Available at http://www.nature.nps.gov/ParkScience/index.cfm?ArticleID=344&Page=1. Accessed August 5, 2013.

Harvey Inc., K.C. 2009. Pinedale Anticline Project Area sage grouse monitoring, noise monitoring report. Prepared by K.C. Harvey, Inc., 376 Gallatin Park Drive, Bozeman, MT 59715. August 14, 2009.

Lynch, E., D. Joyce, and K. Fristrup. 2011. An assessment of noise audibility and sound levels in U.S. National Parks. *Landscape Ecology* 26:1297–1309.

Reijnen, R., R. Foppen, C. Ter Braak, and J. Thissen.1995. The effects of car traffic on breeding bird populations in woodland. II. Reduction of density in relation to the proximity of main roads. *Journal of Applied Ecology* 32:187-202.

Wyle. 2008. Noise basics and the effect of aviation noise on the environment. Unpublished report. El Segundo, CA, 48pp. Available from http://www.wyle.com/ServicesSolutions/science/EMMA/AcousticandVibrationConsulting/Resources/DocumentLibrary/NoiseGuidance/Pages/default.aspx Accessed August 6, 2013.

X. Scientific Inference

The NTT and COT Reports are lacking in scientific inference in hypothesis testing.

A. Studies Ignored

MacCoun, R.J. 1998. Biases in the interpretation and use of research results. *Annual Review of Psychology* 49:259-287.

Moore, D. A., L. Tanlu, and M. H. Bazerman. 2010. Conflict of interest and the intrusion of bias. *Judgment and Decision Making* 5(1):37–53.

Nickerson, R. S. 1998. Confirmation Bias: A Ubiquitous Phenomenon in Many Guises. *Review of General Psychology* 2(2):175-220.

Pielke, Roger A. Jr. 2004. When scientists politicize science: making sense of controversy over

The Skeptical Environmentalist. *Environmental Science & Policy* 7:405–417.

Platt, J.R., 1964. Strong inference: Certain systematic methods of scientific thinking may produce much more rapid progress than others. *Science* 146:347-353.

Popper, R. 1962. Science: Conjectures and Refutations,'' in Conjectures and Refutations: The Growth of Scientific Knowledge New York: Basic Books.

Ramey, R.R., L.M. Brown, and F. Blackgoat. 2011. Oil and gas development and greater sage grouse (*Centrocercus urophasianus*): a review of threats and mitigation measures. *The Journal of Energy and Development* 35(1):49-78.

Rehme, S.E., L.A. Powell, and C.R. Allen. 2011. Multimodel inference and adaptive management. *Journal of Environmental Management* 92:1360-1364.

Exhibit D: Peer Review and Information Quality Breakdown in an Endangered Species Act Decision: The Case of the Greater Sage Grouse

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16 October 2013

ABSTRACT
This paper discusses issues with the implementation of Information Quality Act guidelines in U.S. Endangered Species Act (ESA) listing decisions. These issues are illustrated by the key scientific paper and peer review processes that figured prominently in the decision to list the greater sage grouse (*Centrocercus urophasianus*) as "warranted" under the ESA as a threatened or endangered species in 13 states and provinces. We examine limitations of the data, errors and bias in the analyses and inferences based upon those analyses, and then explore why and how questionable data and analyses were used as the basis for such a far-reaching decision, even when independent peer review did not support the conclusions. We discuss policy implications and potential policy solutions, and how these checks and balances could reduce opportunities for various types of error and bias in the ESA decision-making process.

INTRODUCTION

The conservation of biodiversity is a worldwide concern, especially the conservation of threatened and endangered species and the habitats they depend upon. In the United States the protection of species threatened with potential extinction is provided by the Endangered Species Act (ESA) of 1973. The Act requires that the U.S. Fish and Wildlife Service (USFWS) make decisions to list species as threatened or endangered, *"solely on the basis of the best scientific and commercial data available"*. The USFWS must determine whether a species, subspecies, or distinct population is likely to become threatened or in danger of extinction (endangered) in the reasonably foreseeable future, throughout all or a significant portion of its range. In making such decisions (and those that follow to aid the recovery of species), the USFWS is afforded substantial judicial deference in interpreting what constitutes best available scientific and commercial data, sometimes refered to as *best available science* (Hickey 2009). Although the ESA refers to *data*, the USFWS actually relies on published and unpublished studies, and professional opinion, rather than the underlying *data*. The USFWS assures the quality of the information which is used for its decisions by relying on the Information Quality Act (IQA), the bulletin (OMB 1999, 2002) implenting IQA, and the Department of Interior's Scientific Integrity policies (DOI 2011).

For many rare or declining species, there are only limited data available, and those data may be incomplete or inadequate for the purposes of assessing population numbers and trends. The problem is particularly acute in species that are not of commercial value. For example, data may have been collected over many years for other purposes and now applied to answer questions that were not originally anticipated. Or, the agencies monitoring the species may have been reluctant to change and adopt superior methods of data collection. Therefore, listing decisions and recovery actions may be made on the basis of limited or sub-optimal data, which can hinder the types of discriminating analyses and the inferences that can be drawn from them.

In other cases, underlying data used in studies may not be made public because agencies or researchers have witheld access to them. This may be because agencies or researchers consider the data proprietary, or they may not want to reveal the locations of endangered species. In either case, when data are not made public, it prevents independent reanalysis and review (Fischman and Meretsky 2001).

In this paper we explore these issues by examining the highly influential scientific paper by Garton et al. (2011), that figured prominently in the decision to list the greater sage grouse as "warranted but precluded" for threatened or endangered status under the ESA (USFWS 2010). We examine limitations of the data used by Garton et al. (2011), the analyses, inferences based upon those analyses, and then explore why and how such an important decision as an ESA listing could have been based on such questionable analyses of questionable data. This is of particular concern given that there was considerable independent peer review that did not support the conclusions of that analysis. We also discuss potential policy solutions to these shortcomings, and how these

checks and balances could benefit the conservation of species by reducing opportunities for various types of error in the research and decision making process.

SHORTCOMINGS OF THE APPLIED METHODOLOGY

The species in question, the greater sage grouse, is a large ground-nesting bird dependent upon sagebrush habitat in western North America. Each spring, sage grouse congregate at traditional sites (leks) where the males display in order to attract and mate with females. Thirteen states and provinces began counting the number of adult male sage grouse at prominent leks in the 1940's and 1950's as a potentially useful index of population size. Initially, male counts were made at a few large and easily located leks. Then, from 1965 to 2001, the number of counted leks increased approximately ten-fold. The data collection, however, continued to be a non-random sample of leks, but included no information on the number of leks that were not included in these counts.
Concern and repeated litigation over the status of sage grouse, and a desire to quantitatively estimate population sizes and trends, has motivated three different research groups to conduct analyses of male lek count data (Connelly et al. 2004; WAFWA 2008; Garton et al. 2011). The most recent and most ambitious of these studies, Garton et al. (2011), used 42 years of male lek count data (from 1965-2007) to estimate population trends, reconstruct estimates of past population sizes, and forecast population sizes and probabilities of persistence 30 and 100 years into the future, to 2037 and 2107 respectively.

The male lek count data used by Garton et al. (2011) and previous authors were collected by different states and provinces - some of which used different methods - and by many different individuals at thousands of locations. Data from different states and provinces were combined for analysis in Sage Grouse Management Zones (SMZs) and metapopulations. The authors claim that they carefully examined all data prior to analysis to ensure that they were obtained following appropriate procedures, but the authors also acknowledged that they *"had to assume that the data were collected properly."* However, the number of cases where this assumption had to be made was not reported, nor did they report the number of leks that were deleted from the raw data.

After filtering the data, the analytical approach had multiple procedures:

(a) Male lek count data were used to develop annual estimates of the rate of change from the previous year to the present year for each lek with successive counts, and these were then averaged across each population.

(b) The reciprocal of those estimates was then used to back-calculate (reconstruct) breeding population sizes prior to 2007 (the terminal year in which the largest number of leks was counted). This effectively estimated how many male sage-grouse would have been counted in earlier years, if the maximum number of leks counted had been counted every year. A formula for estimating the compounding error of such a

procedure was applied to their reconstructed population data and 90 percent confidence intervals (CI) were reported.

(c) The reconstructed population sizes were then used to find "best fit" stochastic population models by considering 26 exponential and density-dependent growth models with varying numbers of parameters (including year, two time periods (1969-1987 and 1988-2007), and time lags). Model selection procedures were employed to evaluate models relative to each other. Additionally, the data were grouped in 5-year blocks, using averages and associated statistics for each block.

(d) The models developed in (c) were used for 30 and 100-year population forecasts as part of a population viability analysis (PVA). Extinction predictions were based on the proportion of replicate trajectories where the estimated effective population (N_e) sizes fell below 50 or 500, in which case populations were deemed "quasi-extinct."

Garton et al. (2011) reported that 44% of their models indicated declining carrying capacity through time, ranging from -1.8% to -11.6%. In other words, their results found that 56% of populations were stable, increasing, or had no significant trend. Also, 18% of the models incorporated lower carrying capacities from 1987 – 2007, compared to 1967-1987. Again, this could also be viewed as 72% of populations being stable, increasing, or having no significant trend. They also reported that 13% (3) of 24 populations for which they had sufficient data, had a high likelihood of declining below $N_e = 50$, and 54% (13) had a likelihood of declining below $N_e = 500$ within 30 years. On a 100-year time horizon, 75% of the populations and 29% of the SMZs were projected to decline below effective population sizes of 500. For 2007 they estimated a minimum of 88,816 male grouse. They assumed a ratio of 2.5 adult females per lekking male, yielding a minimum population estimate of 310,856 adult sage grouse. This number contrasts with an estimated population size of approximately 535,542 sage grouse, based on estimates provided by states and provinces (USFWS 2010).

The authors acknowledged the inherent inaccuracy of lek counts and several limitations of the data for inferring population abundance and trends, and conceded that they made no attempt to estimate true population abundance using leks counts. Yet, despite this caveat, Garton et al. (2011) subsequently used lek count data to create an index of historical abundance, population reconstructions, and probability of extinction forecasts for 30 and 100-year time horizons. They concluded by proposing that: *"these forecasts will be useful in guiding decisions concerning the future of sage-grouse and the sagebrush communities upon which they depend."*

Data limitations in the conservation of endangered species can lead to a policy dilemma analogous to the challenge of minimizing Type I and Type II statistical errors. Type I error occurs when conservation actions are based on an erroneous or exaggerated conclusion that a biologically meaningful and statistically valid risk threatens a species. Type II error may occur if conservation actions are *not* taken, based on the mistaken belief that little or no biologically meaningful and statistically valid risk threatens a species, when one actually does. Minimizing both types of error can be difficult, because

attempts to minimize one type of error can increase the probability of the other type of error.

In practice, the situation is more complex than this simple dichotomy for two reasons. First, Type I and II error scenarios assume that the basic data are sound, a condition that can be difficult to meet with endangered species. Because scientific uncertainty is anathema to government, scientists are encouraged to fill these information gaps as best they can with new analyses of existing data, or new data and analyses. Second, when one type of error is viewed as having more serious consequences than the other, the standard of proof becomes asymmetrical (MacCoun 1998). For the USFWS, one of the consequences of a decision that might result in a species decline (or extinction) is the threat of costly lawsuits brought by environmental groups. And once listed, the USFWS and other agencies have an additional consequence to consider: in 1978 the U.S. Supreme Court interpreted language of the ESA to conclude that *"the value of endangered species is incalculable"* and that a listed species must be protected *"whatever the cost."* Such interpretations naturally lead to a precautionary approach and to increased potential for Type I error in listing decisions. Other errors, including errors of omission, selective interpretation, or confirmation bias (Nickerson 1998; Robertson 2009), may also contribute to either Type I or II error.

Known issues with lek count data

Numerous published papers have pointed out *why* male lek count data are unreliable and inappropriate for inferring population abundance and trends. These include: Jenni and Hartzler (1978), Emmons and Braun (1984), Walsh et al. (2004), Connelly and Schroeder (2007), Garton (2007), and Western Association of Fish and Wildlife Agencies (2008). There were also six publicly available peer reviews commissioned by the Colorado Division of Wildlife that specifically pointed out methodological issues with Garton et al. (2011). These include Conroy (2009), Noon (2009), Runge (2009), and three anonymous peer reviews (CDOW 2009). (Note: The version of Garton et al. that was reviewed in 2009 by Conroy, Noon, and Runge was the peer reviewed and accepted version that the USFWS relied upon in making its ESA listing decision in 2010 (Garton et al. 2009). The 2011 version of Garton et al. that we discuss here is virtually identical to the 2009 version, with just minor edits to text.)

Briefly, the issues identified by the authors and reviewers listed above include:

1) No demonstrated correspondence between male lek counts and actual population number or trends.
2) Data collection procedures were not standardized among states and sometimes varied within states over time.
3) Personnel monitoring leks and individual differences in methods and detection ability change over time, leading to *observer bias*.
4) Data sets from multiple states and provinces (i.e. data from two to six states) were combined for analysis of SMZs. (This problem is exacerbated by the fact

that some states supplied data summaries while others provided raw lek count data.)

5) Data were not randomly collected by any state or province, and there are an unknown number of unsampled leks in each population. Therefore, it is impossible to know the extent to which sampling effort is representative of the distribution of sage grouse within populations or SMZs. This also affects the definition of dispersal distances which, in turn, are used to determine whether populations are isolated.
6) Only males were counted; there is no accounting for the number of females or juveniles in the populations sampled, their sightability, nor how these differ across different sagebrush habitats or decades.
7) The number of grouse counted at a lek depends upon the spatial definition of a lek: a more inclusive definition includes nearby satellite leks and results in a higher count, while a more restrictive definition results in more leks with fewer birds counted in each lek. Previous authors provided quantitative criteria for what constituted a lek. Connelly et al. (2004) considered all males within 2.5km of a lek to be part of that lek, while the Western Association of Fish and Wildlife Agencies (2008) used 0.5km as a cut-off. Garton et al. (2011) did not specify any cut-off distance.
8) A disregard for estimating the number of unknown leks makes it is impossible to use male lek count data to estimate population number or trends.
9) A lek is not reported in databases until two or more male grouse are found using it. Consequently, counts at a lek start with a positive number and any lek that has become inactive or merged with another lek is followed by zero counts. This leads to negatively-biased trends.
10) The assumption that lek-attendance rates of adult male greater sage-grouse are high and constant is not supported by the data.
11) The number of sage grouse leks being counted has increased over time, but the non-random sampling of leks has not yet changed.
12) Small sample sizes and variation in sample sizes across years at each lek increases the statistical unreliability of reconstructed population estimates.

The low resolution of population reconstructions

Plots of population reconstructions and their 90% confidence intervals in the study by Garton et al. (2011) are so wide that no trend can be supported at that confidence level for many populations. (At 95%, the confidence intervals would be so wide that there would be nothing to discuss about the results.) The following illustrates the magnitude of the problem: First, the 90% CI for the Dakotas (Figure 2 in Garton et al. 2011): about 950 male sage grouse were estimated for 2005, but the 90% CI for 1968 was 400 - 9,250, thus a trend ranging between a 90% decrease and a 150% increase over that time period. Second, the east-central Idaho population, with only two leks counted in 1965-1969 and four leks in 2000-2007, had 90% CIs between zero and no upper limit across all years. Yet despite the enormous uncertainty surrounding these and other population reconstructions, Garton et al. (2011) were willing to make several remarkably *precise*

predictions about the future of some populations. For example, they stated that the Powder River Basin, Wyoming population *"will fluctuate around carrying capacity which will decline from 3,042 males attending leks in 2007, to only 312 males attending leks in 2037, to going extinct with only two males attending leks in 2107 if this trend continues at the same rate in the future."* That population had a 90% CI of 0 - 180,000 in 1968, 5,000 - 40,000 in 1987, and an estimate of about 8,000 in 2007.

Lack of accounting for error in population growth models and negative trend bias

It is important to recognize that the population growth models in Garton et al. (2011) were not fitted to observed lek count data but instead to *reconstructed population estimates*. These were calculated in such a way that the input and output variables share data, and therefore cannot be considered independent (i.e. the population reconstruction method depends upon quantities that appear on both the "prediction" and "predictor" side of the equation). One reviewer (Conroy 2009) reported that this resulted in "built in patterns" in the reconstructed population estimates, which in turn affected the population growth models and led to erroneous inferences. Similarly, one of the anonymous CDOW reviewers reported a negative trend bias when Garton et al's (2011) method was applied to simulated input data that deliberately had *no* trend. That reviewer reported that 34-40% of the simulated populations produced a statistically significant negative trend using Garton et al.'s (2011) methods. These reviewers also pointed out that sampling variation and statistical uncertainty from reconstructed population estimates were not carried over by Garton et al. (2011) into subsequent models of population growth and persistence.

These assessments are supported by results in Appendix 1 of Garton et al. (2011) where they list results for best models of their reconstructed population data: the 26 adjusted r^2 values range from 0 to 0.682, the highest of which is for a population with data for only 1996-2007, and the next closest value was 0.498, and average r^2 was only 0.257. This indicates that the models, on average, did not explain 75% of the variation in the data sets (i.e. low resolution).

The low statistical resolution of the reconstructed populations for which the models were developed suggests that a great deal of error accompanies the PVA forward projections. Similar to the issues with estimating population reconstructions in reverse time, errors will compound and grow exponentially. Garton et al. (2011) discuss this potential, but ultimately emphasize the literature that better supports their analyses. In reality, given the poor resolution of the reconstructed population data base and the growth models based upon it, the PVA projections incorporate a great deal of compounded error that renders projections at even 30 years meaningless. This leaves almost no clearly useful analytical results in what Garton et al. (2011) produced.

Mathematical error(s)

Garton et al's (2011) use of 20 males and 2.5 times that number of females to achieve an N_e of 50, is in error and should result in an N_e of 57.14 (using Wright's 1938 equation). Instead, only 17.5 breeding males would be needed for an N_e of 50 (assuming a ratio of 2.5 females per lekking male). Likewise, 175 males rather than 200 would be required for an N_e of 500. In other words, extinction risk was overestimated across all populations by setting the minimum number of breeding males *higher* than necessary for maintaining an N_e of 50 or 500. Although these differences may seem slight, they do establish different thresholds for generating extinction probabilities across all populations. (This was not a result of the formula error noted below.)

Garton et al. (2011) presented an incorrect equation for estimating effective population size: $N_e=1/((1/Nm) + (1/Nf))$, where Nm is number of breeding males and Nf is the number of breeding females in a population. The correct equation, from Wright (1938) is: $N_e=4NmNf/(Nm+Nf)$. The two equations would have been mathematically equivalent if Garton et al. (2011) had used a four instead of a one in the numerator. It is unknown whether this mistake carried over into the population viability analysis (in which case it would have overestimated extinction risk), or whether it was a typographical error in their paper. This question cannot be answered because the code and data used to perform the analysis are not publicly available.

Reliance on the 50/500 rule of thumb: an obsolete concept

The basic concept underlying minimum viable population size (MVP) and population viability analysis is that there must be some "minimum conditions for the long term persistence and adaptation of a species or population" (Soule 1987). An effective population size (N_e) of 50 was suggested as the minimum in the short term to limit the loss of heterozygosity through genetic drift and potential resultant inbreeding depression that could lead to a risk of population extinction (Soule 1980). An N_e of 500 was proposed as the minimum necessary to maintain the long-term adaptive potential of a population (Franklin 1980) based on a handful of studies of quantitative genetic variation in highly inbred lines of mice, maize and *Drosophila* (summarized by Lande 1976). None of those studies actually compared extinction risk with genetic variation or N_e.

Although the 50/500 rule of thumb is widely cited, field data, laboratory studies, and theory show that this rule of thumb is not a reliable predictor of extinction. Successful populations have been founded by few individuals, and populations with a much lower N_e than 50 have persisted long past when they should have gone extinct under the 50/500 rule of thumb (Krausman et al. 1993, 1996; Goodson 1994; Luikhart and Cornuet 1997; Wehausen 1999; Ramey et al. 2000; Frankham 2005). Criticism of the 50/500 rule of thumb was succinctly summarized by Boyce (1997): *"Unfortunately, the 50/500 rule does not have a sound genetic or demographic basis. And there is no theoretical or empirical justification for basing MVP on an estimate of N_e… until such evidence becomes available, reliance on rules of thumb, such as the 50/500 rule is arbitrary and capricious."*

In practical terms, the predictions of future sage grouse population sizes by Garton et al. (2011) are not falsifiable because they are simply probability statements about what might happen if environmental conditions are unchanged. While long-range predictions based on models are potentially useful heuristic tools, they are also notoriously inaccurate and can be easily over-applied (Pielke, Jr. and Conant 2003). Their lack of potential falsifiability effectively places decisions based upon them outside the realm of science.

Hunting mortality: an error of omission in model development

Garton et al. (2011) ignored the effects of sport hunting in their models, although it is the largest documented source of sage grouse mortality: 207,433 sage grouse harvested in the U.S. during 2001-2007 (Reese and Connelly 2011). We find it curious that Garton et al. (2011) ignored hunting mortality, while suggesting that other human activities must have reduced carrying capacity, specifically: expansion of cheatgrass and conifer woodlands, increased fire frequency, energy development, and spread of West Nile Virus.

If one accepts population estimates (88,816 male grouse in 2007 or a total population size of 310,856), then hunters removed 28,180 sage grouse or approximately 9 percent of the species in 2007 alone. In four of the six pervious years, the take was even higher (up to 37,607 in 2006). These numbers do not include the number of grouse that were wounded and not recovered by hunters.

Regionally, the estimated percentage of sage grouse hunted may have been even higher in some years. For example, in 1992 an estimated 34,388 sage grouse were harvested by sport-hunters in Wyoming (Reese and Connelly 2011). Using the upper and lower 90% CI values of the estimated number of males in the Wyoming Basin SMZ and Powder River population in 2007 (and 2.5 adult females per male counted at leks), hunting loss would have amounted to 12 - 29% of the estimated adult population. This is the same SMZ where Garton et al. (2011) estimate a rate of decline between 3.4% and 10.5% annually. With this level of hunting mortality occurring annually, we question the assumption that there is no (additive) demographic effect (Gibson et al. 2011). The difficulty in establishing a link is in part due to the fact that sage grouse lek counts, the basis of hunting harvest, are not a reliable indicator of population number or trends (see discussion above). Clearly, more refined data and methods are needed to address this question.

DISCUSSION

Once a ESA listing is final, compliance is a costly endeavor. Compliance with regulations associated with listings usually involve a substantial allocation of conservation resources in order to be effective (Government Accountability Office 2006; Ferraro et al. 2007). Compliance can lead to secondary costs to local communities and regional economies (Wanger 2010), and is imposed with no regard to cost based on the

Supreme Court's admonishment that ESA listed species must be protected *"whatever the cost*" (*TVA v. HILL, 437 U.S. 153 (1978)).*

Independent and detail-oriented peer reviews are important for prudent decision makers. Equally important is the availability of data and methods used to ensure the replicability of results and allow identification of errors, methodological biases, and potential for falsification of hypothesized population trends (Fischman and Meretsky 2001). This is recognized and required by IQA Guidelines issued by federal agencies. However, in the case of the greater sage grouse, the failure was not of the guidelines themselves, but of the agencies' failure to apply them.

In the case of the sage grouse decision, the question is: what were the checks and balances in the ESA listing process, and why did these fail to detect and filter out a study with numerous limitations, errors, and unfalsifiable predictions? We argue that the reason is largely due to reliance on an ineffective peer review process and acceptance of "scientific" information that has not been sufficiently scrutinized (e.g. due to data being withheld or reliance on population predictions with unreasonable margins of error).

Peer Review

Science is a human activity, therefore errors can and do occur, and peer review exists as a filter on information quality. However, there is no guarantee that papers being peer reviewed will be examined in depth, results replicated, or reviewer comments fully addressed and made public. Unless peer reviewers are provided the original data along with sufficient time and resources to adequately investigate the analyses, the reviewers are forced to assume that the data are sound.

Currently, the USFWS does not require that the data used in research that it cites be made publicly available, nor do they actively engage in or encourage replication of results in peer review. Since 2002 however, IQA guidelines set a higher standard for federal agencies, including the USFWS. They require that studies be reproducible and provide a rebuttable presumption that peer-review of the studies was adequate (OMB 2002). Additionally, the U.S. Department of Interior's information quality guidelines (US-DOI 2002) require that reproducibility *"shall generally require sufficient transparency about data and methods that an independent reanalysis could be undertaken by a qualified member of the public."* And USFWS (2007) guidelines state that, *"higher levels of scrutiny are applied to influential scientific, financial or statistical information, which must adhere to a higher standard of quality."* It is apparent that these requirements were not applied to their full extent by the USFWS in its consideration of Garton et al. (2011) because the raw data were unavailable, and valid criticisms of the data and methods made by reviewers outside of the production of this monograph series were clearly ignored by both the editors of the volume and the USFWS in its decision. This raises questions about the efficacy of the peer review process in the production of this highly influential paper, and with the peer review of the USFWS decision that cited the paper 62 times.

It also raises issues with the efficacy of the peer review of the recent USFWS and State-sponsored Conservation Objectives Team Report (COT 2013), which cited Garton et al. (2011) 61 times and based their population threats analyses, population definitions, current and projected numbers of males in each population, and probability of population persistence on Garton et al. (2011).

As long-time students of the ESA and peer reviewers of USFWS recovery plans and proposed rules, it has been our experience that peer reviewer and public comments on proposed rules are typically combined into broad categories, paraphrased, and summarized by the USFWS. Responses are then prepared to these summaries. Many valid criticisms and details are potentially lost in this process, diminishing the value of reviews and public comments. For example, valid issues raised in outside peer reviewer comments of Garton et al. (2011) were only discussed in a brief paragraph in the USFWS's "warranted but precluded" decision (USFWS 2010):

> *"We received these reviews and have reviewed them in the context of all other data we received in preparation of this finding. Their primary concern was about the applicability of analyzing and presenting future population projections in the manner done by Garton et al. (in press), based on the limitations of the data, the assumptions required, and uncertainty in the estimates of the model parameters. Garton et al. (in press) acknowledged these concerns, as several of the reviewers pointed out, and their analyses underwent peer review via the normal scientific process prior to acceptance for publication."*

The last sentence of this summary also illustrates a key false assumption in the ESA decision-making process: that the *"normal scientific peer review process"* leading to publication is automatically a good filter on information quality. Empirical evidence and the collective experiences of many authors renders this assumption disputable (Mahoney 1977; Roy and Ashburn 2001; Hilborn 2006; McCook 2006; Sandström and Hällsten 2008; Casadevall and Fang 2009; Fang et al. 2012; and Ramey 2012). While traditional peer review is a useful tool, it is clearly an imperfect tool and applied with great variation. As a result, proposals have come forth on how to improve its effectiveness or adopt innovative alternatives (Weicher 2008; Suls and Martin 2009).

Despite variation in how peer-review is conducted, there are at least two well-justified standards that distinguish a rigorous peer-review process from a less than rigorous one. One is: required preparation of a detailed response to each of the peer review criticisms, and discussion of why the criticisms might not be considered valid and should be ignored. While the extent to which this occurred in production of the *Studies in Avian Biology* monograph (of which Garton et al. 2011 is one of 25 chapters) is unknown because reviews were confidential (itself a violation of the Information Quality Guidelines), the USFWS's response to outside peer reviewer's criticisms (see previous paragraph) is illustrative of a process that deviates from this standard.

The second standard is: the role of editorship and authorship need to be independent so that editors are not in a position to review and approve articles that they have authored. In

the case of Garton et al. (2011), one of the authors, J. Connelly, was also one of the two editors of the monograph that Garton et al. (2011) was published in. (Both editors were authors on multiple papers in this monograph.)

There is the need for greater accountability and a more comprehensive review process for highly influential scientific papers used in ESA listing decisions (and of the listing decisions themselves). However, it is questionable whether an additional round of peer review or the convening of expert panels would be adequate. An extensive social psychology literature points to the reasons *why*: even with intentions of neutrality, traditional peer review and expert panels may be unable to uncover the whole truth because of inherent cognitive and motivational mechanisms that contribute unintentionally to bias (e.g. strategy-based errors, confirmation bias, or majority amplification; see MacCoun 1998 for an extensive review).

Better access to data

In an ideal world, all of the data used to develop a highly influential scientific paper would be publicly available to allow for independent replication and ensure the potential for falsifiability. Therefore, it is worth asking: why is this not the case with Garton et al. (2011) and many similar, highly influential papers, especially given that *"The* [sage grouse] *monograph is recognized by the USFWS and the Court as the primary source of science for the new review and listing determination."* (USGS 2009b).

Until such time that underlying data of highly influential studies used in ESA decisions are mandated to be publicly available, few options exist to gain access to these data. While the option to obtain data under FOIA from federal agencies is available, and has been used for replication and publication of analyses (e.g. Turner et al. 2004, 2006), federal agencies must possess the data if they are to be obtained under FOIA. However, the little known OMB Circular A-110 provides a second option for public access to data under FOIA when studies are federally grant-funded (OMB 1999):

> *"(d) (1) In addition, in response to a Freedom of Information Act (FOIA) request for research data relating to published research findings produced under an award that were used by the Federal Government in developing an agency action that has the force and effect of law, the Federal awarding agency shall request, and the recipient shall provide, within a reasonable time, the research data so that they can be made available to the public through the procedures established under the FOIA."*

Procedures are well established, as some agencies (such as the National Institute of Health) are familiar with the responsibilities of granting agencies and awardees. To our knowledge, no data requests under A-110 have yet been submitted to the USFWS.

A third potential remedy exists in the form of "requests for correction" under the IQA. This administrative procedure only allows for suggested corrections to the record and does not provide legal remedy should an agency fail to correct or provide information.

The remedy of last resort, costly and time consuming for all involved, but comprehensive in its potential depth, is the power of subpoena.

From our viewpoint, these remedies should not be necessary. It is in the best interests of biodiversity conservation, responsible agencies, and researchers, to provide ready access to data used in scientific papers and key decisions, either online or in publicly accessible archives.

CONCLUSIONS

It is our view that a scientifically critical review of the study by Garton et al. (2011) on greater sage grouse would have concluded that there was no scientific basis for a "warranted" decision (for a ESA threatened listing) because of fundamental problems with the available data as well as with the analyses. Instead, the decision should have called for development of better data collection, with the goal of revisiting the issue in 5 years, when the relationship of lek counts to actual population data might be better understood, or a probability-based census method implemented. This would have minimized Type I error without increasing Type II error.

We acknowledge that multiple studies have presented documentation of the loss of sagebrush in the western U.S. and Canada (i.e. Miller and Rose 1999; Schroeder et al. 2004), however, the extent to which this loss of habitat translates into loss of sage grouse, is not certain. Therefore, the policy-relevant questions about sage grouse should be: 1) are populations in decline; 2) if so, where; 3) why has it occurred; and 4) what can be done to insure the stability of these populations? In order to address these questions, reliable data on population numbers and trends are needed. Those data are currently lacking.

To their credit, Garton et al. (2011) called for establishment of range-wide, standardized methodologies based on probability sampling of leks, breeding males, and females, that would allow for more meaningful population analyses in the future (e.g. sentinel-lek and dual-frame sampling methods). Walsh et al. (2010) have recently proposed the application of mark–resight methods to estimate population size in sage grouse and other lekking species.

From our assessment, the data collected for more than 50 years by thirteen states and provinces are inadequate to answer the above questions regardless of the analysis applied. Repeated calls to reform this weak and outdated methodology, whose limitations have been clearly documented here and elsewhere, have not yet moved agencies into reforming their "business as usual" approach to counting male sage grouse on leks each spring. This puts the overall management of this species on a shaky database and will continue to hinder effective management until more biologically relevant and statistically defensible census methods are adopted.

The issues and potential solutions identified here also apply to the ESA listing of species outside of the U.S. (an increasing trend) and more broadly to endangered species laws of other nations (e.g. Australia's Environment Protection and Biodiversity Conservation Act of 1999, Canada's Species at Risk Act of 2002, and South Africa's National Environmental Management: Biodiversity Act of 2004), as well as international treaties (e.g. the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) of 1973). Failure to implement changes will result in falure to adequately protect species that are truly at risk of extinction.

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BEFORE THE UNITED STATES DEPARTMENTOF THE INTERIOR,
U.S. GEOLOGICAL SURVEY DATA QUALITY OFFICIAL

GARFIELD COUNTY, COLORADO	)	**Data Quality Act Challenge**
GRAND COUNTY, COLORADO	)	**to U.S. Department of the Interior**
JACKSON COUNTY, COLORADO	)	**Dissemination of Information**
MESA COUNTY, COLORADO	)	**Presented in the U.S. Geological**
MOFFAT COUNTY, COLORADO	)	**Survey Greater Sage-Grouse**
RIO BLANCO COUNTY, COLORADO	)	**Monograph**
CARTER COUNTY, MONTANA	)	
FALLON COUNTY, MONTANA	)	
FERGUS COUNTY, MONTANA	)	
MCCONE COUNTY, MONTANA	)	
MUSSELSHELL COUNTY, MONTANA	)	
PHILLIPS COUNTY, MONTANA	)	
PRAIRIE COUNTY, MONTANA	)	
RICHLAND COUNTY, MONTANA	)	
TOOLE COUNTY, MONTANA	)	
YELLOWSTONE COUNTY, MONTANA	)	
ELKO COUNTY, NEVADA	)	March 18, 2015
EUREKA COUNTY, NEVADA	)	
UINTAH COUNTY, UTAH	)	
WESTERN ENERGY ALLIANCE	)	
AMERICAN EXPLORATION & MINING	)	
ASSOCIATION	)	
COLORADO MINING ASSOCIATION	)	
COLORADO WOOL GROWERS ASSOCIATION	)	
INDEPENDENT PETROLEUM ASSOCIATION	)	
OF AMERICA	)	
INTERNATIONAL ASSOCIATION OF	)	
DRILLING CONTRACTORS	)	
MONTANA ASSOCIATION OF OIL, GAS &	)	
COAL COUNTIES	)	
MONTANA PETROLEUM ASSOCIATION	)	
NEVADA MINING ASSOCIATION	)	
PETROLEUM ASSOCIATION OF WYOMING	)	
PUBLIC LANDS COUNCIL	)	
UTAH MULTIPLE USE COALITION	)	

Petitioners

v.

UNITED STATES GEOLOGICAL SURVEY
U.S. DEPARTMENT OF THE INTERIOR

Agency.

REQUEST FOR CORRECTION OF INFORMATION UNDER THE DATA QUALITY ACT AND APPLICABLE INFORMATION QUALITY GUIDELINES

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I. Introduction

The counties and organizations listed above (the "Petitioners") hereby submit this Challenge for Correction of Information ("Challenge") against the U.S. Geological Survey ("USGS") report entitled "Comprehensive Review of Ecology and Conservation of the Greater Sage Grouse: A Landscape Species and its Habitats (the "Monograph") pursuant to the Federal Information Quality Act, (44 U.S.C. § 3516) ("Data Quality Act" or "DQA") and the "Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information disseminated by Federal Agencies" issued by the Office of Management and Budget (67 Fed. Reg. 8452 (Feb. 22, 2002) ("OMB Guidelines")), as well as the Information Quality Guidelines of the U.S. Department of the Interior (67 Fed. Reg. 50687 (Aug. 5, 2002) ("DOI Guidelines")) and the USGS Guidelines ("USGS Guidelines")[1] collectively known as (the "Guidelines") as well as presidential memoranda and secretarial orders on scientific integrity and transparency as discussed below.

In March of 2010, the U.S. Fish and Wildlife Service ("FWS") issued a warranted-but-precluded ("WBP") listing decision on greater sage-grouse ("GRSG") under the Endangered

[1] USGS, Information Quality Guidelines, http://www.usgs.gov/info_qual/.

Species Act ("ESA").[2] FWS cited an alleged inadequacy of existing regulatory mechanisms as a factor in its WBP decision.[3] Pursuant to a settlement agreement with activist litigants, FWS agreed to consider listing the species under the ESA by September 30, 2015.[4]

The Monograph is a highly influential report that was prepared by the Cooper Ornithological Society ("COS") as "Monograph: Studies in Avian Biology"[5] and relied heavily upon by FWS in its 2010 listing decision. In fact, FWS cited four of the most influential chapters of the Monograph no fewer than 174 times.[6] Out of 38 authors, over one-third were federal biologists, including 12 from USGS, one from the Bureau of Land Management ("BLM"), and one from FWS.[7] In total, the Monograph is 25 chapters, with conclusions on wildlife ecology, wildlife science, conservation biology, GRSG biology, and GRSG population dynamics.[8]

While the Monograph was intended to "produce new scientific information about GRSG populations, sagebrush habitats, and relationships among GRSG, sagebrush habitats, and land use,"[9] it lacks the scientific quality, integrity, objectivity and utility required by the DQA, the

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[2] 75 Fed. Reg. 13910 (Mar. 23, 2010).

[3] Dept. of the Interior, Bureau of Land Management, *Northwest Colorado Greater Sage-Grouse Draft Land Use Plan Amendment and Environmental Impact Statement*, p. xxi (August 2013) ("NW CO DEIS").

[4] FWS, Press Release: *U.S. Fish and Wildlife Service Seeks Science, Data Related to Greater Sage-Grouse and Efforts to Protect Sagebrush Habitat*, http://www.fws.gov/greatersagegrouse/news_releases/20140811_DataCall_release_FINAL.pdf.

[5] USGS, Ecology and Conservation of Greater Sage-Grouse: a Landscape Species and Its Habitats, A Release of a Scientific Monograph with Permission of the Authors, the Cooper Ornithological Society, and the University of California Press, (http://web.archive.org/web/20100527124712/http://sagemap.wr.usgs.gov/monograph.aspx

[6] Center for Environmental Science, Accuracy & Reliability, *Science or Advocacy? Ecology and Conservation of Greater Sage-Grouse: a Landscape Species and its Habitats: An Analysis of the Four Most Influential Chapters of the Monograph*, https://www.hightail.com/download/UW14OU1VMVh0TWxYd3NUQw (Feb. 1, 2012) (hereinafter "CESAR") at 7.

[7] CESAR at 5.

[8] Dan Ashe, The Fish and Wildlife Service, http://www.fws.gov/mountain-prairie/species/birds/sagegrouse/COT/COT-Report-with-Dear-Interested-Reader-Letter.pdf, at 1-2, (published March 22, 2013).

[9] USGS, Ecology and Conservation of Greater Sage-Grouse: a Landscape Species and Its Habitats, A Release of a Scientific Monograph with Permission of the Authors, the Cooper Ornithological Society, and the University of California Press, (http://web.archive.org/web/20100527124712/http://sagemap.wr.usgs.gov/monograph.aspx

Guidelines and the additional authority cited herein. Petitioners have reviewed the Monograph and found it to be inaccurate, unreliable, and biased in violation of the DQA and the Guidelines.

The DQA, Section 515 of the Treasury and General Government Appropriations Act of FY 2001 (Public Law 106-554), requires federal agencies to ensure and maximize the quality, objectivity, utility, and integrity of information, including statistical information, disseminated by federal agencies on or after October 1, 2002. Agencies are required to review the quality of information before its dissemination and treat information quality as integral to every step.

The Office of Management and Budget ("OMB") government-wide guidelines impose three core responsibilities on the agencies:

- First, the agencies must embrace a basic standard of "quality" as a performance goal, and agencies must incorporate quality into their information dissemination practices. OMB's guidelines explain that "quality" encompasses "utility" (usefulness to its intended users), "integrity" (security), and "objectivity." "Objectivity" focuses on whether the disseminated information is accurate, reliable, and unbiased as a matter of presentation and substance.

- Second, the agencies must develop information quality assurance procedures that are applied before information is disseminated.

- Third, the OMB government-wide guidelines require that each agency develop an administrative mechanism whereby affected parties can request that agencies correct poor quality information that has been or is being disseminated. If one is dissatisfied with the initial agency response to a correction request he or she may file an administrative appeal.

The Monograph qualifies as information disseminated by USGS, or in the alternative, as USGS-sponsored information.[10] FWS relied extensively upon the Monograph in its 2010 WBP decision. In addition, DOI agencies are considering Land Use Plan Amendments based in part

[10] USGS Guidelines III-1; and III-2, http://www.usgs.gov/info_qual/#guidelines ("The USGS provides unbiased, objective scientific information upon which other entities may base judgments. Since its inception in 1879, the USGS has maintained comprehensive internal and external procedures for ensuring the quality, objectivity, utility, and integrity of data, analyses, and scientific conclusions. These Information Quality Guidelines cover all information produced by the USGS in any medium, including data sets, web pages, maps, audiovisual presentations in USGS-published information products, or in publications of outside entities. These guidelines provide an administrative process for persons to seek correction of information maintained and disseminated by the USGS that they believe is in error.")

upon the Monograph. Finally, unless corrected, FWS will likely rely upon the Monograph when it issues a final listing decision on GRSG.[11]

As a result, the Monograph is "highly influential" information subject to even higher standards of quality.[12] It is not subject to any exclusion from the DQA nor from the Guidelines.[13]

If recommendations from the Monograph are implemented, they will have enormous social and economic consequences in the West without commensurate benefits to local GRSG populations and habitat. Given FWS's reliance on the Monograph to date, Petitioners interests are already being harmed by the flaws and inaccuracies in this influential report. For example, in litigation over the listed status of GRSG, Judge Winmill extended deadlines so that FWS could use information from the Monograph. Ultimately, FWS cited the Monograph well over 174 times in its 2010 WBP decision. BLM then published the NTT Report and FWS published its COT Report. Collectively, these documents have formed the basis of Land Use Plan Amendments across the West.

The information disseminated information should be corrected upon consideration of the most recent or thorough information from stakeholders, the public and the scientific community. This Challenge constitutes the most recent and thorough information.

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[11] FWS, Press Release: *U.S. Fish and Wildlife Service Seeks Science, Data Related to Greater Sage-Grouse and Efforts to Protect Sagebrush Habitat*, http://www.fws.gov/greatersagegrouse/news_releases/20140811_DataCall_release_FINAL.pdf (Aug. 11, 2014) ("The Service agreed, as part of a 2011 court settlement, to make an initial determination on whether to propose the species for listing by September 30, 2015").

[12] USGS Guidelines III-2, http://www.usgs.gov/info_qual/#guidelines ("USGS data collection and research activities are carried out in a consistent, objective, and replicable manner that has been vetted through a vigorous and open process of peer review to ensure that the best possible results are achieved and that there are no weaknesses or errors in the data or conclusions. USGS scientific information is subject to a high degree of transparency about the data and methods used to facilitate the reproducibility of such information by other qualified scientists.").

[13] USGS Guidelines III-1, http://www.usgs.gov/info_qual/#guidelines ("Factors, such as imminent threats to public health or homeland security, statutory or court-ordered requirements, or other circumstances beyond our control, may limit or preclude applicability of these guidelines.").

II. The Petitioners

The Petitioners have a direct interest in the quality and integrity of agency science and decision making, including how the Monograph affects GRSG and public lands management in the West. The Petitioners engage in ranching, grazing, mining, and energy development on multiple-use federal, state and private lands throughout the West, or are counties that rely on these activities for their economic and social viability. The management restrictions, regulatory measures and closures recommended in the Monograph will have a direct impact on the Petitioners, the economy and the future viability of scores of communities, local governments, small businesses, family farms and ranches, mining enterprises, electricity and oil and natural gas development in the West.

- Counties:
  - Colorado: Garfield County, Grand County, Jackson County, Mesa County, Moffat County, Rio Blanco County
  - Montana: Carter County, Fallon County, Fergus County, McCone County, Musselshell County, Phillips County, Prairie County, Richland County, Toole County, Yellowstone County
  - Nevada: Elko County, Eureka County
  - Utah: Uintah County

- Western Energy Alliance represents more than 450 companies engaged in all aspects of environmentally responsible exploration and production of oil and natural gas across the West. The Alliance represents independents, the majority of which are small businesses with an average of fifteen employees.

- American Exploration & Mining Association is a 120 year old, 2,500 member, non-profit, non-partisan trade association based in Washington. AEMA members reside in 42 states and are actively involved in prospecting, exploring, mining, and reclamation closure activities on federally administered lands, especially in the West. Our diverse membership includes every facet of the mining and represents a true cross-section of the American mining community from small miners and exploration geologists to junior and large companies. Most of our members are individual citizens or small businesses.

- Colorado Mining Association is an industry association, founded in 1876, whose more than 1,000 members include individuals and organizations engaged in the exploration, development and production of coal, metals, agricultural and industrial minerals throughout Colorado, the west and the world. CMA's membership also includes persons

and enterprises providing support, services and supplies to the mining industry.

- Colorado Wool Growers Association was founded in 1926. It is premier legislative, regulatory, and policy management organization for the Colorado sheep industry.

- Independent Petroleum Association of America (IPAA) represents the thousands of independent oil and natural gas producers and service companies across the United States. Independent producers develop 95 percent of domestic oil and gas wells, produce 54 percent of domestic oil and produce 85 percent of domestic natural gas. IPAA members are dedicated to meeting environmental requirements while economically developing and supplying energy resources for consumers.

- The International Association of Drilling Contractors (IADC) is a leading oil and gas trade association and it is considered the authoritative body in the drilling space. Headquartered in Houston, Texas, IADC represents the interest of drilling contractors operating throughout the world including all oil and gas producing areas of the United States.

- Montana Association of Oil, Gas & Coal Counties is a non-profit corporation providing leadership on energy issues and promoting responsible energy development for the future of Montana. There are 34 counties that belong to the Association.

- The Montana Petroleum Association is a voluntary, non-profit trade association, whose members include oil and natural gas producers, gathering and pipeline companies, petroleum refineries and service providers and consultants.

- The Nevada Mining Association (NvMA) is a statewide trade organization formed over 100 years ago to address issues facing the mining industry in Nevada. The association has hundreds of members representing mine operators, the exploration community and vendors.

- The Petroleum Association of Wyoming (PAW) is Wyoming's largest and oldest oil and gas organization dedicated to the betterment of the state's oil and gas industry and public welfare. PAW members, ranging from independent operators to integrated companies, account for approximately ninety percent of the natural gas and eighty percent of the crude oil produced in Wyoming.

- The Public Lands Council (PLC), headquartered in Washington, D.C., represents ranchers who use public lands, manage the natural resources and preserve the unique heritage of the West. PLC is a Colorado nonprofit corporation. PLC represents state and national cattle, sheep and grasslands associations. PLC works to maintain a stable business environment in which livestock producers can conserve the natural resources of the West while producing food and fiber for the nation and the world.

- Utah Multiple Use Coalition: Recognizing Utah is a public lands state, eighteen organizations relying on access for natural resources, grazing, recreation and jobs banded

together for a single united voice. Through prudent application of multiple-use management principles, precious recourses such as timber, wildlife, forage, minerals, energy, water and recreation can co-exist with Utah's unique and sensitive environments. Coalition members include the Utah Farm Bureau, Utah Mining Association, Utah Woolgrowers, Utah Rural Electric Association, and Western Counties Alliance.

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III. The Monograph Violates the Quality, Objectivity, Utility and Integrity Standards of the DQA and its Guidelines

The OMB Guidelines implement § 3504(d)(1) of the Paperwork Reduction Act (PRA). 44 U.S.C. § 3516. Section 3504 (d)(1) requires that "with respect to information dissemination, the [OMB] director shall develop and oversee the implementation of policies, principles, standards, and guidelines to apply to Federal agency dissemination of public information, regardless of the form or format in which such information is disseminated...."[14]

Both the DQA and the Guidelines require agencies to "ensure and maximize" the quality, objectivity, utility, and integrity" of information disseminated by federal agencies.[15] "Utility" refers to "the usefulness of the information to its intended users, including the public."[16] For the reasons discussed herein, the Monograph fails to meet quality, objectivity, utility and integrity standards of the DQA, the Guidelines and the additional authorities cited herein. *See* Exhibit A:

[14] 44 U.S.C. § 3504(d)(1).
[15] DQA §515(a), OMB Guidelines, § 11(2), 67 Fed. Reg. at 8458.
[16] OMB Guidelines V(2). 67 Fed. Reg. at 8459. (emphasis added).

Ecology and Conservation of Greater Sage Grouse *gen*.; *see also* Exhibit B: Wildlife Science International Monograph Review, *gen*.

For the reasons expressed herein, the Monograph does not meet the standards of quality and robustness required. It was hardly as "rigorous scientific and scholarly process[es] as can be achieved." *See* Exhibit A at 30. The USGS has also failed to meet its charge in OMB Circular A-130, "[A]gencies should inform the public as to the limitations inherent in the information dissemination product (e.g., possibility of errors, degree of reliability, and validity) so that users are fully aware of the quality and integrity of the information."[17] The Monograph has clearly glossed over limitations and error inherent in the report and the studies cited therein. *See* Exhibits A and B, *gen*.

In this case, the Monograph suffers from fatal flaws, including: 1) significant mischaracterization of previous research; 2) substantial errors and omissions; 3) lack of independence in authorship and peer review; 4) methodological bias; and 5) lack of reproducibility. Many of the aforementioned flaws are directly attributable to: the editors reviewing their own work, peer review comments were ignored, the relied upon data was not made public, and subjective interpretations were employed over objective hypothesis testing. Though the Monograph masquerades as a document of scientific integrity, it contains false information that will continue to fuel unfounded agency action. *See* Exhibit A at 4-13, 17-20, 30-33, and 42.

There was no hypothesis testing whatsoever. Instead, the authors relied on subjective post-hoc interpretation of results. One of the key chapters (Garton et al.) contains mathematical errors that were apparently not identified by peer review and subsequently not corrected.

[17] OMB, Memorandum for Heads of Executive Departments and Establishments (Circular No. A-130) http://www.whitehouse.gov/omb/circulars_a130 (Feb. 8, 1996).

Therefore, the clarity of hypotheses could not be evaluated as required. Research designs were chosen to yield desired outcomes rather than objectively test alternative hypotheses, and ranged from the use of invalid assumptions, to arbitrary thresholds for describing population connectivity (i.e. Knick and Hanser), using smoothing to search for patterns in the data that do not have any statistical significance (i.e. Johnson et al.), to using equations that are in error and population persistence thresholds that have been discredited (i.e. Garton et al.).

The data critical to the analyses, particularly lek count and location data used in Knick and Hanser, Garton et al., and Johnson et al., relied upon simulations. Data points excluded from analyses were not available to the public. Further, here is no evidence that any of the raw or final data sets were provided to the peer reviewers. Therefore, the quality of the data and collection procedures could not be evaluated. The limitations of the analyses were inadequate because they were presented qualitatively rather than by quantifying error and uncertainty.

For example, Chapter 17 of the Monograph, titled *Influence of Environmental and Anthropogenic Features on Greater Sage Grouse Populations*,[18] seeks to determine whether specific activities are correlated with population level declines in GRSG, as determined from lek count trend data.[19] The paper seeks to identify quantifiable threats to populations.[20] However, the paper exemplifies a "weak approach to statistical inference and a poorly planned data-fishing expedition."[21] For instance, there are not enough years of data to support inferences with single variables, much less several variables.[22] The lek counts had only four years of data associated

[18] Douglas H. Johnson et al. (2011), Chapter 17 (407-50).
[19] Chapter 17 (2009), Chapter 17 (2011): *Influence of Environmental and Anthropogenic Features on Greater Sage Grouse Populations*. Douglas H. Johnson et al., *Influence of Environmental and Anthropogenic Features on Greater Sage-Grouse Populations, Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and its Habitats*: Chapter 17 407-50 (2011). Peer review by Wildlife Science International, Inc. at 96.
[20] *Id*.
[21] *Id*. at 97.
[22] *Id*. (Johnson *supra* at Table 1).

with them. Had this paper undergone a rigorous and independent peer-review, it would have almost certainly been rejected.[23] *See* Exhibit B at 94.

This Challenge asks USGS to correct, retract or supplement information referenced in the Monograph and also seeks to ensure that all information disseminated by USGS meets the quality, objectivity, utility and integrity requirements of the DQA and the Guidelines.

A. The Monograph is Not Transparent

The Monograph fails to meet quality and utility standards of the DQA and the Guidelines. The OMG Guidelines require a high degree of transparency for influential information such as the Monograph. Transparency equates to disclosure of the "data and methods of analysis" such that replication of results could be achieved.[24] Peer-review of original and supporting data and results "does not necessarily imply that the results are transparent and replicable."[25] In this case, as discussed in detail below, there are many shortcomings on peer review of the Monograph.

OMB has recognized the benefits of transparency extend beyond the ability to spot errors in government work. Far more important is the ability to assess the extent to which results hinge upon an agency's choices in analysis.[26] "Agency guidelines shall, however, <u>in all cases</u>, require a disclosure of the specific data sources that have been used and the specific quantitative methods and assumptions that have been employed."[27] As discussed below, USGS Guidelines and policies directly contravene this direction.

The Monograph was far from transparent. *See* Exhibit A at 13-16, and 18-19. While USGS' scientific information purports to be subject to a high degree of transparency regarding

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[23] *Id.*
[24] OMB Guidelines V(3)(b)(ii).
[25] AVAILABLE AT: http://www.whitehouse.gov/omb/fedreg_reproducible
[26] AVAILABLE AT: http://www.whitehouse.gov/omb/fedreg_reproducible
[27] OMB Guidelines V. (emphasis added).

the data and methods used to facilitate the reproducibility of such information by other qualified scientists, a detailed review of USGS Guidelines and policies suggests the opposite. USGS proves to be the most secretive and least transparent of any DOI agency in clear violation of the DQA and the OMB and DOI Guidelines.

USGS Guidelines require data collected for publication be "documented to describe the methods or techniques used to collect, process, and analyze data; the structure of the output; description of accuracy and precision; standards for metadata; and quality assurance processes."[28] Such is hardly the case here. In fact, USGS expressly refuses to disclose such underlying data and peer review information in its Guidelines and policies in direct conflict with the DQA and the DOI and OMB Guidelines.[29] This is particularly egregious when, perhaps in violation of the Federal Advisory Committee Act ("FACA"), draft chapters of the Monograph were provided in advance to FWS with no public notice or review. *See* Exhibit A at 6-8.

Garton et al. 2011, which is heavily relied upon by BLM and FWS and in other USGS documents, systematically cloaked lek count data as, "only males are counted at leks, and no provision is made for counting females or juveniles. As a result, the male lek count data represent an unknown proportion of total sage grouse." *See* Exhibit A at 14. These errors are carried forward in other key agency documents like the COT Report. For example, Table 2 in the COT Report (threats) is based <u>entirely</u> on Garton et al. 2011.[30]

What little background presented to the public is presented in a confusing fashion with only vague references to the assumptions upon which it was based. For all of these reasons, the models and the conclusions based thereon in the information disseminated in the Monograph fail to meet the standards under the DQA, the Guidelines and the additional authorities cited herein.

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[28] *Id*.
[29] USGS Manual 502.3.5.E and 502.5.4.A.
[30] COT Report at 16.

For example, for all but a handful of studies, neither the Petitioners nor the public have access to information that is integral to these studies and the models upon which they depend. For example, states within GRSG range collect annual counts on leks. Integral to understanding the science of GRSG is the means upon which to count populations and to predict potential trends. Agency biologists and agency-funded researchers who published in the Monograph have cherry-picked lek count data from the states but did not document which data were included, how this was done, or why other data were excluded, and developed analyses that form the basis of opinions memorialized in the key reports utilized by BLM, FWS and USGS. *See* Exhibit A at 14-16, 20, 24, 29-33 and 35.

Without the underlying data, these reports are neither transparent nor reproducible. Without the state data, it is not possible to reproduce the results of the above-mentioned studies, because each selectively chose data to include and exclude. None of the final data sets used are public.

In the rare instances in which data have been released, there are very serious data quality issues with the lek count data used in many of the cited studies. The quality issues are ignored by authors like Knick et al. 2011, Knick and Hanser 2011, Garton et al. 2011 and other, who summarize these data for use in GIS analyses that appear to be very sophisticated. However, there are significant issues with the majority of the underlying data, especially those before the late 1990s, due to undocumented methods, mixed methods, suspect values, satellite leks, incorrect datums, single counts, biased counts, and unacknowledged uncertainties. *See* Exhibit A, *gen*.

Not only are the data and computer models relied upon in these studies improperly considered as proprietary by USGS, but the methods used to arrive at the final data are not

described with a level of detail that would allow them to be reproducible, rendering the entirety of the lek count data inoperative. *See* Exhibit A at 14-24. Monograph authors each reached different conclusions on which data to include or exclude from the final data set because of how the lek data were interpreted (i.e. definition of a lek) and reliability of the observations.[31] This makes it impossible to provide scientific verification of the Monograph's claims.

Accordingly, USGS has insufficiently disclosed data sources and methodology in the information disseminated in the Monograph in violation of the DQA, the Guidelines and the additional authorities cited herein. Federal and state agencies should not hold a monopoly on data that will be integral to land use decisions and the listing decision on GRSG. Nor should this information form the basis of Land Use Plan Amendments without adequate public scrutiny and transparency.

B. The Monograph is Not Reproducible

OMB explained in its February 22, 2002 agency-wide guidelines that the "general standard" for these robustness checks is "that the information is capable of being substantially reproduced, subject to an acceptable degree of imprecision."[32] "For example, a qualified party, operating under the same confidentiality protections as the original analysts, may be asked to use the same data, computer model or statistical methods to replicate the analytic results reported in the original study."[33] The more important the information disseminated, the more rigorous the standard.[34] Since USGS and the research upon which the Monograph is based do not transparently disclose supporting data, the conclusions in the Monograph are not reproducible.

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[31] (Each group employed different methods, including undocumented and subjective methods, for defining what constituted a "lek" and including/excluding lek counts obtained from them).
[32] 67 Fed. Reg. 8452, 8457 (Feb. 22, 2002).
[33] OMB, *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies*, http://www.whitehouse.gov/omb/fedreg_reproducible (effective Jan. 3, 2002).
[34] OMB Guidelines V10.

See Exhibit A at 6, 8, 15, and 42.

OMB Guidelines provide a higher standard than even peer review applies to influential information, namely a "substantial reproducibility standard."[35] DOI and USGS have adopted, and indeed must adopt, the OMB Guidelines. USGS data collection and research activities are to be "carried out in a consistent, objective, and replicable manner that has been vetted through a vigorous and open process of peer review to ensure that the best possible results are achieved and that there are no weaknesses or errors in the data or conclusions."[36]

In appropriate cases, OMB encourages agencies to consider "confirmation" as a standard in assessing the objectivity of original and supporting data.[37] "The more important the information, the higher the quality standards to which it should be held, for example in those situations involving 'influential scientific, financial or statistical information'"….[38]

As referenced above, the Monograph is highly influential information. In it, 38 federal, state, university and environmentalist authors collaborated to produce and compile scientific information about GRSG populations, sagebrush habitats, and relationships among sage-grouse, sagebrush habitats, and land use.[39] The Monograph is controversial and precedent-setting with significant interagency interest from FWS, BLM and USFS.[40]

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[35] 67 Fed. Reg. 8452, 8457 (Feb. 22, 2002).
[36] USGS Guidelines III(2).
[37] 67 Fed. Reg. 8452, 8457 (Feb. 22, 2002).
[38] OMB Guidelines V(3)(b)(ii).
[39] USGS, Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats: *a Release of a Scientific Monograph with Permission of the Authors, the Cooper Ornithological Society, and the University of California Press*, http://web.archive.org/web/20100527124712/http://sagemap.wr.usgs.gov/monograph.aspx
[40] U.S. Office of Management and Budget, *Final Information Quality Bulletin for Peer Review*, at 23 (2004) (hereinafter *OMB Bulletin*) *available at http://www.whitehouse.gov/sites/default/files/omb/assets/omb/memoranda/fy2005/m05-03.pdf*; John C. Freemuth; Forward to the Monograph; *Thoughts on the Role of Science in Making Public Policy*, http://web.archive.org/web/20100527164855/http://sagemap.wr.usgs.gov/Docs/SAB/Forward.pdf ("The Greater Sage-Grouse (Centrocercus urophasianus) has become a species whose possible listing under the Endangered Species Act (ESA) is fraught with controversy.").

The Monograph qualifies as a highly influential scientific assessment such that a heightened standard for substantial reproducibility applies.[41] Unfortunately, the Monograph fails to meet the substantially reproducible standard required under the DQA and the Guidelines. *See* Exhibit A at 8, 15, and 42. For example, analyses in the Monograph are incapable of replication because, in many cases, neither the key data used in the analysis nor the algorithms were publicly available. *See* Exhibit A at 8.

USGS has not disclosed the supporting data and models for the public to assess the objectivity of the Monograph. The models relied upon in various chapters are quite complex. However, they are neither transparent nor reproducible. As a result, neither the peer reviewers, journal editors, or the public can independently evaluate the quality and potential biases in the data and studies.

The data have been collected by various individuals in different states, all using different standards and levels of effort, and all of which have changed over time. USGS has not properly curated nor maintained this data in a central repository. Metadata to describe precisely how the data were collected, recorded and summarized along with quality and control assurances are undocumented in violation of the DQA, the Guidelines and USGS policies. Additionally, the raw data and methods that one could potentially use to reproduce the final data sets used in analyses are not available either because they are not released, undocumented, or may no longer exist. Again, this violates the DQA and the Guidelines.

For these reasons, the studies relied upon in the Monograph fail the substantial reproducibility requirement of the DQA and the Guidelines. Accordingly, the information

[41] U.S. Office of Management and Budget, *Final Information Quality Bulletin for Peer Review*, at 23 (2004) (hereinafter *OMB Bulletin*) *available at http://www.whitehouse.gov/sites/default/files/omb/assets/omb/memoranda/fy2005/m05-03.pdf.*

disseminated violates the "objectivity" standard and the "utility" standards therein because they are not useful to the public. *See* Exhibit A, *gen*.

Virtually all of the significant studies relied upon in the Monograph utilize models. *See* Exhibit A at 12.[42] The Monograph relies extensively upon these models and even models built upon models to evaluate the alleged human footprint on sagebrush habitat and alleged GRSG population responses. *Id.* In contravening the Guidelines, USGS has not demonstrated to OMB that there is no other option than to use the many third-party models disseminated in the Monograph.

While federal agencies often use various models developed by third parties to formulate policies based upon influential scientific information, the DQA, the Guidelines and the additional authorities cited herein require that influential scientific information be reproducible. Such was not the case here.

Garton et al. 2011 is one of the most frequently cited chapters of the Monograph. As discussed below, and in Exhibits A and B, Garton et al. 2011 has been thoroughly discredited. 13 states and provinces collected data using different methods and unequal levels of effort. *See* Exhibit A at 15. Ironing over the inherent limitations of such data, as the Monograph did, "a fundamental problem with this approach is that even if the raw lek-count data were publicly available (<u>which it is not</u>), subjective criteria were used to select the final data sets used in analyses, and therefore the analyses themselves, would not be reproducible."[43] Flawed

[42] *E.g.* ("Speculative models are substituted for lack of historic data on sagebrush extent and sage grouse distribution, and are the basis of postulated historic habitat in the monograph. Thus, the "results" of this modeling exercise are misleading, as are the subsequent analyses that rely on it. In sum, it is not a scientific assessment relying on best available scientific data, but rather an advocacy document expressing the authors' preference for sagebrush ecosystem protection.").

[43] *Id*. (emphasis added).

information, married with veiled agency procedures and a lack of reproducibility facially violate the DQA, the Guidelines, OMB Guidelines, and the Freedom of Information Act ("FOIA").

C. USGS Policy Unlawfully Contradicts the DQA, the Guidelines, OMB's Peer Review Bulletin and FOIA

It is ironic that USGS, (DOI's self-proclaimed "science arm", is the most secretive when it comes to disclosure of scientific data and peer reviews. USGS withholds information related to underlying data and peer reviews as "deliberative and predecisional" and exempt from disclosure under FOIA or the DQA.[44] The agency's reasoning is equally as arrogant, as it believes public disclosure could be construed as incomplete, incorrect or taken out-of-context.[45] Apparently only USGS employees and favored government, academic and non-profit allies can be entrusted with access to such information.[46] USGS seems to indicate the public will be better-off if they do not know the process of agency decision-making or the science behind it. After all, such transparency, "could cause foreseeable and serious harm to the USGS, the DOI, and the public."[47]

The USGS Manual provides, "[T]he unpublished data and information that are gathered by USGS employees, volunteers, and contractors working on behalf of the USGS while conducting scientific and engineering investigations <u>must not be publicly released</u> unless the data and information meet the applicable requirements described and referenced in this chapter."[48] Geologic, geophysical and biological data from private sources, "must be carefully safeguarded against disclosure."[49] Similarly, work USGS performs for other agencies is to be shielded from

[44] USGS Manual 502.3.5.E and 502.5.4.A.
[45] *Id.* at 502.3.5.E.
[46] *Id.* at 502.5.3.C.
[47] *Id.* at 502.3.5.E.
[48] *Id.* at 502.5.3.A. (emphasis added).
[49] *Id.* at 502.5.5.B.

public disclosure.[50] These policies directly contravene the DQA, the DOI Guidelines, the OMB Peer Review Bulletin and the presidential memos and orders and the DOI Manual and orders addressed herein.

In violation of the authorities cited herein, USGS also directs peer reviewers not to disclose their results or conclusions. "[I]nformation distributed for peer review must carry the following statement requiring nondisclosure prior to the information being approved by USGS for release: 'This draft manuscript is distributed solely for purposes of scientific peer review. Its content is deliberative and predecisional, so it must not be disclosed or released by reviewers.

USGS purports to have such a rigorous process for scientific integrity that the public is virtually instructed to accept USGS work without question or reproach.[51] However, even brisk reviews of USGS work on GRSG raise serious questions about the integrity of the work, the underlying data behind it, and the peer review process that endorsed it. *See* Exhibits A and B, *gen*. Such secrecy is hardly consistent with the mandate of the DQA, the Guidelines and the presidential and departmental authorities cited herein. Rather, the agencies are directed to be transparent to ensure scientific integrity, objectivity and quality.

D. Conflicts of Interest with the Monograph and Other Key Documents

The Department of the Interior Manual ("DOI Manual") defines a conflict of interest as "any personal, professional, financial, or other interests that conflict with the actions or judgments of those covered by this policy when conducting scientific and scholarly activities or using scientific and scholarly data and information because those interests may: (1) significantly

[50] *Id.* at 502.5.5.A.
[51] *Id.* at 502.5.3.B.

impair objectivity; (2) create an unfair competitive advantage for any person or organization; or (3) create the appearance of either."[52]

A number of the relevant regulations and guidance stress the importance of independence[53] and the need to avoid conflicts of interest.[54] Among other things, independence means that a peer reviewer may not have been a contributor to the work product leading to the listing of a species and the peer reviewer has not been influenced by funding considerations. The National Academy of Sciences ("NAS") considers financial interests, access to confidential information, reviewing one's own work, public statements and positions, and employees of sponsors as problems to be avoided in its conflicts policy.[55]

A small number of GRSG specialist-advocates have had a disproportionate influence on formulating federal policy including their overlapping participation in preparation of the Monograph. More diverse expertise and viewpoints are clearly needed. More importantly, these issues exhibit serious conflicts of interest in contravention to the DQA, the Guidelines and the additional authorities cited herein.

As recently as March 12, 2015, Reese, Beck, Holloran co-signed a letter to individual White House and DOI officials advocating for the most egregious regulatory restrictions in the

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[52] U.S. Department of the Interior Manual, available at: http://www.doi.gov/pmb/eeo/directives/Departmental-Manual.cfm; 305 DM 3.

[53] Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities 59 Fed. Reg. 34270 (Jul. 1, 1994); OMB Peer Review Bulletin; Memorandum for the Heads of Executive Departments and Agencies. 74 Fed. Reg. 10671 (Mar. 11, 2009), available at: http://www.gpo.gov/fdsys/pkg/FR-2009-03-11/pdf/E9-5443.pdf (http://www.whitehouse.gov/sites/default/files/microsites/ostp/scientific-integrity-memo-12172010.pdf); Performance Work Statement for Scientific, Technical and Advisory Services (http://www.fws.gov/informationquality/peer_review/IDIQ_Performance_Work_Statement_17Nov2011.pdf); Information Quality Guidelines and Peer Review (http://www.fws.gov/informationquality/topics/InformationQualityGuidelinesrevised6_6_12.pdf).

[54] Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports (http://nationalacademies.org/coi/); Final Information Quality Bulletin for Peer Review 70 Fed. Reg. 2664 (Jan. 14, 2005); Memorandum for the Heads of Executive Departments and Agencies (http://www.whitehouse.gov/sites/default/files/microsites/ostp/scientific-integrity-memo-12172010.pdf); Department Manual, Part 305, Chapter 3 (http://www.fws.gov/science/pdf/DOIScientificIntegrityPolicyManual.pdf).

[55] *Available at:* http://www.nap.edu/openbook.php?isbn=0309059437&page=9

NTT Report and virtually threatening an ESA listing if such measures were not adopted. Other signatories included COT member Connelly, NTT member Rinkes and Monograph authors Garton and Braun. This interplay amongst close peers on the Monograph and the NTT and COT Reports cannot be understated.[56]

Dr. Kerry Reese, and Dr. John W. Connelly, an author of the COT Report and editor of the Monograph, published eight papers together, including two papers in 2012 and four papers in 2011. All of these were included in the Monograph. Dr. Reese participated in no fewer than eleven presentations with Connelly, four with Gardner, another COT Report author, and four with Dr. Edward O. Garton. Garton et al. 2011 forms the very basis of the COT Report and is the most frequently cited paper therein. Dr. Reese received a $255,203 grant from IDFG with Garton in 2011 and over $1.3 million in sage-grouse funding including $178,442 from USGS, the funding agency on the Monograph.[57]

Dr. Jeffrey L. Beck has two papers with COT member Connelly. Dr. Beck authored numerous papers with other frequently cited sage-grouse biologists including Naugle, an author of the NTT Report. No financial support is listed in the information received by the Alliance via FOIA, but given that Beck has published 12 papers on the topic, such support could be expected to be significant.

Dr. Matthew J. Holloran is one of the most cited authors in the COT Report. He authored a 2011 Monograph paper with Connelly, and another with Connelly and Knick. Dr. Holloran also authored three papers with Connelly in 2006, 2009, and 2012. Dr. Holloran's Ph.D. dissertation concluded "currently imposed [natural gas] developmental stipulations are inadequate to protect the greater sage-grouse, and that stipulations need to be modified to

[56] These issues are illustrative. However, it should be noted Petitioners and the public do not have access to the reviewers or the reviewer comments on the Monograph.
[57] Scientific Peer Review of the Sage-Grouse Conservation Objectives Draft Report, Appendix A.

maintain populations within natural gas fields."[58] Note the amount of financial support on six recent grants and contracts on sage-grouse totaled more than $3.1 million. Funding sources were not listed. This indicates a bias by Dr. Holloran that calls into question his ability to perform an independent peer review. Holloran also coauthored a USGS Science Summary paper with Manier, Wood and Oyler-McCance of the USGS.

Dr. Terry A. Messmer reported no authorship conflicts with COT Report team members; however, he listed financial support for some 18 recent grants and contracts on sage-grouse totaling more than $2.3 million. Dr. James S. Sedinger was an author with COT and NTT member Shawn Espinosa on a 2011 Monograph chapter and a 2010 paper. Grant and contract support includes $40,000 on sage-grouse from BLM, and five grants and contracts totaling $252,939 from FWS.

These are all indicative of serious conflicts of interest.[59] Moreover, Steve Knick, an editor of the Monograph and author or co-author of nine chapters within it; Dave Naugle from the Natural Resources Conservation Service ("NRCS"), author or co-author of four chapters in the Monograph; David Wood from BLM; Pat Diebert from FWS; and Shawn Espinosa from Nevada's Department of Wildlife all served on the NTT which developed the NTT Report. Knick, Diebert, Wood, Espinosa and Naugle, among others, were involved in BLM's last-minute efforts to bolster the science in the NTT Report. Please note the 2010 WBP decision cited the 2009 draft Monograph many, many times. The Monograph was finalized and published in 2011. This accounts for the year cited for Monograph chapters below.

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[58] Holloran 2005.

[59] Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports (http://nationalacademies.org/coi/); OMB Peer Review Bulletin; Memorandum for the Heads of Executive Departments and Agencies (http://www.whitehouse.gov/sites/default/files/microsites/ostp/scientific-integrity-memo-12172010.pdf); Department Manual ("DM") Part 305, Chapter 3 (http://www.fws.gov/science/pdf/DOIScientificIntegrityPolicyManual.pdf).

Garton et al. 2011 (chapter 16) was cited no fewer than 62 times in the 2010 WBP decision and 61 times in the COT Report; Hagen 2011 (chapter 8) was cited 15 times in the 2010 WBP decision and once in the COT and NTT Reports. Knick 2011 (chapter 13) was cited nine times in the 2010 WBP decision, four times in the COT Report and once in the NTT Report; Knick and Hanser 2011 (chapter 18) was cited 38 times in the 2010 WBP decision, eight times in the COT Report and six times in the NTT Report; Naugle et al. 2011 (chapter 21) was cited eight times in the 2010 WBP decision and three times in the NTT Report; and Schroeder et al. 2004 (chapter 23) was cited 18 times in the WBP decision; six times in the COT Report and once in the NTT Report; Walker and Naugle 2011 (chapter 10) was cited 48 times in the WBP decision and once in the NTT Report; and Wisdom et al. 2011 (chapter 19) was cited 41 times in the 2010 WBP decision, 12 times in the COT Report and two times in the NTT Report.Naugle et al. 2011a and Naugle et al. 2011b are cited six times in the NTT Report, and the opinion and bias found in Naugle 2011a seems to have been adopted by the NTT Report without citation of attribution. Naugle served as his own editor for Naugle et al. 2011a. His co-authors on the study included Doherty, Walker, Copeland, Holloran and Tack.

Doherty et al. 2008 was heavily relied upon by the NTT Report, albeit misrepresented or taken out of context 67%of the time. Doherty authored or co-authored three chapters of the Monograph. Naugle and Walker were co-authors on Doherty et al. 2008. Doherty co-authored at least three other papers with Naugle (Doherty et al. 2010a, Doherty et al. 2010b, and Doherty et al. 2011). Doherty and Holloran have been co-authors on at least one other paper.

Walker et al. 2007 was cited nine times in the NTT Report and twice in the COT Report. Walker authored or co-authored three chapters in the Monograph. Walker and Naugle 2011, a chapter in the Monograph, was cited in the NTT Report. Copeland co-authored one chapter in

the Monograph. Holloran 2005 was cited 12 times in the NTT Report, twice in the COT Report and 19 times in the 2010 WBP decision on GRSG. He authored or co-authored two chapters in the Monograph. Tack was cited three times in the NTT Report.

The NTT Report relied heavily on the Monograph. It uses 16 of the Monograph's chapters. Knick et al. 2011 was cited six times by the NTT Report and twice by the COT Report. Connelly was an author and editor of his own work in the Monograph, including specifically the paper by Garton et al. 2011 which he then cites and uses as the basis of the COT Report.

Hanser authored or co-authored seven chapters in the Monograph. Knick and Hanser 2011 (chapter 18 in the Monograph) was cited six times in the NTT Report, eight times in the COT Report and 38 times in the 2010 WBP decision. Knick et al. 2003 was cited once in the NTT Report and 14 times in the COT Report.

Braun was the technical editor on the Monograph and co-author of two chapters; and is the author, co-author, and editor (in some cases both author and editor) of at least 14 of the studies cited by the NTT Report. Dr. Braun was a paid consultant to the activist groups that petitioned to list GRSG and an active proponent for listing GRSG and Gunnison sage-grouse under the ESA and a self-proclaimed sage-grouse advocate. Braun is quoted in press releases and an op-ed advocating for federal listings.[60] Furthermore, Braun was the primary witness on GRSG conservation measures for Western Watersheds in litigation against BLM on the Pinedale and Craters of the Moon Land Use Plan Amendments.

Leu and Hanser 2011 was a chapter in the Monograph and was cited three times in the COT Report. Leu co-authored two chapters in the Monograph. Holloran co-authored a USGS

[60] Press Release, Biodiversity Conservation Alliance, *Sage Grouse Takes Center Stage in Oil and Gas Controversy*, (Feb. 26, 2003); Op-ed Denver Post (Nov. 14, 2014): http://www.denverpost.com/opinion/ci_26937943/overreach-sage-grouse-hardly.

Science Summary paper with Manier, Wood and Oyler-McCance of the USGS and two chapters in the Monograph. Skagen, another USGS employee, and Espinosa were listed as reviewers on the paper. Oyler-McCance has long been a listing advocate for GRSG and Gunnison-sage grouse and was a co-author of two chapters in the Monograph.

E. The Monograph Did Not Undergo Adequate nor Open Peer Review

The Monograph failed to undergo adequate peer review as required by the DQA, the Guidelines and the additional authorities discussed herein. Peer review is a process by which something proposed for research or publication is evaluated by a group of experts in the appropriate field.[61] Peer review is used to ensure work meets appropriate standards,[62] and ensure and maximize that the quality, objectivity, utility, and integrity of provided information meets the standards of the scientific and technical community.[63] Reviewers are not to be selected from among the authors' close colleagues, students, or friends. Here, the four pivotal chapters of the Monograph happen to contain the most flaws. *See* Exhibit A at 1.

The Monograph was compiled of only a limited variety of sources and without adherence to established peer-review standards. *See* Exhibit A at 2, 5.[64] As discussed above, the Monograph editors appear to have reviewed, edited and approved their own work for publication in violation of the DQA, the Guidelines and the additional authorities cited herein. *See* Exhibit A at 6.

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[61] Merriam Webster, an Encyclopedia Britannica Company, "peer review," http://www.merriam webster.com/dictionary/peer%20review (also: "a process by which scholarly work (such as a paper or a research proposal) is checked by a group of experts in the same field to make sure it meets the necessary standards before it is published or accepted").

[62] *Id.*

[63] Joshua Bolten, OMB, Memorandum for Heads of Departments and Agencies (M-05-03) http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf (Dec. 16, 2004).

[64] Elsevier, Journal of Molecular Biology: Guide for Authors, http://www.elsevier.com/journals/journal-of-molecular-biology/0022-2836/guide-for-authors

1. Peer Review Standards

DOI's Information Quality Mission Statement provides, in pertinent part:

> "In order to ensure the accuracy and integrity of its published scientific information, DOI follows a robust peer review process wherein the information undergoes internal peer review and is subject to public scrutiny. DOI, its bureaus and offices, and the National Invasive Species Council maintain the highest standards possible for published information to ensure integrity and transparency."[65]

Peer review of the Monograph was not subject to any public scrutiny whatsoever. And, as discussed above, USGS is the most secretive and least transparent of any DOI agency in direct violation of the DQA, the Guidelines and the additional authorities addressed herein.

The Monograph failed to meet the applicable peer review planning standards.[66] DOI Guidelines require not only that information be consistent with the Guidelines, but that the agency maintain an administrative record of review proceedings.[67] For influential information, DOI commits to provide "more rigorous review of the conclusions than the review performed by the originating office."[68] USGS has not issued any such records for the Monograph and has certainly provided no evidence of the rigorous review required.

Government-wide guidance to peer review of government science is established in the "*Final Information Quality Bulletin for Peer Review*" issued by the Office of Management and Budget (OMB) of the Executive Office of the President (the "OMB Peer Review Bulletin").[69] The OMB Peer Review Bulletin provides detailed guidelines for peer review of influential scientific information and applies more stringent peer review requirements to highly influential scientific assessments. It includes guidance on what information is subject to peer review, the

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[65] Chief Information Officer, DOI Information Quality Mission Statement, http://www.doi.gov/archive/ocio/iq.html (emphasis added) (last updated Oct. 21, 2010.
[66] *See* Chief Information Officer, Department of the Interior Information Quality Mission Statement: DOI Bulletin for Peer Review, http://www.doi.gov/archive/ocio/iq_1.html.
[67] DOI Guidelines II.5.
[68] *Id.*
[69] *Id.*

selection of appropriate peer reviewers, opportunities for public participation, and related issues. Such is clearly applicable to the Monograph.

According to the OMB Peer Review Bulletin, the peer review shall be solely of scientific and technical matters.[70] Peer review typically evaluates 1) the clarity of hypotheses, 2) the validity of the research design, 3) the quality of data collection procedures, the robustness of the methods employed, 4) the appropriateness of the methods for the hypotheses being tested, 5) the extent to which the conclusions follow from the analysis, and 6) the strengths and limitations of the overall product.[71]

Here, the reviewers are unable to evaluate the quality of data collection procedures when they were not privy to that data. Hypothesis testing was noticeably absent for the Monograph chapters. As a result, the rigorous review required by the DQA, the Guidelines and the OMB Peer Review Bulletin was not completed for the Monograph despite its status as clearly influential scientific information and a highly influential scientific assessment. It was the key document relied upon by FWS in its 2010 WBP decision. Again, FWS cited four influential chapters of the Monograph no fewer than 174 times. *See* Exhibit A at 7. Where USGS disseminates influential scientific information or highly influential scientific assessments, OMB Peer Review Bulletin requirements must be met.[72] Such was not the case here.

The USGS Manual defines scientific assessments as, "[E]valuation of a body of scientific or technical knowledge which typically synthesizes multiple factual inputs, data, models, assumptions, and/or implies best professional judgment to bridge uncertainties in the available

[70] NRC, Applying OMB Peer Review Guidelines, http://www.nrc.gov/public-involve/ml051600303.pdf
[71] *See Id*. at 3.
[72] USGS Manual 502.3.4.E (emphasis added).

information."[73] The Monograph clearly qualifies as a highly influential scientific assessment. USGS is to provide a peer review agenda for such information.[74]

In violation of the DQA, the OMB Peer Review Bulletin, the Guidelines and the USGS Manual, we find no reference to the Monograph nor to USGS papers relied upon as chapters within it on the USGS Peer Review Agenda.

2. USGS Did Not Meet its Review and Approval Process

Information adopted and disseminated by USGS allegedly, "passes through many quality assurance reviews, including rigorous peer review, prior to approval and release to ensure the reliability, objectivity, and integrity of the information."[75] Such was not the case with the Monograph. In reference to its peer review planning process requirements, DOI directs readers to links[76] to its agencies' websites. Notably, the USGS peer review link contains absolutely no reference to peer review on the Monograph.[77] On a related note, we question whether USGS demonstrated in a Paperwork Reduction Act submission to OMB that the proposed collection of information in the Monograph Report was collected, maintained and used consistent with the DQA Guidelines.[78]

Chapter 502.3 of the USGS Manual, **"**Fundamental Science Practices: Peer Review" was established on December 16, 2011 by the Office of Science Quality and Integrity.[79] The purpose and scope of Chapter 502.3 of the Manual provides:

> "Peer review, as a cornerstone of scientific practice, validates and ensures the quality of published USGS science. This policy updates the Fundamental Science

[73] http://www.usgs.gov/usgs-manual/500/500-25.html
[74] USGS Peer Review Agenda. Available at: http://www.usgs.gov/peer_review/ (emphasis added).
[75] USGS Guidelines III.3.
[76] It should be noted that the most recent Peer Review Report referenced by DOI in its link for "Information Quality and Peer Review Reports," was from FY2010.
[77] http://www.usgs.gov/peer_review/
[78] DOI Guidelines VI.
[79] http://www.usgs.gov/usgs-manual/500/502-3.html.

> Practices (FSP) requirements for peer review of USGS information products and applies to all USGS scientific and technical information, whether published by the USGS or an outside entity."[80]

These provisions clearly apply to the Monograph. Citing the OMB Guidelines, the OMB Peer Review Bulletin, and DOI's Guidelines as authority, the Manual adopts a means to "safeguard both excellence and objectivity of science through peer review."[81] However, the Monograph was compiled of only a limited variety of sources and without adherence to established peer-review standards. *See* Exhibit A at 5. The required safeguards were totally lacking.[82]

In addition peer reviewers are directed to follow the guidance in the USGS Peer Review Checklist for a framework to summarize their work.[83] Here, there are significant issues with peer review on the Monograph. *See* Exhibits A and B, *gen*.

3. Conflicts of Interest in the Monograph and its Peer Review

The OMB Peer Review Bulletin requires reviewers are selected based upon 1) expertise: to ensure that the selective reviewer has the knowledge, experience, and skills necessary to perform the review, 2) balance: to represent a diversity of scientific perspective relevant to the subject, 3) independence: to ensure that the reviewer was not involved in producing the draft document to be revised, 4) conflict of interest: to examine prospective reviewers' potential financial conflict including significant investments, consulting arrangements, employer affiliations, and grants/contracts.[84]

Unfortunately, the USGS Manual virtually promotes conflicts of interest in peer reviews. Authors of information disseminated by the agency are to suggest or nominate peer reviewers for

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[80] http://www.usgs.gov/usgs-manual/500/502-3.html
[81] *Id.*
[82] *See* USGS Manual 502.3.5.C.
[83] USGS Manual 502.3.5.C.
[84] http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf

their own work.[85] This inherently leads to conflicts and a lack of independence in violation of the DQA and its Guidelines, the OMB Peer Review Bulletin and NAS standards. Authors are directed to consult with their supervisors or approving officials regarding the appropriateness of peer reviewer selections.[86]

CESAR exposed these and other issues in its scathing review of the Monograph.[87] For example, CESAR found the Monograph suffers from: 1) significant mischaracterization of previous research; 2) substantial errors and omissions; 3) lack of independence in authorship and peer review; 4) methodological bias; and 5) lack of reproducibility.[88] Other issues included: authorship shared with peer reviewers listed in acknowledgements, authorship shared with Monograph editors, grant support from FWS and USGS; significant financial support for GRSG research (Drs. Holloran and Reese listed millions in federal support);[89] and authorship with other influential GRSG authors.

The OMB Peer Review Bulletin requires agencies to adopt or adapt the National Academy of Sciences policy and procedures depicted in the "*Committee Composition and Balance and Conflicts of Interest*".[90] According to this policy, it is essential that the work of committees of the institution used in the development of reports not be compromised by any significant conflict of interest. For this purpose, the term "conflict of interest" means any financial or other interest which conflicts with the service of the individual because it (1) could

[85] USGS Manual 502.3.6.F.
[86] *Id.*
[87] https://www.hightail.com/download/UW14OU1VMVh0TWxYd3NUQw.
[88] *Id.* at 42.
[89] Reese listed over $6.3 million in funding and in-kind contributions, but failed to account for precisely how much can be attributable to sage-grouse.
[90] See *Id*. at 10.

significantly impair the individual's objectivity or (2) could create an unfair competitive advantage for any person or organization.[91] Such is clearly the case here.

Again, USGS' reliance on such a select group of advocates is clearly contrary to the DQA, the Guidelines, the DOI Manual, NAS policy and secretarial orders and presidential direction discussed herein.[92]

4. Peer Review Failed to Undergo Public Review and Comment

In this case, the USGS failed to produce an administrative record for peer review as required by the DQA and the Guidelines. Further, DOI provides no evidence that it rigorously reviewed the Monograph as required. Neither did the USGS submit peer reviews on the Monograph to the public for review and comment. As referenced above, this information should have already been publicly available.

The OMB Peer Review Bulletin[93] established government-wide guidance to improve the peer review of scientific documents, providing specific requirements for "influential scientific information" and "highly influential scientific assessments." Under these definitions, the reports in question clearly necessitate higher minimum requirements with respect to public transparency. These requirements include; peer review prior to dissemination, by reviewers with expertise, balance, independence, and no conflict of interest. Also, "[t]he agency shall disclose the names of the reviewers and their organizational affiliations in the report."[94] Above and beyond these requirements, "an agency conducting a peer review of a highly influential scientific assessment

[91] The National Academies, Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports, http://www.nationalacademies.org/coi/bi-coi_form-0.pdf.
[92] Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports (http://nationalacademies.org/coi/); Final Information Quality Bulletin for Peer Review 70 Fed. Reg. 2664 (Jan. 14, 2005); Memorandum for the Heads of Executive Departments and Agencies (http://www.whitehouse.gov/sites/default/files/microsites/ostp/scientific-integrity-memo-12172010.pdf); Department Manual ("DM"), Part 305, Chapter 3: http://www.fws.gov/science/pdf/DOIScientificIntegrityPolicyManual.pdf.
[93] 70 Fed. Reg. 2664 (Jan. 14, 2005).
[94] *Id.* (emphasis added).

must ensure that the peer review process is transparent by making available to the public the written charge to the peer reviewers, the peer reviewers' names, the peer reviewers' report(s), and the agency's response to the peer reviewers' report(s)."[95] Again, USGS flagrantly violates this direction in its Guidelines and policies. By contrast, if a FWS peer review process is challenged under the DQA, the peer reviewer's name(s), the peer reviewer's report(s), and the agency's response to the peer reviewer's report(s) must be made public.[96] It should be noted the USGS did not post the Monograph (November of 2009) until months after it was presented to high-level staff at the U.S. Department of the Interior (July of 2009).

5. Persuasive Showing Overcomes the Presumption of Objectivity

As the "sole science agency for the Department of the Interior," USGS commits to maintaining the integrity of information and science employed to make sweeping decisions, as "the USGS employs the best and the brightest experts who bring a range of earth and life science disciplines to bear on problems."[97]

The OMB guidelines state that information will generally be presumed to be objective if data and analytic results have been subjected to formal, independent peer review; however, this presumption is rebuttable "based on a persuasive showing by a petitioner in a particular instance."[98] The issue is what will be considered a "persuasive showing" that will overcome the presumption of objectivity under the proposed agency guidelines. When technical information is subject to "formal, independent, external peer review, the information may generally be presumed to be of acceptable objectivity."[99]

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[95] *Id.*
[96] *Id.* at 15.
[97] USGS, About USGS, http://www.usgs.gov/aboutusgs/ (last visited Jan. 6, 2015 at 3:05 PM).
[98] 67 Fed. Reg. 8452, 8454 (Feb. 22, 2002).
[99] http://www.whitehouse.gov/omb/fedreg_reproducible (effective Jan. 3, 2002).

An example of such a review is the process used by scientific journals.[100] However, even journal peer review does not necessarily equate to quality. As OMB has recognized, there are well-documented examples of flawed science published in respected journals.[101] Moreover, Fang et al. 2012, a paper published in the Proceedings of the National Academies, points to a growing problem with a growing number or retractions of published scientific papers because of error, fraud, plagiarism, and other forms of misconduct. Their work recognizes that, even after errors or misconduct have been identified, many papers continue to be cited and actual retraction can take years. Accordingly, the presumption of objectivity and adequate peer review is rebuttable.[102] In this case, information submitted by the Petitioners, including, but no limited to the significant conflicts of interest and failure to adhere to DQA standards overcome such a presumption.

For influential information, DOI committed to a high degree of transparency about data and methods to facilitate reproducibility.[103] USGS has not met the applicable standards for peer review. Serious conflicts issues abound with regard to the reviewers of the Monograph.

6. The Monograph Failed to Address Reviewer Criticisms

The USGS did not document how it addressed several comments and issues raised by peer reviewers in the Monograph. *See* Exhibit A at 8, and 13.[104] The Monograph certainly failed to address or incorporate significant issues raised by reviewers from the State of Colorado. *See* Exhibit A at 8.

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[100] *Id.*
[101] *Id.*
[102] *Id.*
[103] DOI Guidelines VII.3.b.ii.
[104] (" In addition to our own independent scientific review, CESAR also considered reviews conducted by scientists commissioned by the State of Colorado whose comments were ignored by the publishers and editors of the monograph. These scientists identified most of the same flaws in the work identified by our staff.")

Scientists and scholars are required to "place quality and objectivity or scientific and scholarly activities and reports ahead of results or personal gain or allegiance to individuals or organizations."[105] Scientists and scholars are further required to "welcome constructive criticism of [their] scientific and scholarly activities and … be responsive to their peer review" and "provide constructive, objective, and professionally valid peer review of the work of others, free from any personal or professional jealously, competition, non-scientific disagreement, or conflict of interest."[106] In this case, significant issues raised during the peer review process were either ignored or not adequately addressed in the final Monograph. *See* Exhibit A at 8, and 13.

For example, One reviewer noted that it was questionable how scientific sources were used to establish risks and that there were limited (if any) direct relationships between habitat characteristics and population change.[107] Similarly, citations to Connelly *et al.* 2011a for the proposition that large seasonal and annual movements emphasize the need for large landscapes to support viable populations are suspect.[108] Connelly et al. 2011 is fraught with errors of omission and inaccuracies. *See* Exhibit B at 135-137. Connelly et al. 2011 is often cited for the proposition that programs for conservation on private lands would need to be implemented in combination with programs affecting effective rehabilitation and restoration on public lands.[109]

Garton et al. is another example of deeply flawed work that was hotly criticized by reviewers including peer reviews for the *Studies in Avian Biology* journal and independent peer reviews provided after initial acceptance but before the galley proof stage (both provided by the State of Colorado). The failure to fully address and/or incorporate <u>all</u> reviewer comments fails the standards of the DQA, the Guidelines and the OMB Peer Review Bulletin. In addition, it

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[105] DOI Guidelines VII.3.7(B)(1).
[106] *Id*. at 3.7(B)(5) – (6).
[107] *Id*. at 7.
[108] *See, e.g.* COT Report at 8-9.
[109] DEIS at 945.

raises serious questions about compliance with the presidential direction, DOI orders on scientific integrity and the USGS' Guidelines and policies. *See* Exhibit B at 59-86, 90, 94, 98, 136, and 139.

F. The Monograph Was Not Based on the Best Available Science

The Monograph failed to meet DQA standards for the best available data. Agencies are directed[110] to adopt congressional standards of scientific integrity stemming from the Safe Drinking Water Act ("SDWA"),[111] for agency action based on science, the SDWA standards must entail:

> (i) the best available, peer-reviewed science and supporting studies conducted in accordance with sound and objective scientific practices; and (ii) data collected by accepted methods or best available methods (if the reliability of the method and the nature of the decision justifies use of the data).[112]

The Monograph and the studies cited therein fail to meet the best available science standards. *See* Exhibits A, B and C, *gen*. Significant uncertainties are ignored and conjecture and opinion are presented as facts, ie the presence and intensity of threats, and their impacts to GRSG. *Id.*

Executive Order 13562 also requires that regulations "must be based on the best available Science" and that costs of regulation are clearly justified by the benefits[113] In this case, USGS cannot possibly justify the alleged benefits of measures recommended in the Monograph (such as increased federal controls over public and private lands (as discussed below and in the attached) against the dramatic societal costs they would entail. USGS is directed to select approaches that

[110] OMB Guidelines V3.b.ii.B.ii.C.
[111] 42 U.S.C. § 300g-1(b)(3)(A).
[112] Available at: http://www.whitehouse.gov/omb/fedreg_reproducible
[113] Federal Register, Vol. 76, No. 14 (January 21, 2011) at 3821. Executive Order 13563: *Improving Regulation and Regulatory Review*, http://www.gpo.gov/fdsys/pkg/FR-2011-01-21/pdf/2011-1385.pdf.

impose the least burden on society and to identify alternatives to direct regulation. Here, USGS did not even attempt to do so.

Unfortunately, the Monograph does not qualify as a series of unbiased analyses and comprehensive review of all of the available scientific literature about conservation of the species. Instead, it provides a limited and selective review of the scientific literature and subjective post-hoc interpretations of analytical results. Hypothesis testing was not used in any of the studies. *See* Exhibits A and B, *gen*. As a result, outdated information and beliefs are perpetuated in the Monograph, and all resulting agency reliance thereon by BLM, USFS and FWS are in violation of the DQA, the Guidelines and this presidential direction to the agencies. *See* Exhibit A at 12.

Opinion and post hoc rationale guided authors of the Monograph, including Knick and Connelly 2009, 2011. *See* Exhibit A at 10-11:

> "evidences a belief that natural phenomena are governed by a predetermined purpose as opposed to blind natural laws. For such views to be expressed as a 'unifying concept' by the editors and authors of an influential scientific monograph is 'highly unusual.'"

Put Simply, these are pseudoscientific, teleological beliefs that have no place in a USGS sponsored and authored "scientific" product.

The introduction section of the Monograph opines that other factors associated with habitat loss and fragmentation are summarized by Knick *et al.* (2011) and include conversion of sagebrush for agriculture, the expanding human population in the West and urban development in sagebrush habitats, vegetation treatments to enhance grazing for livestock, and impacts from

wild ungulates and free-roaming equids (horses and burros).[114] As noted in Exhibits A and B herein, this study significantly misrepresents works cited therein.

The Monograph habitually mischaracterizes previously conducted research, contains substantial errors and omissions, lacks independence in authorship and peer review, contains methodological bias, and categorically lacks reproducibility. *See* Exhibit A at 42. It is rife with misrepresentation, selective citation of information, misuse of citations and reliance on opinion rather than the scientific method. *See* Exhibits A and B, *gen*.

There are substantial technical and mathematical errors in the Monograph as well as many misleading citations. One of the most egregious examples of this failure was reliance on Garton et al. 2011. This paper contains mathematical errors and built-in methodological bias. *See* Exhibit C: Peer Review and Information Quality Breakdown. Neither the underlying data or computer code were ever made public. And the USGS never documented its responses to independent peer review comments commissioned by the State of Colorado. *Id.*

To the extent the agency believes it cannot disclose certain information in the Monograph, robustness checks are required for ensuring compliance with the DQA because the public will not be afforded any other mechanism for determining objectivity, utility and reproducibility. In fact, the "agencies shall apply <u>especially rigorous robustness checks</u> to analytic results and document what checks were undertaken."[115] DOI Guidelines mirror this requirement, but the Monograph did not undergo rigorous checks.

Unfortunately, the Monograph and many of the studies upon which it relies have significantly flawed assumptions, questionable analytic models and questionable statistical

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[114] Monograph Introduction at 15: Knick et al., *Greater Sage Grouse and Sagebrush: an Introduction to the Landscape*, http://web.archive.org/web/20100527171636/http://sagemap.wr.usgs.gov/Docs/SAB/Chapter01.pdf; *see also* Chapter 15, http://web.archive.org/web/20100527165725/http://sagemap.wr.usgs.gov/Docs/SAB/Chapter15.pdf

[115] OMB Guidelines V3.b.ii.B.ii (emphasis added).

procedures. *See* Exhibits A and B, *gen*. As a result, the robustness checks required by the DQA and the Guidelines are missing or inadequate.

While scientific integrity and transparency in agency decision making are clearly enumerated priorities for this administration, the Monograph falls far short of these goals. *See* Exhibit A at 13. For example, the Monograph did not employ the scientific method. Hypothesis testing was not utilized by any of the authors of the 25-chapter Monograph. "Instead, the authors rely on *post hoc* interpretation of results or purely descriptive approaches." *Id*. A search for the terms 'hypothesis' and 'hypotheses' indicates they appear only six times in the 25 chapters; and then only to describe the work by other researchers in citations. *Id*. Accordingly, it runs counter to the DOI Manual on Scientific Integrity, the presidential orders discussed above, as well as the DQA and its Guidelines.

The DOI Manual defines the scientific method as, "[A] method of research in which a problem is identified, relevant data are gathered, a hypothesis is formulated from these data, and the hypothesis is empirically tested in a manner specified by documented protocols and procedures."[116] As discussed above, and in the attached exhibits, the Monograph falls short of these requirements. In addition, the Monograph is speculative in terms of effectiveness, based on subjective interpretation of results, does not address the primary cause and effect mechanisms limiting GRSG, and will likely do nothing for the GRSG by promoting passive rather than active management.

For all of the reasons addressed herein, the Monograph fails the transparency and reproducibility standards of the DQA, the Guidelines, and the presidential direction to agencies on scientific integrity and transparency.

[116] DOI Manual, 305 DM 3.5(N).

G. The Monograph is Biased and Lacks Objectivity

As discussed in detail in Paragraph IV below, the Monograph suffers from: significant mischaracterization of previous research; substantial errors and omissions; lack of independence in authorship and peer review; methodological bias; and a lack of reproducibility. The Monograph has been characterized as an advocacy document for sagebrush preservation. *See* Exhibit A at 12. Editor Dr. John Connelly's bias is apparent. Connelly signed the *Letter from Biologists to the United States Senate Concerning Science in the Endangered Species Act* ("the Letter") exclusively to bolster the ESA.[117] As discussed below, Connelly, Garton, Braun and Reese (all Monograph authors) also recently lobbied the White House directly for greater restrictions on public land use in the name of GRSG conservation.

For all the reasons addressed herein, the Monograph is not presented in an accurate, clear, complete and unbiased manner pursuant to the DQA and applicable Guidelines.[118]

IV. Specific Issues with Chapters in the Monograph

Generally, the Monograph suffers from: significant mischaracterization of previous research; substantial errors and omissions; lack of independence in authorship and peer review; • methodological bias; and a lack of reproducibility. *See* Exhibit A at 42. Petitioners have not addressed each and every chapter of the Monograph. Rather, Petitioners reference specific issues with specific chapters below:

A. Monograph Chapter 1, *Greater Sage-Grouse and sagebrush: an introduction to the landscape,* (Steven T. Knick and John W. Connelly)

The Monograph's introductory chapter, *Greater sage-grouse and sagebrush: an introduction to the landscape* (Knick and Connelly 2009, 2011) summarizes previous research

[117] *A Letter from Biologists to the United States Senate Concerning Science in the Endangered Species Act* at 9 (March 2006).
[118] *See* OMB Guidelines V(3)(a).

and sets the context for subsequent chapters. *See* Exhibit A at 9. In many cases, Monograph editors Steve Knick and John Connelly appear to have reviewed, edited and approved their own work for publication. *See* Exhibit A at 6. For example, Knick (USGS) authored or co-authored nine chapters of the Monograph's 25 chapters. Connelly (Idaho Game and Fish) authored or co-authored seven chapters of the Monograph.

This chapter has been characterized as, "advocacy document expressing the authors' preference for sagebrush ecosystem protection." *See* Exhibit A at 12. The authors, Knick and Connelly, place significant importance on their own work. Over one-third of the citations in this chapter are papers or reports by Knick or Connelly. *See* Exhibit A at 9.

There were also real issues with peer review of this chapter. The listed reviewers (Naugle, Rotenberry, and Dobkin) were co-authors on other papers in the Monograph (Naugle authored three chapters, including one he co-authored with Knick and Connelly), or co-authors of previous papers with Knick and Connelly. *See* Exhibit A at 9. This peer-review fails to meet DQA, DOI and OMB peer review standards as discussed above.

Aside from the concerns inherently raised by the chapter's authorship and lack of independent peer review, Knick and Connelly repeatedly paint an incomplete view instead of a scientifically and factually accurate presentation. For example, Knick and Connelly present a seemingly extensive list of potential threats to sage grouse, including: 1) the conversion of sage brush to croplands resulting in the reduction, elimination or fragmentation of sagebrush; 2) development of oil and gas resources; 3) exploration and development of wind and geothermal energy; 4) livestock grazing; 5) urbanization and increasing human densities "as people choose to live near wilderness and recreation areas"; 6) new corridors proposed for energy transmission; 7) road installation; 8) increasing outdoor recreation including off highway vehicles and hiking;

and 9) the "human footprint". *See* Exhibit A at 9-11. But these alleged threats are speculative because the effect size and importance of each of these factors is not quantified. *See* Exhibit B at 8-9. Discussion of potential cause and effect mechanisms is also lacking.

Moreover, this chapter does not address how harvest and predation impact GRSG. This is significant given the high harvest rates cited in Chapter 6 of the Monograph and literature on the significant affects of predation on GRSG as discussed extensively below. *Id*.

Knick and Connelly also recommended an enormous "Sage Grouse Conservation Area" far beyond where the species are currently or were historically found with a 50km buffer around leks and restrictions within the bird's alleged "historic range" prior to European settlement. *See* Exhibit A at 10.

However, the authors provide no data nor evidence to support their recommendations. Specifically, the authors wrongly allege a loss of half of historic sagebrush habitat with zero supporting data on what constitutes the historic habitat and invalid assumptions that simply inflate their estimates. *See* Exhibit A at 18. The pre-European distributions of GRSG are much more uncertain than Knick suggests. (e.g. Connelly et al. 2004; Schroeder et al. 2004). *See* Exhibit A at 12. This uncertainty stems from: an incomplete historical record; imprecise estimates of sagebrush extent which are impossible to know without actual data; and the historic absence of GRSG from northern Montana, as noted in the absence of sage grouse from the Lewis and Clark expedition record and later records.[119]

The authors also appear biased against multiple uses of public lands and seem to advocate for stricter regulation, even on private land. For example, Knick bemoans, "wildlife conservation is not the exclusive or dominant objective on any major federal lands... Consequently, conservation objectives often compete with commodity production and non-

[119] *Id.*

consumptive uses." Connelly's bias in favor of species' listings under the ESA may also be an issue. For example, Connelly signed the *Letter from Biologists to the United States Senate Concerning Science in the Endangered Species Act* ("the Letter") exclusively to bolster the ESA.[120] Authored by biologists acting as ESA advocates, the Letter aimed to convince the U.S. Senate that the ESA is both effective and important, notwithstanding its abysmal record, less than 2%, in actually recovering species.[121]

There are similar issues with this chapter in regard to claims about the effects of habitat fragmentation, alleged loss of habitat connectivity, conversion to agriculture, urbanization, infrastructure, invasives, and pinyon-juniper encroachment. *See* Exhibit A at 19-20.

The authors' proposed 50km buffer increases the area of their proposed "Sage Grouse Management Area" by over 450,000km2 without supporting evidence. The authors then translate opinion "into an unsupported policy rationale for federal regulation across eleven states…." As a result, "[S]peculative models are substituted for lack of historic data on sagebrush extent and sage grouse distribution, and are the basis of postulated historic habitat in the monograph." *See* Exhibit A at 10-12.

B. Monograph Chapter 3: *The Legal Status of Greater Sage Grouse: Organizational Structure of Planning Efforts,* (Stan J. Stiver)

In this case, the author exhibits bias in his praise for litigious environmental groups while ignoring the significant contributions of industries and ranchers to conservation efforts. *See* Exhibit B at 14-15. The author also seems to praise the ESA listing petitions filed on GRSG casting further doubt on his objectivity and independence. Stiver also cites Chapter 6 of the

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[120] *A Letter from Biologists to the United States Senate Concerning Science in the Endangered Species Act* at 9 (March 2006).

[121] Doc. Hastings, 112th Congress, Oversight Hearing on the Endangered Species Act: How Litigation is Costing Jobs and Impeding True Recovery Efforts," (Dec. 6, 2011), available at: http://naturalresources.house.gov/calendar/eventsingle.aspx?EventID=270315

Monograph for the erroneous proposition that predation and harvest are significant to individuals or local groups but not significant to populations. Predation and harvest are discussed extensively below. This bias is not befitting of a supposedly scientific document.

C. Monograph Chapter 4: *Characteristics of Greater Sage-Grouse Habitats: A Landscape Species at Micro- and Macro Scales,* (John W. Connelly et al.)

This paper does not address important issues that would influence the study's conclusions. First, the paper does not address one of the most ubiquitous hazards to GRSG survival: wire fencing. This is a hazard to GRSG because they fly low and fast. Exhibit B at 18. Fences also pose a predation risk from perching raptors.[122] FWS devoted an extensive discussion to this hazard in its 2008 Interim Status Update[123] and Environmental Defense has issued a white paper on the subject.[124] *See* Exhibit B at 17-19.

Other obvious yet unmentioned hazards include hunting harvest, which occurs across most of sage grouse habitat; and predation, which only received one mention in the context of nest predation. In contrast, and in evidence of bias, the effects of energy development are mentioned three times. The paper also fails to provide other references that suggest that GRSG have a broader habitat tolerance than just sagebrush.

D. Monograph Chapter 6: *Harvest Management for Greater Sage-Grouse: A Changing Paradigm for Game Bird Management,* (Reese and Connelly)

This chapter provides a summary of the history of GRSG hunting and harvest rates from the states that allow hunting (only Washington State and Canada do not allow GRSG hunting). *See* Exhibit B at 22-24. If the species is in decline, why are we allowing harvest at all? If there is a desire to maintain harvest for cultural reasons, then why not limit harvest to male sage grouse only, or to populations that are stable? Hunting is a major source of female sage grouse

[122] *Id*. at ¶4.1.
[123] USFWS 2008.
[124] Environmental Defense 2009.

mortality. This would suggest a need for limiting the hunting of female sage grouse in order to avert population level declines.

While the authors aver there are no studies that indicate population-level impacts from sage grouse hunting, they acknowledge that reliable population data are not available. "Given the uncertainty in abundance estimates for breeding season populations, expecting any state to adequately determine size of any population of Greater Sage-Grouse in fall is not realistic."

E. Monograph Chapter 8: *Predation on Greater Sage Grouse: Facts, Process, and Effects,* (Hagen)

This chapter was cited 15 times in the WBP decision, once in the NTT Report and once in the COT Report. It summarizes literature and unpublished research about predation. The paper criticized most studies that reported predator management's positive effects and concluded that predator management effectiveness was short term. Not only does Hagen (2009, 2011) appear biased in his presentation of research, but this paper also represents an outdated view of predation on GRSG (and solutions to it). The outdated, but oft-repeated, narrative that predation can only be controlled indirectly through landscape-level management is truly mistaken as discussed at length below. *See* Exhibit B at 29-30.

F. Monograph Chapter 9: *Parasites and Infectious Diseases of the. Greater Sage-Grouse,* (Christiansen and Tate)

This chapter is a summary of literature and unpublished information on parasites and infectious disease in Sage Grouse. It paints a simplistic picture of west Nile virus ("WNV") epidemiology and fails to discuss implications of recent literature. The paper improperly characterizes GRSG susceptibility to WNV as "extreme." Exhibit B at 32-33. Yet the authors do not acknowledge that laboratory-confirmed disease incidence data from the Centers for Disease Control show a decrease in WNV infections, across species, since 2004.

G. The Monograph Chapter 10: *West Nile Virus ecology in sagebrush habitat and impacts on greater sage-grouse populations,* (Walker and Naugle)

This Monograph chapter was cited 48 times in the 2010 listing decision. This chapter fails to acknowledge the situation has changed with WNV both as a result of reduction in occurrence and in terms of the mitigation measures implemented. It presents a biased and outdated view which assumed many die offs were the result of WNV without any testing data at all. Verifiable data from the Center for Disease Control ("CDC") has shown that this threat is not uniform across the range and the threat has largely subsided since a peak in 2004. *See* Exhibit B at 35 and 37-41.

The papers also suggest, "[I]ncreasing temperatures associated with changing climate may exacerbate WNV risk/or sage-grouse" with no support nor evidence as to predicted rates of alleged temperature increases. As CESAR summarized, "Walker and Naugle's paper is based on outdated information and, in light of recent changes, overstates the influence of oil and natural gas development in providing mosquito breeding habitat…." This chapter is rife with personal opinion and lacking in data and analysis. *See* Exhibit A at 34-35.

The entire data set used to allegedly determine WNV occurrence is not publicly available. The authors exhibit bias against productive use of public lands such as oil and natural gas and agriculture by exaggerating alleged impacts while ignoring threats to the species such as hunter harvest and predation. In regards to climate change, the authors also exhibit bias in their failure to acknowledge that populations naturally fluctuate as a result of weather patterns and other factors as discussed below. This chapter twice addressed repeated attempts to list GRSG under the ESA without acknowledging these were made by advocacy organizations rather than scientific organizations. *See* Exhibit A at 35-37.

This paper dedicates only ten lines of text to results, and those results are not mentioned in the discussion and recommendations. Paradigms are outdated and do not make use of recent epidemiological research on WNV and mosquito control measures. *See* Exhibit B at 37. The risk of artificial reservoirs such as CBM ponds for WNV were overstated, particularly in light of current regulations for mosquito control at ponds associated with energy development.

While the authors are correct about the need to monitor GRSG populations for WNV mortality, there is a need for more clear-cut criteria for what constitutes WNV mortality in order to prevent misreporting false-positives. The authors are cautious in their view of mosquito control measures, but one author (Walker) previously expressed far more optimistic views in testimony before the Colorado Oil and Gas Conservation Commission.[125]

H. Monograph Chapter 13: *Ecological influence and pathways and land use in sagebrush* (Knick, Hanser, Miller, Pyke, Wisdom, Finn, Rinkes and Henny)

This chapter was cited 58 times in the 2010 listing decision. It discusses and analyzes the effects of nearly every conceivable human activity on GRSG including hypothetical ones which the authors assume have a negative effect. Rather than accurately representing studies cited, the authors substitute their own values to delineate huge hypothetical "effect areas" for each type of human activity. For example, they use a 3km buffer around oil and gas operations when none of the studies cited stand for such a proposition. Exhibit A at 39. Further, the authors fail to include data to support their assertions. Depictions of pre-European sage grouse distribution include large areas of non-habitat and exclude historic sage grouse occupancy that was clearly outside of sagebrush habitat. Citing Schroeder et al. (2004), Knick et al. surrounds this enormous and artificial range with a 50km "buffer" thereby greatly *overestimating* the area

[125] (Walker "testified in his official capacity as Avian Research at the Colorado Division of Wildlife, before the Oil and Gas Commission of the State of Colorado on DOCKET NO. 0803-RM-02. In that testimony, Walker spoke favorably about how the proposed rule would control mosquitoes that vector West Nile virus at water sources associated with energy development.".

in which sage grouse have been allegedly negatively affected by human development. *See* Exhibit A at 38-40.

While the authors purportedly allowed public access to their underlying data on the USGS Sagemap site, the CESAR authors were unable to find it there. Accordingly, its results are not repeatable and verifiable. *See* Exhibit A at 40.

The authors are often cited for the mistaken proposition that connectivity is a limiting factor for GRSG. However, they erroneously treat leks which have moved due to disturbance as if they were extirpated. Additionally, the authors re-sampled their data rendering replication untenable. However, the authors failed to acknowledge that this rescaling data (from a 30m resolution originally to a 540m resolution) could be expected to inflate the effects of disturbance. For these reasons, and other substantive issues, it falls far short of the best scientific and commercial data available.

I. Monograph Chapter 14: *Influences of the Human Footprint on Sagebrush Landscape Patterns: Implications for Sage Grouse Conservation,* (Leu and Hanser) [126]

This Monograph chapter is cited three times in the COT Report for the proposition that fragmentation is the primary cause of population declines and that GRSG avoid anthropogenic disturbances as opposed to natural disturbances. This chapter utilizes a complex spatial analysis to predict impact of the "human footprint" on sagebrush habitat.

The data used in the paper relies upon model inputs, however, the authors do not address any error associated with these borrowed inputs or use statistical methods that address the error variance. In fact, the terms "error," "'uncertainty,"' and "confidence interval" are absent from the paper. The authors' results are deemed supportive of those obtained by other authors in the

[126] Leu, M. and S.E. Hanser Influences of the human footprint on the sagebrush landscape patterns: implications for sage-grouse conservation. Pp. 253-272 *in* S.T. Knick and J.W. Connelly (eds). Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38). University of California Press, Berkeley, CA.

Monograph, however no criteria were provided that would potentially falsify previous conclusions.

The size of the affected areas in the paper was derived from one or a few studies, and improperly applied cross the entire range of the sage grouse. This is a questionable one-size-fits-all approach to quantifying potential disturbance. *See* Exhibit B at 54. Moreover, the measurement techniques concerning the spatial attributes of land intervals were created with fractals, not Euclidean geometry.[127] Other authors such as Halley et al. 2004 have raised issues as to whether these models accurately represent real-world situations, and the conditions under which its use may be questionable.

The authors also erroneously believe raven control to be ineffective and suggest that all future transmission lines follow existing high impact corridors, an expensive proposition to be based on surmise. Their corvid (e.g. raven, crow, and magpie) and domestic cat and dog predator risk models (regressions of probability of occurrence vs. distance from human habitations) were based on extremely limited data (4, 2, and 3 data points respectively) and with no tests of significance or confidence intervals.

J. Monograph Chapter 16: *Greater Sage-Grouse population dynamics and probability of persistence*, (Garton, Connelly, Hagen, Horne, Moser, and Schroeder)

This Monograph chapter was cited 68 times in the 2010 listing decision and 61 times in the COT Report. Although Garton et al. is the most influential chapter of the Monograph, it is also the most fundamentally flawed, as it contain two egregious mathematical errors that grossly overestimate the risk of extinction, built-in methodological bias, unaccounted for analytical error,

[127] Euclidean geometry is "plane geometry" based on certain intuitive axioms. See generally Harold E. Wolfe, Introduction to Non-Euclidean Geometry. 9 Mill Press (2007). Euclidean geometry is usually used for land surveys. In contrast, non-Euclidean geometry is a small set of axioms that negate the assumed parallel postulate of Euclidean geometry. *See* Michelle Eder, Views of Euclid's Parallel Postulate in Ancient Greece and in Medieval Islam, Rutgers University (2000). In other words, Euclidean geometry works on a flat plane and non-Euclidean geometry operates on a curved plane. This fosters different results with the different measurement systems.

and errors of omission. *See* Exhibit B, *gen*; *see also* Exhibit C, *gen*. USGS must retract this chapter for its significant violations of the DQA and the additional authorities cited herein. The significance of several of these papers has changed as the importance of issues has shifted as a result of new research, regulations, and politics.

While many of these issues were pointed out by peer reviewers before final publication, the editors of the Monograph, Garton et al., and USGS chose to ignore them. CESAR, and others, have detailed other significant issues with this work:

> "Garton et al. (2009, 2011) and the FWS (2010) downplayed or ignored known issues with the data provided in this paper, errors in formulas used, errors of omission, and bias with their analytical method. These errors were exposed when the Colorado Division of Wildlife, commissioned independent scientists to review its contents. These comments, which were formally submitted to the FWS, were uniformly ignored."

See Exhibit A at 13. This chapter was the quantitative basis used to assess the rate of population decline and extinction risk, and it formed the basis of population predictions and priorities in the highly influential COT Report. Since its publication, Dr. Robert Zink empirically tested the isolation of sage grouse populations and several of Garton's predictions. Significantly, Zink 2014 found no genetic evidence of population declines in GRSG.[128]

Zink "compare[d] genetic variability measures with quantitative estimates of population trends to determine whether the effects of population declines can be observed at two geographic scales in the microsatellite and mitochondrial DNA data…" Populations in decline should show reduced genetic diversity. And reduced genetic variability can also pose a risk to population persistence. But for GRSG, "the expected population genetic signatures of differences in population size were not observed."[129] Dr. Zink concluded, "[T]here is no clear evidence that the population genetic variability of the greater sage-grouse has been influenced by range reduction

[128] Zink 2014.
[129] *Id.*

and fragmentation" and that "there is no evidence of heightened inbreeding in smaller populations."[130]

In addition, Ramey et al. 2013 detected several errors in the calculations of Garton et al. 2011 that dramatically skew probabilities to estimated declines over time. *See* Exhibit C, *gen*.[131] Because Ramey et al. 2013 and Zink 2014 constitute the best available science on these topics, USGS should retract or correct the Monograph accordingly.[132]

There are also many limitations to the use of lek count data which Garton et al. failed to acknowledge. For example, lek count data does not account for the fact that males move between leks. Only males are counted at leks so the proportion of males to the total population is unknown. And the thirteen different states and provinces that collect data may use different methods and unequal levels of effort. Even within a state, counts may vary from year-to-year depending upon conditions. For example, roads may be impassable and leks much more difficult to reach in heavy snow years resulting in fewer counts than in average or dry years.

This sampling bias was pointed out by Colorado reviewers, but ignored by the authors. In sum, determining range-wide populations of sage grouse using lek counts is untenable. As one Colorado reviewer noted, "…fluctuations in the population of males may or may not be indicative of fluctuations in the population as a whole. Further, it is not clear to what extent lek counts even fully represent the population of males." Another comment was more direct, "[T]he

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[130] *Id.*

[131] Ramey, Wehausen and Brown 2013(open source peer-reviewed manuscript) *Peer Review and Information Quality Breakdown in an Endangered Species Act Decision: the Case of the Greater Sage Grouse*.

[132] It should be noted that the FWS and USGS convened a closed-door workshop on October 22-23, 2014 in Ft. Collins, Colorado entitled "Expert Elicitation Workshop on the Genetics of Greater-Sage Grouse" (the "Workshop'). The aim of the Workshop was auspiciously to work on "specific technical questions." The way in which the agencies convened this Workshop also drew sharp rebukes and calls for transparency from eighteen (18) Members of Congress in an October 16, 2014 letter to Interior Secretary Sally Jewell. Petitioners believe the way the Workshop was convened and conducted likely violates FACA, the DQA and its Guidelines as well as presidential memoranda and DOI orders on scientific integrity and transparency. We caution USGS not to adopt or incorporate any alleged findings from this closed-door Workshop.

data set from which this analysis and all other population analyses of sage-grouse are built appears to be deeply flawed, because the sampling scheme is not representative." *See* Exhibit A at 25.

Connelly et al. (2004), Western Association of Fish and Wildlife Agencies (WAFWA 2008), and Garton et al. (2009, 2011) each tried to conduct a range-wide analyses of male lek count data. But each used different methods, including undocumented and subjective methods, for defining what constituted a "lek" and for including and excluding lek counts. While each study used the same raw data provided by the states, the number of leks selected for analysis differed nearly three-fold (3,419 - 9,789 respectively) between WAFWA 2008 and Garton et al. (2009, 2011).

Moreover, even if the raw lek-count data in this chapter was publicly available, which it is not, subjective criteria were used to select the final data sets used rendering the analysis incapable of repetition. While Connelly et al. (2004) and WAFWA (2008) were unwilling to overstate the significance of their results to infer GRSG population numbers or trends, the Monograph authors did quite the opposite. One Colorado reviewer acknowledged limitations in Colorado lek count data and that none of the authors bothered to contact the state for "clarification or corrections." As a result, "…we can only assume that the data quality control for the manuscript is suspect or assumptions were made that are erroneous." *See* Exhibit A at 21.

The authors also started with a very low population estimate for GRSG,[133] "then use[d] their analyses to make predictions of past and future population trends in sage grouse, and their probabilities of extinction, thirty and one hundred years into the future (from 2007)" with disingenuous precision. Their conclusions improperly estimated: 1) current population sizes; 2) past population sizes or "reconstructed population estimates" (backwards from 2007 to 1965); 3)

[133] 42% lower than recognized by the states and provinces in 2007.

population growth models to the reconstructed population estimates; and 4) future population estimates and trends along with alleged probabilities of population persistence in the years 2037 and 2107. The authors emphasized the precision of their results and downplayed the limitations. Then, the authors overstated the significance of the results. The analysis fails to address the inherent bias which occurs as a result of the data and analysis used. There are questions regarding the mathematical choices the authors make and the unacknowledged propagation of error in their models, that put their extinction predictions on par with guesswork.

In addition, the authors based their faulty persistence prediction on 50/500 "rule of thumb" which has been repeatedly disproved and repudiated. For example, the 50/500 rule of thumb and the absence of empirical data to support it has been criticized by Boyce 1997 and Frankham 2005. There is no basis for its use in reliably predicting the sage grouse population persistence 30 or 100 years into the future.

As one reviewer noted, the population persistence assumptions are particularly egregious, "It is an ambitious, but flawed analysis. Model assumptions are not always made clear and when they are they open doubt about the results and the authors." *See* Exhibit A at 32. Another stated, "[T]he selection of effective population sizes are inconsistent and arbitrary…."[134] One summarized, "[T]his is not a valid estimate of the variance of the probability of extinction. It fails to include the parameter uncertainty in the population models." *See* Exhibit A at 34.

One reviewer understandably expressed "serious misgivings" with the authors' reconstructed index approach. Another said, "[T]his is a strange assertion. It is not clear how a nonrandom sample would be likely to provide an unbiased estimate of population trend. "They [the reconstructed population estimates] are only 'remarkably precise' if one ignores the

[134] *Id.*

propagation of error in the index construction," said one reviewer. Confidence intervals, then, were severely lacking in this chapter. *See* Exhibit A at 29-30.

Another reviewer remarked, "[T]he authors note the complications and inaccuracy of lek counts, but then proceed to use the data ignoring the inherent biases and uncertainties" and that significant mathematical errors render the trend analysis "wrong" and the results irreproducible. *See* Exhibit A at 20.

Among this Chapter's main conclusions are that GRSG do not fit within typical upland game bird demographics. GRSG are relatively unique because populations tend to have low winter mortality, high annual survival, and are migratory. However, the authors do not adequately consider that the intensity of hunting likely contributes to population declines. Moreover, the claim within the paper that GRSG require "vast landscapes" is overstated. While GRSG occupy a large range with "semi-isolated populations interconnected by occasional migration among populations," the seasonal migration distances, often over 20km and home ranges over 600kmn are not remarkable compared to other species.

K. Monograph Chapter 17: *Influences of environmental and anthropogenic features on Greater Sage-Grouse populations, 1997-2007,* (Johnson, Holloran, Connelly, Hanser, Amundson and Knick)

This chapter was cited three times in the NTT Report for the erroneous proposition that lek count trends have been found to be lower near highways and roads. However, the authors do not have enough years of data to support inferences with single or multiple variables. The authors examined different variables using 11 years of lek count data for the response variable in seven different management zones to determine whether specific activities correlated with population level declines in GRSG. Many of the lek counts only had four years of data associated with them resulting in no significant correlations between predictor and response

variables. This lack of data demonstrates Johnson et al. 2011 is not an example of the best scientific data available.

L. Monograph Chapter 18: *Connecting pattern and process in Greater Sage-Grouse populations and sagebrush landscapes,* (Knick and Hanser)

This chapter is cited 38 times in the 2010 WBP decision, six times in the NTT Report and seven times in the COT Report. It perpetuates a myth that GRSG leks, and therefore populations, are isolated by distances greater than 18 km and that this isolation influences lek and population persistence. The 18 km number was not derived from an analysis of actual dispersal data but selected from an arbitrary point on a curve. *See* Exhibit B at 97-98. It was assumed that lek persistence was correlated with population persistence, even though many leks are ephemeral and GRSG are known to move between leks during the breeding season, as well as over much greater distances (up to 300 km).

The authors erroneously assume that all forms of human activity are collectively deleterious to sage grouse, without any data to support such an assertion.

M. Monograph Chapter 19: *Factors associated with extirpation of sage-grouse* (Wisdom, Meinke, Knick and Schroeder)

This chapter was cited 41 times in the 2010 WBP decision, two times in the NTT Report and 12 times in the COT Report. It represents some of the key scientific issues regarding assertions that large areas of unfragmented sagebrush habitat are needed to insure population persistence. In this paper, discriminant analysis on 22 environmental variables was used to model variables that best predict extirpated versus extant sage grouse populations. *See* Exhibit B at 100-103. There are serious statistical issues with the discriminant analysis that are not addressed by the authors.

For example, variables used to provide the best discrimination cannot be assumed to be independent, leading to biased and erroneous interpretation of results. The authors proposed that GRSG populations are at greatest risk in areas of occupied territory that nonetheless possess the characteristics of extirpated areas, as defined by their analysis. However, they do not test such predictions against evidence of population decline. The authors also advance several far-fetched and pseudoscientific explanations regarding the potential electromagnetic field effects of transmission lines and cell towers. Other issues include use of a weak threshold discriminant function analysis classifications.

At least three of the variables found by the authors to provide the best discrimination between occupied and extirpated areas were not independent. For example, the authors did not acknowledge that transmission line towers and cell phone towers have a tendency to be placed on high points, and thus these two variables and the elevation variable are not independent.

Another problem with this chapter is its speculative basis and lack of reproducibility. For example, the authors did not distinguish between different types of electrical transmission lines even though they would be expected to have different effects on GRSG.

N. Chapter 21: *Energy Development and Greater Sage-Grouse,* (Naugle, Doherty, Walker, Holloran and Copeland)

This Monograph chapter is cited eight times in the 2010 WBP decision and three times in the NTT Report for the erroneous narrative that oil and natural gas development is uniformly deleterious to GRSG populations. The authors examined 32 published papers, reports, management plans, and theses regarding biological responses of sage grouse to energy development and then dismissed all but seven studies. This "*critical review*" is not impartial because the authors are also authors on four of the seven pieces of the literature reviewed. *See* Exhibit B at 115. Clearly they were selectively picking which studies fit their narrative. Four of

the seven studies focused on impacts to GRSG in areas of *intensive* energy development and are not necessarily representative of less intensive energy development nor development based on newer environmental regulationsor technologies. Studies not written by the authors were reinterpreted.

This chapter discusses 1) the scientific literature documenting biological responses of GRSG to development; 2) quantified changes in landscape features detrimental to GRSG that result from development; 3) the potential for landscape level expansion of energy development within GRSG range; and 4) recommended landscape-scale conservation strategies.

It misrepresents cited studies to conclude that male and female grouse abandon leks due to "noise and human activity associated with energy development." However, the cited support, Lyon and Anderson (2003), never mentioned abandonment. Instead, Lyon and Anderson (2003) reported that: " [H]ens we captured on disturbed leks demonstrated greater movements from capture lek to nest than hens from undisturbed leks. Hens from disturbed leks nested approximately twice as far from capture leks as did hens from undisturbed leks."

The chapter briefly mentions mechanisms that may result in some of the avoidance behavior by sage grouse, however the primary focus is on "impacts." It is therefore lacking in analysis of understanding why GRSG may avoid energy development or whether they have lower survivorship adjacent to it. Understanding these issues is a predicate to mitigating effects. The chapter does not provide the impacts of energy development on GRSG with regard to potential for enhanced mitigation measures to minimize displacement from leks and impacts on nesting and survival. However, the authors state: " [S]everity of impacts and continued leasing...dictate the need to shift from local to landscape conservation." This premise is not

meaningful because local management is necessary to ensure effective mitigation and can allow local populations to be maintained.

This chapter also advises that federal and state government and industries need to implement solutions at a large scale. They suggest that one approach is to forego development in priority landscapes until new best management practices are implemented but they fail to recognize other studies that demonstrate mining and oil and gas development can coexist with GRSG. In addition, GRSG have been found to recover after development ceased.

O. Monograph Chapter 22: *Energy development and conservation tradeoffs: systematic planning for sage-grouse in their eastern range,* (Doherty, Naugle, Copeland, Pocewicz and Kiesecke)

This chapter combined data on projected oil and natural gas development with potential wind development to produce a new category, "energy development," for GRSG vulnerability assessment and conservation planning. While projected oil and gas development were based on *actual* well data or lease sales that overlap sage grouse core areas, wind development was based on undeveloped and unleased commercial wind *potential*. *See* Exhibit B at 123. While the basic approach of mapping areas of key conservation importance and development to avoid conflict was first introduced in the 1960's by McHarg (1969) and widely applied since, there are serious issues with this methodological approach.

An unbiased approach would involve analysis of the two types of development separately, then overlay their projected impacts to sage grouse in a common unit that reflects each development's impact(s) to GRSG. *See* Exhibit B at 123-129. The authors present an approach that assumes all impacts are created equal, regardless of whether they are from oil and gas, or wind development. This one-size-fits-all approach grossly overestimates loss of

GRSG within areas of potential development. Furthermore, while some impacts from oil and natural gas have been quantified, there are no studies documenting impact of wind energy development to GRSG.

Another issues with this chapter is the $1km^2$ grid size, which is very crude and significantly overestimates the scale of impacts. Data at much finer resolution are readily available and are the scientific standard for habitat analyses.

For example, Garfield County developed its "Greater Sage-Grouse Conservation Plan" based on the best available science and a tailored approach to private and public land management to benefit the species.[135] In recognition of the County's unique GRSG habitat characteristics of extreme topographic variation and naturally fragmented suitable habitat patches, Garfield County commissioned an in-depth analysis of its 2,956 square miles, revealing that nearly 70% of Garfield County is not suitable for the GRSG.[136]

A measured approach that makes use of best available information would likewise incorporate current development, physiographic features, and vegetation into an analysis to more accurately portray landscape potential for sage grouse. Failure to incorporate readily available information on essential GRSG habitat elements as well as areas that are permanently unavailable, limits its accuracy and utility of this "risk assessment" and its use for policy decisions.

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[135] Garfield County, Board of County Commissioners, *Greater Sage-Grouse Conservation Plan*, http://www.garfield-county.com/community-development/documents/FINAL-Approved-Grouse-Plan-Amendment%201_11-20-2014.pdf (adopted Mar. 18, 2013) (amended Nov. 17, 2014) (last visited Dec. 29, 2014 at 10:30 AM) (Habitat mapping provided by state and federal agencies were not accurate and did not provide adequate planning information)

[136] *Id*. at pages 10-17, and 35-37 (the Garfield County plan utilized highly sophisticated and peer reviewed habitat modeling completed in November of 2014 that proved a 67% decrease in potentially suitable habitat from Colorado Parks and Wildlife's model, indicating that CPW and BLM over-mapped 147,000 acres of private and public land).

As with other papers in the Monograph, the authors did not consider hunting to be a factor controlling GRSG populations. The discussion section of Doherty et. al includes an extensive set of policy recommendations for decision makers that are based less on the results of the study than on a political point of view and self-importance. This detracts from the results of the study and gives the appearance of advocacy dressed-up as science.

V. The Monograph Misrepresents Several Key Issues

USGS must incorporate and rely upon the most recent information in the Monograph. To do otherwise would be inconsistent with the best available science standard under the ESA, the information quality standards of the Data Quality Act and the standards of scientific integrity required by presidential and Interior Department memoranda and additional orders and authority referenced herein.

The Monograph fails to consider major natural factors that affect GRSG populations while exaggerating impacts from human activities such as energy development, gracing and mining, while downplaying threats from predation and hunting.

A. GRSG Populations

The are many errors in the Monograph's approach to GRSG populations. There is no evidence of the purported population declines nor genetic isolation that certain Monograph authors contend. For example, in Utah, the number of leks counted has increased from a low of 125 to 361 currently.[137] In regards to males counted, the increase is even more dramatic: 1,555 males in 1996 to 5,973 in 2006 (280%).[138] While current numbers are not quite that high, differences in methodologies and inaccuracies inherent in lek counts must be considered. BLM also acknowledges in its Land Use Plan Amendments that, "GRSG in Colorado have been

[137] *Id.*
[138] *Id.*

increasing for about the last 17 years, and breeding populations have not declined for the last 39 years,"[139] and that sagebrush habitat in Jackson County (which harbors the second largest population in the planning area) is, "largely intact, and there is little threat of fragmentation."[140] And data from the Nevada Department of Wildlife ("NDOW") indicates GRSG populations have been increasing over the last three years. According to NDOW, the 2010 fall population estimate increased about 18% compared to the 2009 estimate, and the population has been increasing since 2008.

The Monograph fails to acknowledge that the size of GRSG populations sufficiently negates threats. FWS has estimated the GRSG population to be 535, 542.[141] Many species have been delisted or removed from candidate status with far less significant population numbers and ranges. Perhaps never before has FWS considered listing a species so numerous and wide-ranging as GRSG. As noted above, there is ample precedent not to embark on the proposed regulatory restrictions, let alone a federal listing, for GRSG. Such actions are unlikely to benefit the species but would certainly harm the West.

B. GRSG Populations Naturally Fluctuate

The Monograph fails to recognize that populations of any given species naturally fluctuate. This significant error of omission violates quality, objectivity and integrity standards of the DQA, the Guidelines and the additional authority cited herein.

Populations of any given species are known to be extremely dynamic. It is critical to understand the trends in population dynamics and the factors responsible for population variability to properly evaluate and manage species. Understanding natural fluctuations in

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[139] *See* NW CO GRSG DEIS at 253 *citing* Figure 3-5.
[140] NW CO GRSG DEIS at 246.
[141] 75 Fed. Reg. 13910, 13921 (Mar. 23, 2010).

abundance and the population dynamics of individual and range-wide populations is also essential for the proper status assessment of a species.

Here, the Monograph fails to take into account that populations of species are responsive to such factors as seasonal and long-term fluctuations in regional weather conditions, short-term weather extremes and stochastic events, intra- and inter- species competition for resources, intra- and inter- species behavioral competition, predator-prey relationships, and subtle or severe changes in habitat quality. As discussed herein, climactic patterns associated with the PDO greatly influence GRSG populations in Wyoming.[142] These and other factors may influence a species greatly, and may mask or prevent a correct interpretation of direct and indirect anthropomorphic factors.

GRSG populations characteristically exhibit multi-annual fluctuations in abundance indicating that some mechanism or combination of mechanisms are causative factors.[143] Factors influencing GRSG abundance may include weather patterns and the composition and abundance of predators that influence nesting success.[144] Nesting success and chick survival is considered to be the most significant parameter affecting population dynamics.[145]

Published studies of factors affecting nest success and GRSG chick survival have focused on micro-scale habitat factors such as percent coverage and height of forbs and grasses and availability of arthropods.[146] These studies follow logically from previous research on GRSG brood habitat selection (Sveum et al. 1998, Drut et al. 1994a, Wallestad 1971, Klebenow 1969) and chick diets (Drut et al. 1994b, Johnson and Boyce 1990, Peterson 1970, Klebenow and Gray 1968). Collectively, these studies clearly demonstrate that nesting GRSG typically select

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[142] *See* Ramey, Thorley and Ivey 2014, *infra*.
[143] USFWS 2013, Fedy and Doherty 2010, Montana GRSG Working Group 2005.
[144] Montana GRSG Working Group 2005.
[145] Schroeder et al. 1999.
[146] Aldridge and Boyce 2007, Dahlgren et al. 2010, Gregg and Crawford 2009.

relatively mesic[147] habitats with abundant forbs and arthropods and that chick survival is highly correlated with these factors. Chick survival has been shown to be an important determinant of population growth rates, and chick survival is increasingly being shown to be affected at the population level relative to large-scale abiotic[148] factors such as regional variation in precipitation and temperature.

Guttery et al. 2013 reported that climatic variables play a primary role in determining GRSG reproductive success and the study demonstrated that temperature and precipitation have significant effects on chick survival. Similarly, Blomberg et al. 2012 found strong correlation between multiple climatic variables and GRSG population dynamics. Annual recruitment of GRSG was higher in years with higher precipitation, based on annual precipitation, annual rainfall, and average winter snow depth. Likewise, GRSG population growth was positively correlated with annual rainfall and mean monthly winter snowpack in the study area. Annual survival of adult male GRSG was negatively affected by high summertime temperatures, i.e., higher survival rates occurred in years with relatively low maximum temperatures. These results are consistent with the hypothesis that water balance in sagebrush systems is important to GRSG populations and led the authors to conclude that the stability of GRSG populations is dependent upon stable annual survival rates and occasional large inputs of new individuals into the population when climatic conditions are favorable for chick and juvenile survival.

Extended periods of below normal precipitation and shorter-term severe drought may reduce the abundance and duration of herbaceous cover at nest sites, and result in a reduction in the quantity and quality of food resources available to hens and chicks, which, if severe, could

[147] Habitat with a moderate or well-balanced supply of moisture.
[148] Non-living chemical and physical parts of the environment that affect living organisms.

jeopardize GRSG survival.[149] Prolonged drought during the 1930's and mid-1980's to early 1990's coincided with declining GRSG populations throughout much of the species' range (Patterson 1952, Fischer 1994, Hanf et al. 1994, Connelly and Braun 1997, Braun 1998). From 1985 through 1995, the entire range of GRSG experienced severe drought as defined by the Palmer Drought Severity Index, with the exceptions of north-central Colorado and southern Nevada (USFWS 2013). Heath et al. 1997 concluded that drought conditions during spring and summer 1994 in Wyoming resulted in impaired productivity and decreased survival of GRSG, most likely because of subsequent decreases in forb production and increased predation resulting from a lack of sufficient cover.

The amount and timing of spring and summer rainfall affects annual plant production and influences population dynamics of GRSG, causing short term fluctuations of less than 10 years in GRSG abundance.[150] Wet springs often result in increased green-up and an increase in the variety of forbs and consequently insects on the sage-steppe, thereby increasing chick survival.[151] Wyoming Game and Fish Department 2009 reported increases in GRSG numbers in Wyoming during the late 1990's with some individual leks seeing three-fold increases in the number of males between 1997 and 1999. This increase was synchronous with increased spring precipitation over the period. The return of drought conditions in the early 2000's appears to have led to decreases in chick production and survival, thus resulting in declining populations. Conversely, extreme precipitation during the spring and summer caused widespread flooding in 2011 in southeastern Montana and increased GRSG nest failure and depressed hatch rates.[152]

[149] McCarthy and Kobriger 2005, Connelly et al. 2004, Fischer et al. 1996.
[150] Eustace 2002.
[151] McCarthy and Kobriger 2005, Blomberg et al. 2012.
[152] Foster et al. year unknown.

Cold, wet weather or extremely low temperatures during the hatching period can result in loss of chicks and young birds to hypothermia.[153] Measures of drought, precipitation, and temperature can be correlated to winter snow pack which is known to be a major driver of vegetation dynamics throughout much of the mountainous regions of western North America.[154] Long, cold winters with deep snows that cover sagebrush plants on winter ranges can be a threat to survival because GRSG are totally dependent upon sagebrush as food during winter months.[155]

Until recently, there was no evidence that severe winter weather affected GRSG populations unless sagebrush habitat had been greatly reduced; however, such an effect has been reported recently in several studies. Danvir 2002 recorded declines in a GRSG population following deep snow winters of 1985-86 and 1992-93 in Wyoming, hypothesizing that GRSG survival rates declined because the species became more visible and vulnerable to predation, and that there was increased competition with jackrabbits, mule deer, and other grouse for the sagebrush foliage available above the snowpack. Moynahan et al. 2006 found that a severe winter affected survival of GRSG in Montana from 2001 to 2004. Similarly, Anthony and Willis 2009 reported strong evidence that severe weather (i.e., mean daily min. temp, extreme min. temp, snow depth) affected survival of female GRSG in southeastern Oregon.

The effects of both annual and long-term fluctuations in weather patterns on the nest success and survival of GRSG have been well documented. Short-term fluctuations in weather patterns are significant factors contributing to the annual and near future population status, while long-term weather patterns have a greater effect on condition of habitats and play a larger role in determining the long-term trends of the population.[156]

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[153] McCarthy and Kobriger 2005, Hannon and Martin 2006.
[154] Walker et al.1993.
[155] McCarthy and Kobriger 2005.
[156] McCarthy and Kobriger 2005.

Recent efforts to develop range-wide conservation and mitigation objectives for the GRSG resulted in several documents proposing specific strategies or actions. Although the counts of male GRSG on leks has been, and continues to be, the primary mechanism for collecting data about the relative abundance and population trends of GRSG, the Monograph does not acknowledge that lek counts provide only a crude, nonrandom, and statistically invalid estimates of population trends.[157]

Critical information on natural population fluctuations and the factors that drive them such as weather patterns and survival rates are glaringly omitted in the Monograph. Taking into account natural fluctuations in GRSG population and their primary drivers, using explicit, data-driven population models, i.e., Bayesian hierarchical state-space models, must be included in any objective and statistically rigorous evaluation of the population status.[158] An accurate assessment of GRSG population dynamics and fluctuations are also critical to proper species management and developing effective conservation and mitigation strategies.

By ignoring natural fluctuations due to variations in weather, drought, and other natural conditions, the Monograph lays the groundwork for an improper regulatory threshold that GRSG populations must be stable or increasing in all cases. This fundamental flaw violates the DQA, the Guidelines and the secretarial and presidential orders and memoranda discussed herein.

C. Predation and Predator Control

The Monograph ignores substantive threats to GRSG in favor of pre-conceived notions of human impact in violation of the DQA and the Guidelines. Predation is the most common cause of direct mortalities of the GRSG. GRSG eggs are preyed upon by red foxes (*Vulpes vulpes*), coyotes (*Canis latrans*), American badgers (*Taxidea taxus*), common ravens (*Corvus corax*), and

[157] Walsh et al. 2004; Ramey et al. 2014.
[158] Coates et al. 2014.

black-billed magpies (*Pica hudsonia*). Common predators of juvenile and adult GRSG are golden eagles (*Aquila chrysaetos*), prairie falcons (*Falco mexicanus*), other raptors, coyotes, American badgers, and bobcats (*Lynx rufus*). Younger birds, especially broods, are preyed upon by common ravens, red foxes, northern harriers (*Circus cyaneus*), weasels (*Mustela sp.*), and various species of ground squirrels and snakes.

Of these predators, the common raven is the most abundant and has the greatest impact on the survivorship of the GRSG. Raven populations have increased an estimated 300% in the past 27 years in the United States (Sauer et al. 2008) with reports of 1,500% increases within a 25-year period in some areas of the West.[159] The Monograph virtually ignores this critical fact. While not migratory species, crows and ravens are inexplicably protected under the Migratory Bird Treaty Act ("MBTA").[160] Nowhere does the Monograph call out that the primary predator of GRSG is protected by the MBTA such that predator control efforts that would benefit GRSG are subject to regulatory red-tape--including FWS approvals.

Mortality due to predation during the first few weeks after hatching was estimated to be 82%.[161] In regards to Gunnison sage-grouse, "survival of juveniles to their first breeding season was estimated to be low (10%)."[162] Nothing in the Monograph is presented to quantify the habitat conditions that are purported to increase the significance of predation and nothing to identify the significance those conditions to sage grouse habitat throughout their range.

The common raven is clever and highly adaptable, which allows them to opportunistically exploit food resources provided by human activities. They routinely forage at landfills, in dumpsters, and at livestock operations and they commonly scavenge on carcasses of

[159] Boarman 1993.
[160] 50 C.F.R. § 20.100.
[161] Gregg *et al.* 2007.
[162] GUSG Threatened Listing, 79 FR 69192, 69274 (Nov. 20, 2014).

animals killed by vehicle strikes. The explosive increase in raven abundance has resulted in large increases in predation, and has contributed to the severe decline of many species including the desert tortoise (*Gopherus* sp.), marbled murrelet (*Brachyramphus marmoratus*), least tern (*Sternula antillarum*), California condor (*Gymnogyps californianus*), and GRSG.

While many scientific studies have found that GRSG nest predation is related to the amount of herbaceous cover surrounding nest sites and that nesting success is correlated with vegetation structure and composition, suggesting that the quantity and condition of breeding habitat is the most important factor that dictates the productivity of GRSG (Connelly et al. 1994, Braun 1998, Schroeder and Baydack 2001, Coates 2007, Hagen 2011), the Monograph ignores substantial evidence indicating that most GRSG nests are lost to predators such as red foxes, badgers, coyotes, black-billed magpies, and common ravens, even in excellent GRSG habitat.[163]

The negative effects of predation and raven abundance on nest success have been well documented. GRSG nests are subject to varying levels of predation. Predation can be total (all eggs destroyed) or partial (one or more eggs are destroyed). However, in either case, hens abandon the nests.[164] Re-nesting efforts may partially compensate for the loss of nests due to predation (Schroeder 1997) but may not completely offset the losses. Additionally, the presence of high numbers of predators within a GRSG nesting area may negatively affect GRSG productivity without causing direct mortality. Loss of breeding hens and young chicks to predation can influence overall GRSG population numbers, as these two groups contribute most significantly to population productivity.[165]

According to Valkama et al. (2005), predation may influence grouse population dynamics by reducing nest success, survival of juveniles especially during the first few weeks after

[163] *See* Gregg et al. 1994, Heath et al. 1997, Holloran 1999, Connelly et al. 2004.
[164] Coates 2007.
[165] Baxter et al. 2008.

hatching, and annual survival of breeding age birds. Similarly, others found that nest predation can be a limiting factor for GRSG population sustainability.[166] Moynahan et al. (2007) reported that 54% of nest failures were caused by predation. Gregg et al. (2007) estimated that GRSG mortalities due to predation were as high as 82% during the first few weeks after hatching.

Raven abundance was strongly associated with GRSG nest failure in northeastern Nevada, resulting in negative effects on GRSG reproduction.[167] The study associated increased raven abundance with a reduction in the time spent off the nest by female GRSG, thereby potentially compromising the ability to secure sufficient nutrition to complete the incubation process. Similarly, high corvid abundances attributed to increased GRSG nest and brood failure in western Wyoming (Bui 2009). Coates and Delehanty (2010) found that GRSG nest failure and observed raven predation of GRSG nests were associated with indices of raven abundance. Decreases in daily survival rate (DSR) of GRSG were attributed to increased raven abundance.

Unlike other population limiting factors (e.g., habitat, weather, and drought), predation can realistically be reduced by applying appropriate management measures.[168] Management of some predator populations, especially raven populations occurring in areas where GRSG mortality is high, is needed to ensure that GRSG populations are not depressed by a known and easily mitigated source of mortality.

In 2001, the U.S. Department of Agriculture (USDA) Animal Plant Health Inspection Service (APHIS) Wildlife Services (WS) initiated a systematic raven management program in Nevada to reduce raven numbers in GRSG habitat. The primary method of raven removal was through chicken egg baits treated with DRC-1339 (3-chlorop- toluidine hydrochloride). Coates and Delehanty (2004) observed that GRSG nest success near these raven removal activities was

[166] Nelson 1955, Gregg et al. 1994, Schroeder and Baydack 2001.
[167] Coates 2007.
[168] Cote and Sutherland 1997.

significantly greater (73.6%) than the mean nest success (42.6%) based on 14 studies from 1941 to 1997.[169] They also observed that raven numbers in treated areas declined from a high of 5/km^2 to low of 0.31/km^2 over a period of five month.

In 2007, the USDA/APHIS/WS began testing the effects of the removal of common ravens using baits treated with DRC-1339 to livestock depredation in southern Wyoming. This program provided additional information of the potential effects of raven removal on GRSG nest success. It was found that the nest success of GRSG was reduced when ravens were present within 550 meters of a nest. The study also reported that the abundance of ravens can be substantially reduced at a relatively large scale (15-km radius or 706.5 km^2) by using DRC-1339; raven densities decreased by 61% at removal sites compared to an increase of 42% at non-removal sites. In areas occupied by ravens, average GRSG nest survival was estimated at 22%; and in areas absent of ravens, nest survival was estimated at 41%. This suggests that areas with high raven populations may contribute to lower GRSG population growth rates (Dinkins 2013). Cote and Sutherland (1997), using meta-analytic techniques, found that predator removal has a large, positive effect on post breeding population size and hatching success for several species of game birds.

Results of these raven removal efforts suggest that well-designed raven management strategies could substantially increase GRSG nest survival rates in areas where raven predation is a substantial contributing factor to nest failure. Long-term solutions to reduce artificially high raven abundances are necessary to address the detrimental effects of raven predation on GRSG and other imperiled species. Reducing raven abundance has been shown to be effective using some lethal means, and reducing numbers may also be possible using other as yet untested lethal and non-lethal means. Effective lethal control might be accomplished by shooting, removal of

[169] Schroeder et al. 1999.

raven nests and eggs, and poisoned baits. Effective non-lethal control might be accomplished by reducing or eliminating nesting structures and/or making subsidized food resources (road-kill, dead livestock, and garbage) unavailable. Despite the research and application of these methods for raven management, the Monograph selectively chose to disregard them.

The negative effects of predation on the nest success of the GRSG have been well documented and should be included in any objective and complete analysis of threats to GRSG. The FWS 2010 WBP decision (USFWS 2010) recognized predation as a primary threat to the GRSG and devoted three pages of discussion to this issue.[170] Despite this, some recent efforts to develop range-wide conservation objectives for the GRSG [and to inform the public of the upcoming 2015 listing decision] failed to recognize and address predation as a primary threat to the species. The Monograph, the NTT Report and the COT Report all fail to recognize predation as the single most important factor affecting the abundance of the GRSG.

These key reports virtually ignored the topic of predation and the major body of scientific literature on raven predation and experimental data on predator management. Substantial and critically important information on these topics is available from a variety of sources including Boarman 1993; Boarman 2003; Boarman et al. 1995; Boarman and Heinrich 1999; Boarman et al. 2006; Bedrosian and Craighead 2010; Bui 2009; Cagney et al. 2010; Christiansen 2011; Coates 2007; Coates and Delehanty. 2004; Coates et al. 2008; Coates and Delehanty 2010; Conover et al. 2010; Cote and Sutherland 1997; DeLong 1995; Gregg et al. 1994; Heinrich et al. 1994; Moynahan et al. 2007; Preston 2005; Ramey, Brown, and Blackgoat 2011; Schroeder and Baydack 2001; Snyder et al. 1986; Sovada et al. 1995; Watters et al. 2002; and Webb et al. 2009.

[170] 75 FR 13910.

Finally, recent work Baxter et al. 2013 shows even bottlenecked GRSG populations can see marked population improvements following predator control efforts.[171]

The Monograph ignored the body of literature relevant to raven predation on GRSG, including its deleterious effect on survivorship and recruitment, and most importantly, the integrated management strategies that can reduce losses of GRSG. Only two references related to predation on GRSG were cited (Greg et al. 1994 and Hagen 2011) and the word "raven" was mentioned only once, at page 63. The Monograph did not mention predator management that could benefit GRSG within high risk areas and instead, viewed predation as a byproduct of human activities that could be regulated (i.e. land health assessments and emphasizing vegetation cover as a means to measure and mitigate livestock use; or increasing landscape level habitat connectivity). This extremely passive and scientifically untested approach is speculative at best and therefore would not result in a reduction of the short-term or long-term threats caused by high raven abundances.

Even though the Monograph contends that predation impacts are solely related to habitat condition, there is no information to suggest that habitat conditions alone will compensate for excessively high predator populations. The information disseminated concludes that, regardless of habitat conditions, predation does not affect GRSG populations in general. However, the removal of predators was a primary factor in the recovery and delisting of the Aleutian Canada goose in North America.[172] In delisting the Aleutian Canada goose, FWS also recognized the

[171] Baxter, R. J., Larsen, R. T. and Flinders, J. T. (2013), Survival of resident and translocated greater sage-grouse in Strawberry Valley, Utah: A 13-year study. The Journal of Wildlife Management, 77: 802–811. doi: 10.1002/jwmg.520.

[172] 66 Fed. Reg. 15643 (Mar. 20, 2001); *see also* FWS News Release, March 19, 2001.

removal of predators benefited not only that species, but many other bird species on the islands, including puffins, murrelets, and auklets.[173]

The Monograph provides limited and selective evaluations of threats to GRSG, and ignore the major body of scientific literature that is available on raven predation and experimental predator management. In order to comply with the DQA and the Guidelines, the The USGS needs to address and incorporate this information on the effects of predation and predator control into the Monograph.

D. Hunting

The Monograph gives insufficient attention to hunting as a threat to GRSG. Some 207,430 GRSG were harvested during hunting seasons between 2001 and 2007.[174] As a result, past and potentially ongoing hunting is likely a contributor to declines in GRSG populations or avoidance of human activities in GRSG populations.

The Monograph erroneously concludes harvest from hunting does not significantly affect population trends, yet ignored that 207,430 sage grouse were harvested between 2001 and 2007 alone. *See* Exhibit A at 9. Again, this number does not account for unrecovered wounded birds which can increase mortality rates as much as 50%. *See* Exhibit A at18. Mortality from hunting and predation could be as high as 10% of the population annually. *See* Exhibit A at 10.

Additionally, new data and research published by Gibson et al. 2011 have refuted the frequently repeated belief that there is a no additive demographic effect of hunting on GRSG populations. Thus, the hunting of some populations will have an effect not only on those

[173] 66 Fed. Reg. 15643 (Mar. 20, 2001); *see also* Press Release, U.S. Fish and Wildlife Service, An Endangered Species Success Story: Secretary Norton Announces Delisting of Aleutian Canada Goose, (Mar. 19, 2001).

[174] Kerry P. Reese and John W. Connelly, *Harvest Management for Greater Sage-Grouse: A Changing Paradigm for Game Bird Management*, *in* Greater Sage-Grouse Ecology and Conservation of a Landscape Species and its Habitats. Studies in Avian Biology (vol. 38) Table 7.3 p. 106 (Steven T. Knick and John W. Connelly eds., 2011).

populations but also on nearby populations that are not hunted but are genetically and demographically linked by dispersal.[175]

The USGS must address and incorporate up-to-date information on threats to GRSG from hunting in the Monograph to comply with the DQA and the Guidelines.

E. Oil and Natural Gas

The Monograph violates Executive Order 13563, which calls for "objectivity of any scientific and technical information and processes used to support [an] agency's regulatory actions."[176] It also fails to meet DQA standards for quality and integrity.

The Monograph exhibits serious bias against oil and gas development. USGS describes energy development as one of the greatest threats to GRSG. As one example, Garton et al. 2011 and Knick and Hanser 2011 (Knick and Hanser were cited eight times in the COT Report, six times NTT Report and 38 times in the 2010 WBP decision) claim populations in the Colorado Plateau have a 96% chance of declining below 200 males by 2037 due primarily to threats from oil and gas (referred to as "energy development" in the papers). Such assertions are without basis given the status of GRSG populations today. Garton et al. 2011 and Knick and Hanser 2011 are no longer the best available science. *See* Exhibits A and B, *gen*.

Key assertions in the Monograph are both biased and in error, especially the frequently repeated, but erroneous assumption, that a temporary decrease in lek counts immediately adjacent to active wells is equivalent to a population decline.

While surface disturbance from oil and gas had local negative effects on male sage grouse lek attendance, it did not result in significant effects at a population level.[177] Data shows

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[175] Gibson, R. M., V. C. Bleich, C. W. McCarthy, T. L. Russi. (2011) Recreational hunting can lower population size in greater sage-grouse. Pp. 307-315 in B.K. Sandercock, K. Martin, and G. Segelbacher (eds.). Ecology, Conservation, and Management of Grouse. *Studies in Avian Biology* (vol. 39), University of California Press, Berkeley, CA.

[176] *Available at: http://www.gpo.gov/fdsys/pkg/FR-2011-01-21/pdf/2011-1385.pdf.*

GRSG population increases despite intensive energy development that has occurred in Jonah, Labarge, and Pinedale Anticline within four miles of active leks.[178] In Pinedale, the Pacific Decadal Oscillation ("PDO") a climate index derived from sea surface temperatures in the North Pacific accounted for 78% of population variations and 67% in Wyoming GRSG working groups.[179] This is highly significant because if the primary climate drivers of GRSG populations are not taken into account, which the Monograph and cited studies do not acknowledge, then management prescriptions recommendations will be based on erroneous information.

Walker et al. 2007 (from the Monograph) has been cited for the mistaken proposition that GRSG populations can be significantly reduced, and in some cases locally extirpated, by non-renewable energy development activities, even when mitigation is implemented.[180] But reliance on Walker et al. 2007 is untenable. *See* Exhibit B at 24 and 134. And there is little overlap between energy development (and potential for development) and GRSG habitat.[181]

Frequently cited studies in the Monograph regarding energy infrastructure and disturbance on GRSG are outdated. Kirol et al. 2015, Ramey, Brown and Blackgoat 2011, and Applegate and Owens 2014, have demonstrated technological advances and mitigative methodologies help to minimize impacts to GRSG. In addition, many of the studies cited within the Monograph were conducted in heavily developed energy fields which did not utilize today's technology.

While avoidance might occur due to heavily developed oil and gas fields, the intensive down-hole development of yesteryear at Pinedale (particularly in the Jonah Field) is not

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[177] Ramey, Thorley and Ivey 2014.
[178] Ramey, Thurley and Ivey 2014; *See also* Wyoming Game and Fish Department, *Wyoming Sage-Grouse Population Lek Count Data* (2013); Wyoming Oil and Gas Conservation Commission *Well Data*; Disturbance Data from PAPO, JDMIS, and PDMIS databases.
[179] Ramey, Thorley and Ivey 2014.
[180] COT Report at 10.
[181] *See* http://blogs.scientificamerican.com/extinction-countdown/2014/10/17/sage-grouse-oil-drilling/.

representative of a typical field today. Many of these areas developed prior to widespread use of directional drilling and clustered development. In addition, the Monograph omits numerous scientific papers and reports on oil and gas mitigation measures, mitigation of raven predation, and the fact that GRSG traverse (fly) over or around roads, agricultural areas, and oil and gas development.[182] Accordingly, impacts from oil and gas development today are likely to be much smaller than previously considered.

Moreover, the Monograph Report fails to acknowledge the regulatory mechanisms already inherent to BLM's regulation and management of the onshore oil and natural gas program. No drilling, access, seismic studies or any other surface disturbing work can proceed without regulatory authorization by BLM. This regulatory authorization comes in multiple forms, but the primary are commitments made in project-specific NEPA documents, and Applications for Permit to Drill ("APD").

Companies may not apply for an APD without first completing project-specific environmental analysis under NEPA. When BLM determines that there sill be significant impact to GRSG or other resources for that matter, it prepares and Environmental Impact Statement (EIS) that includes mitigation measures for protecting GRSG. BLM and the companies make a firm commitment that the mitigation measures in the EIS will be enforced through Conditions of Approval ("COA") on APDs. As the APD is absolutely required before drilling can occur, this amounts to a regulatory mechanism that should be recognized by FWS. In fact, a study prepared by SWCA Environmental Consultants found that oil and natural gas companies have more stringent standards in place than the agencies acknowledge. From just a sample of 103 NEPA documents for oil and natural gas projects, the study found that companies have implemented

[182] J. Kehmeier, N. Wojcick, J. Millspaugh, C. Hansen, M. Rumble, S. Gamo and G. Miller, Overview of Greater-Sage-Grouse Monitoring Efforts, Chokecherry and Sierra Madre Wind Energy Project, Carbon County, Wyoming (2014).

773 conservation measures for GRSG. This equates to an average 6.5 firm, enforceable regulatory commitments through COAs on APDs to protect GRSG. [183] .

These measures include monitoring existing populations, restricting human activities to protect leks, interim and final reclamation, noxious weed control, dust suppression through application of water or chemical suppressant to roadways, enforcing speed limits, seeding of all disturbed areas that are not used during the well production phase, NSO buffers to protect wetlands, and general noise abatement.[184] Additionally, oil and natural gas companies have made concerted efforts to reduce human-subsidized GRSG predators, and access to wastewater pits to prevent GRSG oiling and drowning.[185]

NEPA is indeed a valid regulatory mechanism to protect and conserve GRSG, as there is certainty that each COA or conservation measure will be implemented.[186] The Western Governor's Association has compiled similar useful information on existing conservation efforts.[187] The State of Colorado audited COAs recommended by Colorado Parks and Wildlife through Colorado Oil and Gas Conservation Commission rules and found a 97% adoption and implementation rate:

> "Results show very high correlation between Best Management Practices (BMPs) recommended by SPW for protection of GrSG habitat and voluntary adoption. In other words, CPW met with operators every time a permit for drilling in GrSG habitat was sought. During those consultations, CPW recommended a series of actions designed to minimize or eliminate impacts on habitat. Adoption of those recommendations by an operator is entirely voluntary under the 1200-series

[183] *See Id*. at page 5; *see also* List of NEPA Documents Reviewed beginning on page 35.
[184] *Id*. at page 7-8.
[185] *Id*. at page 18; *see also* 139 (Exxon Mobile: "It will be the responsibility of the operator to effectively preclude migratory bird access to, or contact with, reserve pit contents that possess detrimental properties (i.e., through ingestion or exposure) or have potential to compromise the water-repellent properties of birds' plumage").
[186] *Id*. at page 27.
[187] http://www.westgov.org/.

regulations, but our analysis suggests that they are adopted 97% of the time. Please see Appendix B for the full report."[188]

As a result, the Monograph is not presented in an accurate, clear, complete and unbiased manner pursuant to OMB Guidelines.[189] It evidences bias and a lack of transparency and reproducibility in contravention to the DQA, the Guidelines and the additional authorities cited herein.

F. Livestock Grazing

The Monograph fails to recognize the best available science on grazing. Instead of focusing on the negative impacts of historic grazing using citations for alleged threats that are decades old, USGS should be evaluating the application of and results of modern proper grazing management.[190] Historic grazing and research reports of specific grazing practices are immaterial to the question of how modern grazing management practices affect GRSG habitat.

A 1990 BLM report shows that good condition rangeland increased by 100% and poor condition rangeland decreased by 50% between 1936 and 1989. In the years since, there has been extensive progress in the implementation of proper grazing management on federal, state and private lands. Furthermore, it is more important and useful to consider rangeland trends rather than current condition. Regardless of current ecological status, rangelands that are in an upward ecological trend also have improving GRSG habitat.

It is well established that "In the 1960s and 1970s, Idaho had large numbers of sage grouse and extensive livestock grazing. This suggests that healthy sage grouse populations and livestock grazing are compatible. In short, livestock grazing that results in rangeland in good

188 http://cpw.state.co.us/Documents/WildlifeSpecies/SpeciesOfConcern/GreaterSageGrouse/ColoradoSynthesisReportFINAL.pdf

189 *See* OMB Guidelines V(3)(a).

190 *See* Launchbaugh 2012; Mosley and Brewer 2006; Briske et al. 2011.

ecological condition also provides acceptable sage grouse nesting, chick rearing and winter habitat."[191]

The Wyoming Department of Agriculture has strongly stated livestock grazing has no negative effects on the GRSG.[192] Moreover, according to the USDA National Agricultural Statistics, Wyoming sheep numbers were at or near all-time highs the same year GRSG numbers were at or near all time highs (1969).[193] Sheep numbers have dropped precipitously over the last several decades in Wyoming and other western states, and hence, predator numbers have increased accordingly.[194] In fact, the Wyoming Department of Agriculture stated, "[H]abitat alteration caused by livestock grazing (mosaic creation), as well as the predator control offered by livestock producers, have improved and benefited [sic] sage grouse."[195]

Besides ignoring these data from the states, which are the most accurate sources, USGS wholly failed to analyze the effectiveness of current livestock grazing and range management frameworks, standards, and guidelines and failed to consider site-specific considerations to provide case-by-case determinations of effective regulatory mechanisms actually needed for a location. Schutlz 2004 (specific herbaceous height and cover values across the range of GRSG are inappropriate). The Monograph failed to consider that livestock grazing benefits GRSG habitat and that regulatory restrictions on grazing could threaten the viability of ranching in the West. This is contrary to the DQA, its Guidelines and the best interests of GRSG.

The Monograph also undercuts the balanced grazing program passed by Congress as the Taylor Grazing Act ("TGA"). Congress intended TGA land be used primarily for grazing. The

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[191] Idaho Sage Grouse Management Plan (1997).
[192] Letter from Jim Schwartz, Wyoming Department of Agriculture, to Dr. Pat Diebert, U.S. Fish and Wildlife Service (July 30, 2004) (on file with the Wyoming Department of Agriculture).
[193] http://www.nass.usda.gov:81/ipedb/report.htm).
[194] *Id.*
[195] Letter from Jim Scwharz, Wyoming Department of Agriculture, to Dr. Pat Deibert, U.S. Fish and Wildlife Service (July 20, 2004) (on file with Wyoming Department of Agriculture).

Monograph seems to advocate single-use management in direction contravention to existing laws such as the TGA. Accordingly, the Monograph, as implemented through a listing decision or through Land Use Plan Amendments will result in significant economic and social impacts to Petitioners. Federal agency demands for current conservation efforts fail to provide a true holistic approach to managing multiple ownership lands in an economically sustainable manner.

The Monograph did not include input from any affected stakeholders or interdisciplinary experts aside from state and federal scientists and specialists. It ignores regional variances in GRSG needs, and does not present a comprehensive representation of the literature and research surrounding livestock grazing. Subsequent to its publication, Cagney et al. 2010 demonstrated positive attributes of grazing in Wyoming for nesting and early brood rearing habitat.

The Monograph fails to recognize that grazing is a key contributor to GRSG habitat and conservation and omits the many positive impacts of grazing. Grazing is integral to reducing fuels.[196] Without grazing, GRSG habitat would suffer greatly in the West.[197] The many contributions of grazing and ranching, which are largely ignored or understated in the Monograph include:

- Preservation of open space
- Noxious weed and invasive species eradication and containment
- Production of forb growth that is preferred by GRSG to non-grazed areas
- Wildfire prevention and controlled burn efforts
- Development of wildlife watering sources, including placement of bird ladders in troughs
- Predator management.

Even the federal government's Sage Grouse Initiative has recognized the importance of private lands to GRSG conservation.[198] The Monograph must recognize that regulatory burdens

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[196] *See* Davies et al. 2008; Diamond et al. 2009; Messmer and Peterson 2009; Freese et al. 2013; Taylor 2006; and Mosley and Roselle 2006.
[197] *See* Launchbaugh 2012; Mosley and Brewer 2006; Briske et al. 2011.
[198] Sage Grouse Initiative. 2014. *Private Lands Vital to Conserving Wet Areas for Sage Grouse Summer Habitat,* Science to Solutions Series Number 4. Sage Grouse Initiative. 4pp. http://www.sagegrouseinitiative.com/.

such as those advocated in Land Use Plan Amendments, could prove so burdensome that ranching on private lands will become unsustainable. Private lands integral to GRSG conservation, then, would be marketed and sold. When this land is subdivided, GRSG populations would suffer. Accordingly, the very regulatory mechanisms proposed may threaten the productive private and public land relationships that sustain ranching, rural communities and wildlife populations.

G. State, Local and Private Conservation Efforts

The Monograph fails to recognize that states have undertaken significant efforts to conserve GRSG. State conservation plans are preferable alternatives to the misdirected management protocols in the NTT and COT Reports and the Monograph. Federal agencies can rely upon state, regional, and local plans in their consideration of environmental impacts under NEPA.[199]

As Utah Governor Gary Herbert has pointed out, state plans better balance future economic activities with robust protections for GRSG, and were developed using a bottom-up process with input from diverse stakeholders, rather than the top-down approach taken by the agencies.[200]

The Monograph also fails to adequately consider the states' primary authority over wildlife management and their central role in managing GRSG populations and habitat within their borders. For example, Connelly et al. 2011 does not adequately address how individual states or the private sector have contributed to GRSG conservation. For example, the paper only referenced the study of GRSG response to the Conservation Reserve Program in Washington

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[199] *See, e.g.* 40 CFR § 1502.21; *Georgia River Network v. U.S. Army Corps of Engineers*, 334 F. Supp. 2d 1329, 1345 (N.D. Ga. 2003) (agency properly relied upon federal, state and local regulations, including local land use plan); *Sierra Club North Star Chapter v. La Hood*, 693 F. Supp. 2d 958, 990 (D. Minn. 2010) (accepting reliance on local plans in indirect effects analysis).

[200] *See* attached Exhibit A.

State when discussing the efforts of individual states and private sector's conservation efforts. *See* Exhibit B at 130-131, and 134. A paper that is cited for a proposition involving private land should have a more detailed analysis of individual state and private sector efforts to be considered the best scientific and commercial data available. Connelly at al. 2011 lacked critical hypothesis testing and ignored evidence that GRSG may adapt to a disturbed environment. For example, highly naturally fragmented habitats have GRSG persistence. *See* Exhibit B at 136-137.

The states are better suited than the federal government to manage GRSG as such action falls within their traditional jurisdiction and professional expertise. Active consultation between the states and federal agencies, as well as local governments and local GRSG working groups, is a more effective approach than the top-down, one-size-fits-all restrictions in the Reports.

Even the federal government's Sage Grouse Initiative has recognized the importance of private lands to GRSG conservation.[201] Irrigation on private land also provides an important link to GRSG leks which are often located on drier public lands. As *The Progressive Rancher* reported, hundreds or more small homesteads covered large portions of Nevada in the late 1800s to the mid-1900s.[202] The homesteads were nearly always located on a spring or stream that the owners used to irrigate meadows. The homesteaders also vigorously shot and trapped predators, such as coyotes, ravens and badgers. As the Reason Foundation summarized, "[T]he result, according to the article, was a higher sage grouse population than exists today and a distinct

[201] Sage Grouse Initiative. 2014. *Private Lands Vital to Conserving Wet Areas for Sage Grouse Summer Habitat,* Science to Solutions Series Number 4. Sage Grouse Initiative. 4pp. http://www.sagegrouseinitiative.com/.

[202] Progressive Rancher, July/August Edition (last visited Dec. 23, 2014 at 4:24 PM). http://www.progressiverancher.com/Resources/ProgressiveRancher_JulyAug2014.pdf (last visited Dec. 23, 2014 at 4:36 PM).

geography to the grouse's high quality water-dependent habitat: lots of it in small pockets scattered widely across the landscape."[203]

Contrary to some assertions, federal regulation of private land is not conducive to continued conservation. Rather, federal regulation has a significant chilling effect on local, state and private conservation efforts. For example, when FWS proposed listing the Gunnison GRSG despite over $50 million in state investment and 65,000 acres of private lands protected by conservation easements, county officials felt deeply betrayed. Commission Chair Paula Swenson said she was "furiously frustrated" and Commissioner Jonathan Houck, former mayor of the town of Gunnison, said he felt "cut off at the knees."[204] Upon listing the Gunnison sage-grouse, Colorado Governor John Hickenlooper, in a significant bipartisan press release with Members of Colorado's Congressional Delegation, stated:

> "We are deeply disappointed the U.S. Fish and Wildlife Service chose to ignore the extraordinary efforts over the last two decades by the state, local governments, business leaders and environmentalists to protect the Gunnison sage grouse and its habitat. This sends a discouraging message to communities willing to take significant actions to protect species and complicates our good faith efforts to work with local stakeholders on locally driven approaches. In short, this is a major blow to voluntary conservation efforts and we will do everything we can, including taking the agency to court, to fight this listing and support impacted local governments, landowners and other stakeholders."[205]

In response to the Gunnison listing decision, the Colorado Cattlemen's Association issued a release titled, "Lawsuit-Inspired Listing Ends 20 Years of Conservation Efforts."[206]

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[203] Brian Seaholes, *Sagge Grouse Success is Inextricably Linked to Ranching and Farming in the West According to the Co-author of a Groundbreaking New Study*, http://reason.org/blog/show/sage-grouse-success-is-inextricably# (Oct. 9, 2014 at 9:43 AM) (last visited Dec. 23, 2014 at 4:38 PM).

[204] Lynn Bartels, The Denver Post, *Gunnison Seeks to Protect Grouse, Residents from Endangerment Listing*, http://www.denverpost.com/news/ci_26539987/gunnison-seeks-protect-grouse-residents-from-endangerment-listing (Sept. 15, 2014) (last visited on Dec. 23, 2014 at 4:40 PM).

[205] Official Colorado State Web Portal, *Gov. Hickenlooper, Senators Bennet and Udall and Congressman Topton Issue Statements on Gunnison sage Grouse Listing Decision*, http://www.colorado.gov/cs/Satellite?c=Page&childpagename=GovHickenlooper%2FCBONLayout&cid=1251658153409&pagename=CBONWrapper (Nov. 12, 2014) (last visited on Dec. 23, 2014 at 4:43 PM).

[206] http://us8.campaign-archive2.com/?u=8f5fe0c71eb61a94f0da35e3f&id=7432815534

Similarly, in a letter to Interior Secretary Sally Jewel, the Western Governor's Association expressed deep disappointment in one-size-fits-all regulatory restrictions proposed for GRSG and that coordination with the states was "treated more as an afterthought."[207]

These assertions are backed by sound evidence. According to the NRCS, private conservation efforts declined by 95% when FWS proposed listing the bi-state population of GRSG. Even worse, private landowners understandably manage their lands specifically to avoid the presence of species once they have been listed under the ESA.[208]

VI. The DQA Applies to the Monograph

The U.S. Department of the Interior ("DOI") issued its Guidelines to ensure high quality information is generated, used, and disseminated; and to comply with OMB's charge that each agency adopt DQA Guidelines.[209] "The Department's methods for producing quality information will be made transparent, to the maximum extent practicable, through accurate documentation, use of appropriate internal and external review procedures, consultation with experts and users, and verification of its quality."[210] Information released by DOI will be reproducible to the extent possible and influential information shall be produced with "a high degree of transparency about data and methods."[211] "Analytic results shall generally require sufficient transparency about data and methodology that an independent reanalysis could be undertaken by a qualified member of the public resulting in substantially the same results."[212]

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[207] http://westgov.org/news/298-news-2014/800-western-governors-concerned-federal-work-with-states-on-sage-grouse-conservation-an-afterthought-seek-clear-concise-input

[208] Brian Seasholes of the Reason Foundation has provided an excellent summary of landowner reactions to the perverse disincentives of the ESA: http://reason.org/blog/show/the-state-of-the-birds-2014-report (emphasis added).

[209] DOI, *Information Quality Guidelines Pursuant to Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001*, https://www.doioig.gov/docs/InformationQualityGuidelines.pdf ("DOI Guidelines") at II.

[210] DOI Guidelines, II.

[211] *Id.*

[212] *Id.*

The USGS Guidelines apply to all USGS information disseminated to the public on or after October 1, 2002.[213] The USGS Guidelines expressly state that the DOI and OMB Guidelines including the standards and definitions therein also apply to the USGS Guidelines.[214]

A. Information Dissemination Product

The OMB Guidelines define "Information Dissemination Product" as "any books, paper, map, machine-readable material, audiovisual production, or other documentary material, regardless of physical form or characteristic, an agency disseminates to the public. This definition includes any electronic document, CD-ROM, or web page."[215] Similarly, the USGS Guidelines, "cover all information produced by the USGS in any medium, including data sets, web pages, maps, audiovisual presentations in USGS-published information products, or in publications of outside entities."[216]

The DQA and the Guidelines clearly apply to the Monograph. The cover page of each Chapter preserves the USGS' "proprietary" interest in the information contained in each chapter as it's "publisher." The Monograph provides:

> This manuscript contains unpublished, peer-reviewed, scientific information. It has been accepted for future publication in a special volume of the Cooper Ornithological Society scientific series "Studies in Avian Biology." No waiver of proprietary rights to the information is granted by this release on the part of the Cooper Ornithological Society and its publisher, the USGS, or the author(s) of the manuscript.[217]

The Monograph is not exempt from USGS Guidelines, as each chapter of the Monograph was sponsored by USGS, authored or edited by USGS staff, and distributed on the USGS

[213] USGS Guidelines, I.
[214] *Id.*
[215] 67 Fed. Reg. 8452, 8460 (Feb. 22, 2002).
[216] USGS Guidelines, III.
[217] http://web.archive.org/web/20100527164855/http://sagemap.wr.usgs.gov/Docs/SAB/Forward.pdf.

website.[218] USGS also provided logistical and financial support for the Monograph. *See* Exhibit A at 6. The USGS Guidelines apply to information distributed by outside parties if it was conducted at the direction or sponsorship of USGS.[219] It should be noted that the COS charges the public $95 per hardcopy of the Monograph.[220]

Here, the OMB and DOI Guidelines apply to the Monograph as it was both sponsored and disseminated by USGS. Moreover, the Monograph has been heavily relied upon by other agencies, including FWS, BLM and the U.S. Forest Service ("USFS"). Accordingly, it meets the definition of "information dissemination product" under the Guidelines.

The intended users of this information include FWS, BLM, the U.S. Forest Service, state and local governments, domestic energy producers, agricultural producers, public land managers, local and state governments and the general public.

OMB Guidelines define "Dissemination" as "agency initiated or sponsored distribution of information to the public."[221] As provided above, the Monograph was disseminated by USGS through publication on its website.[222] No fewer than 12 USGS employees contributed to the Monograph and influential chapters therein. Additionally, USGS and FWS have represented the Monograph as its own and/or as an official position of the agency in such a way that the Guidelines apply.[223]

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[218] USGS, Sagemap Projects, The Monograph Chapters, http://web.archive.org/web/20100527124712/http:/sagemap.wr.usgs.gov/monograph.aspx (last modified March 5, 2010).
[219] USGS Guidelines, I.
[220] USGS, Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats: *a Release of a Scientific Monograph with Permission of the Authors, the Cooper Ornithological Society, and the University of California Press*, http://web.archive.org/web/20100527124712/http://sagemap.wr.usgs.gov/monograph.aspx
[221] 67 Fed. Reg. 8452, 8460 (Feb. 22, 2002).
[222] USGS, Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats: *a Release of a Scientific Monograph with Permission of the Authors, the Cooper Ornithological Society, and the University of California Press*, http://web.archive.org/web/20100527124712/http://sagemap.wr.usgs.gov/monograph.aspx
[223] OMB, Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies, http://www.whitehouse.gov/omb/fedreg_reproducible.

B. Third-Party Information

To the extent USGS considers the Monograph third-party information, the DQA and its Guidelines still apply. Third-party information that an agency makes public is also subject to the Data Quality and the Guidelines. Here, USGS has clearly funded and adopted the Monograph.[224]

As noted above, the USGS Guidelines expressly state they incorporate OMB and DOI Guidelines. However, the USGS Guidelines conflict with the DQA and the OMB and DOI Guidelines in regards to third-party information. The USGS Guidelines state, where third-party information "is not verifiable, the source will be made transparent to the public, and such information will not be subject to these guidelines."[225] The USGS Guidelines provide:

> "The USGS takes steps to ensure that the quality and transparency of data and information provided by external sources are sufficient for the intended use. Reference to and use of third party data and information is complex and requires extensive collaboration with the scientific and technical community and other external data providers. Third-party data may carry inherent accuracy weaknesses in that the data content often cannot be checked nor their accuracy controlled. In instances where the referenced information is not verifiable, the source will be made transparent to the public, and such information will not be subject to these guidelines."

USGS Guidelines, III.5. OMB Guidelines provide, "[I][f third-party submissions are to be used and disseminated by Federal agencies, it is the responsibility of the Federal Government, under the Data Quality Act, to make sure that such information meets relevant information quality standards."[226] The Guidelines state third-party information endorsed, adopted, disseminated or relied upon, must meet the quality, objectivity, utility and integrity standards required by the Data Quality Act and should be subject to DQA correction. The DOI Guidelines expressly apply to non-Departmental parties that develop scientific and technical information on its behalf.[227]

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[224] The USGS provided logistical and financial support for the Monograph.
[225] USGS Guidelines, III.5 (emphasis added).
[226] OMB § 11 "Information Quality: A Report to Congress" (April 30, 2004).
[227] DOI Guidelines II.4; DOI Guidelines V.

USGS may not re-write the DQA or the OMB or DOI Guidelines. Rather, USGS must revise its Guidelines to accord with the authorities it purports to follow. In regard to the Monograph, USGS has also failed its own transparency standards. The failure to provide underlying data for the numerous models and studies incorporated into the Monograph renders it far from transparent and clearly not reproducible. Moreover, as discussed below, USGS in its Guidelines and in practice steadfastly refuses to disclose underlying data, the identity of peer reviewers, peer reviewer comments and how comments were addressed in the final work product. These overt violations of the DQA, the Guidelines and the additional authorities cited herein must be corrected.

The USGS Guidelines also purportedly address the use of metadata in assuring the quality, utility, objectivity, and transparency of third-party data.[228] It is alleged to be a means by which the agency documents methods and techniques used in studies.[229] While USGS avers that it conforms to established national and international standards for metadata, such as the Federal Geographic Data Committee Geospatial Metadata Standards, Petitioners and the public have no means in which to verify this given the agency's secretive approach.[230]

C. If Uncorrected, the Monograph Will Cause Substantial Harm

As discussed in detail herein, reliance on uncertainties, inaccuracies, bias and misrepresentation in the Monograph will influence the listed status of GRSG under the ESA and will effect dramatic changes across millions of acres of public lands. To avoid actual harm to the Petitioners, western states, local governments, private landowners and stakeholders, USGS must timely respond to this DQA challenge and retract statements and conclusions based on uncertainties and correct bias and misrepresentation of the information disseminated.

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[228] USGS Guidelines, III.5.
[229] *Id.*
[230] *Id.*

Where, as here, Petitioners have provided "significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts," corrective action must include a retraction of the Monograph and its withdrawal from consideration in any listing decision on GRSG or as support for restrictive alternatives in Land Use Plan Amendments by BLM or USFS.

D. The Monograph is Highly Influential Information

The information disseminated here readily qualifies as influential information. USGS has expressly adopted OMB and DOI Guidelines. As OMB states, "[T]he more important the information, the higher quality standards to which it should be held ... ."[231] Ordinary information is distinguished from "influential" information, that is, scientific, financial and statistical information having a clear and substantial impact on important public policies or important private sector decisions. "Influential" information is subject to higher standards of quality and should be reproducible by qualified third parties. The information disseminated in the Monograph is information of extreme importance to the listed status of GRSG, and to states, landowners, user groups and local conservation efforts.

The OMB Guidelines define "influential" requests for correction as those of a substantive nature, which sought "something more than a straightforward webpage or data fix. "Influential" has also been defined to mean "that the agency can reasonably determine that dissemination of the information will have or does have a clear and substantial impact on important public policies or important private sector decisions."[232]

The information disseminated in the Monograph is information of extreme importance. It qualifies under the Guidelines as substantive notices, policy documents, studies and guidance

[231] 67 Fed. Reg. 8452 (Feb. 22, 2002).
[232] 67 Fed. Reg. 8452, 8455 (Feb. 22, 2002).

relied upon by the agency to make decisions that could affect multiple federal and state agencies, local governments, tribes and private individuals in 11 western states and on nearly 60 million acres of public lands. The Monograph was integral to the FWS 2010 WBP decision on GRSG. FWS cited four chapters of the Monograph no fewer than 174 times. *See* Exhibit A at 7.

The Monograph has also influenced BLM and USFS revisions in 98 land use plans ("Land Use Plan Amendments") across 11 western states.[233] The conservation measures in the Land Use Plan Amendments were developed by the GRSG National Technical Team ("NTT") and the FWS Conservation Objectives Team ("COT") which included many of the same staff and scientists from BLM, FWS and USGS involved in the Monograph.[234]

Many of the action alternatives in the 98 Land Use Plan Amendments were based in part on approximately 18 of the 25 chapters of the Monograph and references thereto in the NTT and COT Reports. Accordingly, BLM, FWS and USFS have relied upon and disseminated, flawed information from the Monograph.

An even higher level of scrutiny is applied to such highly influential scientific assessments. Highly influential scientific assessments are those that "the agency or the [OMB Office of Information and Regulatory Affairs] Administrator determines . . . could have a potential impact of more than $500 million in any one year on either the public or private sector or that . . . is novel, controversial, or precedent-setting, or has significant interagency interest."[235] Such is clearly the case here.

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[233] BLM, *Federal Agencies Announce Initial Step to Incorporate Greater Sage-Grouse Conservation Measures into Land Management Plans*, http://www.fws.gov/mountain-prairie/species/birds/sagegrouse/COT/COT-Report-with-Dear-Interested-Reader-Letter.pdf .

[234] BLM, A Report on National Greater Sage-Grouse Conservation Measures, http://www.blm.gov/pgdata/etc/medialib/blm/co/programs/wildlife.Par.73607.File.dat/GrSG%20Tech%20Team%20Report.pdf.

[235] OMB, *Final Information Quality Bulletin for Peer Review*, at 23 (2004) (hereinafter *OMB Bulletin*) *http://www.whitehouse.gov/sites/default/files/omb/assets/omb/memoranda/fy2005/m05-03.pdf.*

The impacts of the Land Use Plan Amendment process and of a potential ESA listing will last for potentially decades and will far exceed $500 million. An independent study has shown that just BLM's Land Use Plan Amendments would have an annual economic impact of between $840 million and $5.6 billion.[236] This does not include impacts on National Forests or private and state lands. These are clearly controversial, novel, precedent-setting issues of significant interagency and public interest. Thereby, the fatally flawed Monograph carries great, but undue, influence. For all of these reasons, the Monograph is highly influential information subject to heightened scrutiny under the DQA and the Guidelines.

E. Petitioners are "Affected Person(s)" Qualified to Bring a DQA Challenge

The OMB Guidelines also require each agency to establish administrative mechanisms that allow "affected persons" to seek and obtain the correction of information that does not meet the OMB Guidelines.[237] OMB makes clear that the purpose of the administrative mechanism is to "facilitate public review" of agency compliance with the OMB Guidelines.[238] The OMB Guidelines concluded that "affected persons are people who may benefit or be harmed by the disseminated information. This includes persons who are seeking to address information about themselves as well as persons who use information."[239] Such a definition provides the public with a right to agency-disseminated information that meets high DQA standards; and with a right to correct any publicly disseminated information that does not meet these standards.

Petitioners are "affected persons" within the meaning of the Guidelines. Petitioners and their members or constituents have a distinct interest in the conservation of GRSG and rely upon

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[236] Law Offices of Lowell E. Baier, *Economic Impact of 2013 BLM Sage Grouse Conservation Plan*, March 1, 2014, http://www.westernenergyalliance.org/sites/default/files/Sage%20Grouse%20Economic%20Report%20-%20Final%20from%20Minuteman%20Press.pdf
[237] 67 Fed. Reg. at 8452.
[238] *Id.*
[239] 66 Fed. Reg. 49718, 49721 (Sept 28, 2001).

public and private lands within the range of the GRSG for the production of natural resources, agricultural goods and products, for revenues distributed to the states and local governments, for recreation and for wildlife conservation. Petitioners have a reasonable likelihood of suffering actual harm from dissemination of the Monograph unless the USGS resolves this complaint prior to the final agency actions and information products at issue herein.

Petitioners have used and will use the information disseminated to better inform and guide their business decisions. Their members and/or constituents are affected by information regarding GRSG numbers, dispersal, and distribution, as well as alleged threats to the species. Where the species is located, how it disperses, and where it is distributed could have strict regulatory consequences to those that produce agricultural products and natural resources from public lands that could be affected. In addition, the local governments rely upon continued access to public lands for natural resources and recreation and the tax and other revenues they generate. Accordingly, Petitioners could be benefited by, or be harmed by the faulty information at issue.

Petitioners are involved in extensive conservation efforts across the West to conserve GRSG while also preventing unfounded federal regulatory restrictions and a listing under the ESA, which would prove less effective than the state and local efforts underway. These conservation efforts include the collection of data used to manage and study GRSG, and ongoing state, local and private conservation efforts for the GRSG. Petitioners have established their interests in ensuring that their members and constituents as well as the public at large have the opportunity for open and robust debate regarding the information disseminated.

VII. The Monograph Does Not Comply with Other Federal Standards

In addition to the many DQA issues discussed herein, the Monograph also violates

Presidential, DOI and agency standards on scientific integrity.

A. The Monograph Report Does Not Comply with Presidential Direction on Scientific Integrity and Transparency

While scientific integrity and transparency in agency decision making are enumerated priorities for this administration, the Monograph falls far short of these goals. The Monograph also falls short of the President's direction to executive departments and agencies. On March 9, 2009, President Obama issued a Memorandum setting forth principles "for ensuring the highest level of integrity in all aspects of the executive branch's involvement with scientific and technological processes."[240] When scientific or technological information is considered in policy decisions, the information is to be subject to well-established scientific processes, including peer review where appropriate. Agencies are directed to appropriately and accurately reflect that information in complying with relevant statutory standards.[241] Such was not the case here.

President Obama committed to "an unprecedented level of openness in Government" by "work[ing] together to ensure the public trust and establish a system of transparency, public participation, and collaboration."[242] President Obama believes that "[o]penness will strengthen our democracy and promote efficiency and effectiveness in Government."[243] In this case, the Monograph has been far from transparent. The USGS failed to disclose virtually any information relative to transparency.

President Obama reaffirmed his commitment to scientific integrity as part of his second term's scientific agenda in 2012.[244] More specifically, the president stated that he had "directed

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[240] 74 Fed. Reg. 10671, 10671 (March 11, 2009).
[241] *Id.*
[242] Barack Obama, *Transparency and Open Government: Memorandum for the Heads of Executive Departments and Agencies*, http://www.whitehouse.gov/the_press_office/TransparencyandOpenGovernment.
[243] *Id*.
[244] *See* Barack Obama, Science Debate 2012, http://www.sciencedebate.org/debate12/ at No. 11 (Sept. 4, 2012); see also Dan Cergano, USA Today, Updated: Obama, Romney Tackle Science Debate Questions,

the White House Office of Science and Technology Policy to ensure that our policies reflect what science tells us without distortion or manipulation," because the President has "insisted that we be open and honest with the American people about the science behind our decisions."[245] Furthermore, "only by ensuring that scientific data is never distorted or concealed to serve a political agenda, making scientific decisions based on facts, not ideology, and including the public in our decision making process will we harness the power of science to achieve our goals – to preserve our environment and protect our national security; to create the jobs of the future, and live longer, healthier lives."[246]

B. The Monograph Fails to Comply with DOI Scientific Integrity Standards

The Monograph also runs afoul of DOI standards on scientific integrity. It suffers from a lack of objectivity, clarity, reproducibility and utility. *See* Exhibits A and B, *gen*.

The DOI Manual implemented a secretarial order: Integrity of Scientific and Scholarly Activities (effective Jan. 28, 2011). The DOI Manual defines "scientific and scholarly integrity" to mean, "[t]he condition resulting from adherence to professional values and practices, when conducting and applying the results of science and scholarship, that ensures objectively, clarity, reproducibility, and utility." [247]

Former Secretary of the Interior Ken Salazar, in announcing his Departmental order on scientific integrity, noted, "[t]he American people must have confidence that the Department of the Interior is basing its decisions on the best available science and that the scientific process is

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http://content.usatoday.com/communities/sciencefair/post/2012/08/obama-and-romney-to-tackle-science-debate-questions-/1#.VJR9BsAKA (Sept. 4, 2012).

[245] *Id*.

[246] *Id*.

[247] *Available at:* http://elips.doi.gov/elips/browse.aspx.

free of misconduct or improper influence."[248] On December 16, 2014, DOI updated and strengthened the policy to "ensure that all Interior employees and contractors uphold the principles of scientific integrity."[249] The policy is to establish the expectations for how scientific and scholarly information is considered and used:

> "Scholarly information considered in Departmental decision making must be robust, of the highest quality, and the result of as rigorous scientific and scholarly processes as can be achieved. Most importantly, it must be trustworthy. This policy helps us to achieve that standard."[250]

Adherence to these DOI standards is to ensure, "objectivity, clarity, reproducibility, and utility of scientific and scholarly activities and assessments and helps prevent bias, fabrication, falsification, plagiarism, outside interference, censorship, and inadequate procedural and information security."[251]

C. The Monograph Violates USGS Scientific Integrity Standards

The USGS Manual Chapter on Scientific Integrity (SM 500.25)[252] establishes a code of scientific conduct for USGS employees and volunteers along with a procedure for addressing allegations of scientific misconduct. "Issues related to scientific excellence, objectivity, integrity, and conflict of interest are dealt with in accordance with established DOI and USGS codes of scientific conduct (SM 500.25)."[253]

The Manual provides that scientific activities follow "standard protocols and procedures and include any of the physical, biological, or social sciences as well as engineering and

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[248] Press Release, U.S. Dep't of the Interior, Salazar Issues Secretarial Order to Ensure Integrity of Scientific Process in Departmental Decision-Making (Sept. 29, 2009), http://www.doi.gov/news/pressreleases/Salazar-Issues-Secretarial-Order-to-Ensure-Integrity-of-Scientific-Process-in-Departmental-Decision-Making.cfm.

[249] DOI, *Press Release: Interior Department Announces Strengthened Scientific Integrity Policy for Employees and Contractors*,

[250] 305 DM 3.4.; I:\Western Energy Alliance\DQA Challenge\Research\Interior Dept. New Policy\Integrity of Scientific and Scholarly Activities.html (emphasis added).

[251] 305 DM 3.5.

[252] http://www.usgs.gov/usgs-manual/500/500-25.html

[253] USGS Manual 502.3.5.D.

mathematics that employ the scientific method."[254] It defines the scientific method as, "[A] method of research in which a problem is identified, relevant data are gathered, a hypothesis is formulated from these data, and the hypothesis is empirically tested."[255] Unfortunately, as referenced above, the Monograph chapters described herein, and in the Exhibits, did not adhere to the scientific method. There was no hypothesis testing used by any of the authors in this 25-chapter monograph. *See* Exhibit A at 13.

Co-authorship[256] with non-USGS authors does not negate these requirements:

> "Where a non-USGS author is the lead and a USGS scientist is a co-author, the USGS scientist must comply with USGS peer review requirements in this chapter or the USGS scientist may not be listed as a co-author. USGS scientists with joint university affiliations are not exempt from complying with USGS peer review requirements."[257]

Nor can USGS classify the Monograph chapters in a way to avoid application of these standards. To the extent USGS considers any of these chapters "extended abstracts"[258] they certainly contain "new interpretive information" which requires peer review and USGS approval.[259]

As addressed herein, and in Exhibits A and B, USGS has not complied with its own Scientific Integrity Standards.

D. USGS is Not Meeting its Mission and Vision

The mission of USGS is to, "serve[s] the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural

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[254] USGS Manual 500.25. E.5.
[255] *Id*.
[256] In regard to submittals to peer-reviewed journal articles, USGS peer review requirements still apply. There, one review is to be initiated or coordinated by USGS with a reviewer that can be internal or external to USGS and one review is to be initiated or coordinated by the journal under its selection and review criteria. USGS Manual 502.3.4.H.
[257] USGS Manual 502.3.4.D.
[258] "Extended abstracts typically are multi-page; summarize scientific studies, results, and principal conclusions; and are often included in a larger volume containing other abstracts intended for release as proceedings or refereed journal publications.…" USGS Manual 502.3.4.I.
[259] *See* USGS Manual 502.3.4.I.

disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life."[260] The agency's vision statement states, "[T]he USGS is a world leader in the natural sciences through its scientific excellence and responsiveness to society's needs."[261] In this case, USGS is not meeting these lofty goals.

The reports incorporated into the Monograph and adopted by USGS are hardly "reliable scientific information" that exhibit "scientific excellence" or "responsiveness to society's needs."[262] *See* Exhibits A and B, *gen*. In fact, adoption of the Monograph in agency decision-making has, and will, result in tremendous societal and economic costs with little or no quantifiable environmental benefits.

While USGS purports to provide "unbiased, objective, and impartial scientific information upon which our audiences, including resource managers, planners, and other entities, rely,"[263] the Monograph is biased, unreliable and irreproducible. Accordingly, agency reliance, and dissemination of same, fails to meet USGS Fundamental Science Practices (FSP) as reflected in the agency's mission and vision.[264]

VIII. Conclusion

The Monograph is a highly influential document, as BLM and USFS are using it to make substantial land use decisions across nearly 60 millions of acres of public lands throughout 11 western states and FWS relied heavily upon it in its 2010 WBP decision and will do so for the upcoming decision. As such, it must adhere to the standards of quality, integrity, objectivity and utility in the DQA as well as administration standards of scientific integrity and transparency.

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[260] USGS Guidelines II.1.
[261] USGS Guidelines II.2.
[262] USGS Guidelines II.
[263] USGS, Fundamental Science Practices, http://www.usgs.gov/fsp/ (last modified Jan. 28, 2013).
[264] *Id.*

Unfortunately, the Mongraph fails to meet these requirements. Much of what it presents as "science" has no basis in scientific design or scientific evidence.

USGS should rely upon data of the highest integrity and accuracy in the Monograph. Unfortunately, the most frequently cited sources contain fundamental flaws including gaps in crucial data, data that are not public, recurrent uncertainties, methodological bias, selective presentation of information, misrepresentation of cited studies and suspect peer reviews. *See* Exhibits A and B, *gen*. Opinions must not be represented as fact nor dictate decisions that are required to be based on scientific data.

The Monograph violates the DQA, the Guidelines as well as the secretarial, presidential and other authorities cited herein. Much of what is presented as "science" has no basis in scientific design or scientific evidence. Notably, the Monograph provides no original data nor quantitative analyses. It fails to provide a comprehensive and unbiased review and perpetuates outdated information and beliefs.

The Monograph is not presented in an accurate, reliable and unbiased manner. It cherry-picked what scientific papers it wished to discuss, presented misleading information, and presented much information out of context and simply ignored large numbers of studies that refute many of its conclusions.

The Monograph does not represent the best available science as required to meet the standards of quality, objectivity and integrity required in the DQA. Rather, the Monograph is comprised of assumptions built upon assumptions. It fails to address the limitations of the underlying data and studies used to reach its conclusions and fails to acknowledge that circumstantial evidence rather than scientific evidence underlies most of the information presented.

The USGS cannot rely on the biased opinions and selective presentation of information to support recommendations that are unsupported by data. As detailed in the text herein and in Exhibits A and B, the Monograph failed to:

- Use sound analytical methods in carrying out scientific analyses and in preparing risk assessments
- Use reasonably reliable and reasonably timely data and information e.g., collected data such as from surveys, compiled information, and/or expert opinion
- Ensure transparency in its dissemination by identifying known sources of error and limitations in the data
- Evaluate data quality and, where practicable, validate the data against other information when using or combining data from different sources
- Ensure transparency of the analysis, to the extent possible, consistent with confidentiality protections, by
    - Presenting a clear explanation of the analysis to the intended audience
    - Providing transparent documentation of data sources, methodology, assumptions, limitations, uncertainty, computations, and constraints
    - Explaining the rationale for using certain data over other data in the analyses
    - Presenting the model or analysis logically so that the conclusions and recommendations are well supported.
- Clearly identify sources of uncertainty affecting data quality
- Clearly state the uncertainty of final quantitative estimates
- Demonstrate that data and data collection systems used are of sufficient quality and precision that uncertainty in the final estimates is appropriately reproducible
- Provide an explanation of the nature of uncertainty in its analysis.

The errors contained in the Monograph are improperly influencing BLM and USFS decision-making on public land management as well as FWS decisions on the listed status of GRSG. Reliance on this biased and faulty information has and will continue to harm the Petitioners and their members. In addition to the damage to the Petitioners, the public, GRSG and the economy will be negatively impacted based upon the errors in the Monograph.

The Petitioners respectfully request USGS retract the Monograph and all reliance thereon in existing and subsequent Land Use Plans Amendments, as well as applicable decisions on listed status of GRSG and/or on permits and authorizations. Alternatively, USGS could, as required by the DQA and the Guidelines, issue an amended Monograph that uses sound analytical methods and the best data available while ensuring transparency and objectivity. Any amended Report should incorporate all reliable information and alternative hyptheses, not just selective supporting information and subjective interpretations of results. It should also identify the limitations of data used rather than stating assumptions as fact. Finally, any amended Report should use and include the best available data as discussed herein.

Respectfully submitted this 18th day of March, 2015.

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Center for Environmental Science, Accuracy & Reliability

Science or Advocacy?

ECOLOGY AND CONSERVATION OF GREATER SAGE-GROUSE: A LANDSCAPE SPECIES AND ITS HABITATS

An analysis of the four most influential chapters of the monograph.

Analysis prepared by staff at the Center for Environmental Science, Accuracy and Reliability (CESAR), Sacramento, California, www.bestscience.org

1 February 2012

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Introduction

An Endangered Species Act (ESA) listing of the greater sage grouse could result in myriad adverse effects on the economies of affected states and counties. Since virtually all economic activities in the affected states are identified as threats to the sage grouse's continued existence, ESA inclusion of the sage grouse will inevitably result in vast, costly economic disturbances. The U.S. Fish and Wildlife Service (FWS) has explicitly identified oil and gas related activities, power transmission and distribution, wind power production, urbanization, recreation, farming and ranching among activities threatening the grouse. FWS has also identified fencing, roads, and power transmission lines as contributing to the bird's decline.

Limitation or cessation of these activities will fundamentally change human and animal lives throughout the west. Removal of fences, roads and livestock will have a profound effect on economic activity as well as quality of life. The effects of an ESA listing of the sage grouse will occur in all eleven states where the bird is found, determining to a notable extent how and where food is grown, water is used, resources are extracted, and even where citizens can enjoy the beauty of natural resources.

Given the tremendous impact of an ESA listing to the human

Economic and social dislocations as profound as these are justified only if based on data demonstrating the accuracy and reliability of the FWS's assessment of the status of the sage grouse.

environment, a listing must be the result of a systematic consideration of all threats based solely on scientific data. Otherwise, the law does not authorize it. The Center for Environmental Science, Accuracy and Reliability (CESAR) is dedicated to ensuring that the ESA is fully and uniformly enforced, without bias. CESAR acts on the principle that accurate scientific data and thorough examination of its implications result in the conservation of natural resources and a thriving society. To this end, CESAR undertook an examination of the data supporting the FWS listing determination. Our intent is to lend insight into the scientific foundation for the determination in order to better understand any necessary conservation actions.

A listing must be the result of a systematic consideration of all threats based solely on scientific data

Our review focused primarily on the Cooper Ornithological Society's Monograph: *Studies in* Avian *Biology.* This monograph/volume is unusual in that it was written specifically as a primary resource document for the FWS's 2010 decision on greater sage grouse. Based on the information in the monograph, FWS determined the grouse was warranted for listing as "threatened" under the ESA but its listing was "precluded by other priorities." The decision was in part a result of repeated, and ultimately successful, litigation by various corporations invested in the issue.

A cursory review reveals a limited variety of sources and lack of adherence to standard peer-review protocols. Over one third of the authors were federal biologists (12 from the USGS, 1 from BLM, and 1 from USFWS, out of 38 authors).

However, when all authors were totaled across all papers, the proportion of federal authors was even higher (44%).

Studies in Avian Biology, Knick (USGS) and Connelly (Idaho Game and Fish), were also authors on multiple chapters (nine and seven papers respectively out of 25 chapters total). These numbers indicate that the editors were essentially reviewing, editing, and approving their own work for publication.

At least six months prior to being made available to the public, near-final chapters of *Studies in Avian Biology* were provided to the FWS as they were completed. These chapters were central in the FWS decision-making process regarding the potential ESA listing of the sage grouse. Information contained within the 25 chapters was distilled into a PowerPoint presentation by Carol Schroeder (Director, Forest and Rangeland Ecosystem Science Center, USGS) and presented to staff and decision-makers at the Department of Interior in Washington, DC on 31 July 2009. However, neither the chapters, nor the USGS presentation, were available for public review until November 2009, when the documents were posted on the USGS Sagemap website. This transparency was forced by repeated requests, including Freedom of Information Act requests. The chapters were then removed from the Sagemap website after publication in *Studies in Avian Biology* in July 2011.

These chapters were central in the FWS decision-making process regarding the potential ESA listing of the sage grouse…

USGS provided logistical support for the publication, and underwrote the financial costs including payment of page charges to the Cooper Ornithological Society (COS), the publisher of *Studies in Avian Biology*.

After being paid once by USGS for the project, *Studies in Avian Biology* became a profit center of the Cooper

Ornithological Society (COS) and is available for US$95.00 (hard copy or e-book format). The public cannot copy any text from COS's e-book version nor print any of its contents. This effectively limits distribution and restricts independent review while securing and increasing COS's profit. Compare this to the .pdf versions available temporarily on the USGS website at http://sagemap.wr.usgs.gov/monograph.aspx, documents that were easily accessed by the taxpayers who paid for their production at USGS and at COS.

This raises the question of whether the documents are a private product or a U.S. Government product since the taxpayers undoubtedly supported the production and publication.

We found only minor editorial changes between the final drafts posted online and used by the FWS for the listing decision and those included in the final *Studies in Avian Biology* monograph. However, the chapter numbers and order were changed, eliminating direct comparisons by chapter. Therefore, this review uses citations by year and chapter number (e.g. 2009 for the original posted chapters cited by the FWS (2010), and 2011 for the final version published in *Studies in Avian Biology*).

A quantitative measure of the importance of this monograph in the FWS's decision-making process can be found through a review of the 2010 sage grouse ESA-listing determination (FWS 2010). Three chapters in particular were cited numerous times (48 to 65 citations). We therefore review here: the introductory chapter and the three chapters most important to the listing determination. First we review the introductory chapter, *Greater sage-grouse and sagebrush: an introduction to the landscape* (Knick and Connelly 2009, 2011) because it sets the context for all of the chapters that follow. Next, we review the top three chapters cited by the FWS in its 2010 'warranted but precluded' decision on sage grouse. These are, in order of importance (the number of times they

were cited by FWS):

- 65 citations: Greater Sage-Grouse population dynamics and probability of persistence.
- 58 citations: Ecological influence and pathways and land use in sagebrush.
- 48 citations: West Nile virus ecology in sagebrush habitat and impacts on greater sage-grouse populations.

Finally, the recent questions raised regarding the scientific rigor and integrity of the science supporting other FWS regulatory actions[1] convinced us of the necessity for a thorough review of the data underlying the sage grouse science used for the listing status review.

We were unable to replicate the analyses published in the monograph as neither the data used in the analysis, nor the algorithms used for Population Viability Analysis are publicly available. This made it impossible for us to directly evaluate or replicate results independently. Thus, since the results are neither reproducible nor verifiable, the study fails the fundamental litmus test of sound science.

In addition to our own independent scientific review, CESAR also considered reviews conducted by scientists commissioned by the State of Colorado whose comments were ignored by the publishers and editors of the monograph. These scientists identified most of the same flaws in the work identified by our staff. Where appropriate, the pertinent comments are included. Where the content of one of these reviews is used, it is clearly indicated.

1 In re Consol. Delta Smelt Cases, 1:09-CV-00407 OWW, 2011 WL 3875512 (E.D. Cal. Aug. 31, 2011)

Chapter Analysis: Greater sage-grouse and sagebrush: an introduction to the landscape [2].

This introductory chapter provides background on sagebrush and sage grouse, summarizes previous research, and provides the context for chapters of the monograph. The authors, Knick and Connelly, assign considerable importance to their own research. Over one third of the citations in this chapter are papers or reports that Knick or Connelly have authored.

Further, peer review of this chapter was not independent: the three listed peer reviewers of this chapter (Naugle, Rotenberry, and Dobkin) were either coauthors on other papers in this monograph (Naugle was author on three papers, including a paper on which he was a coauthor with Knick and Connelly), or coauthors of previous papers with Knick and Connelly. The close collaborative relationship of the authors and coauthors clearly undermines the peer review process which requires independent peer reviewers with no real or perceived conflict of interest.

The authors state that harvest (from hunting) and predation are not significant factors affecting on sage grouse population trends. However, they present no data or quantitative analysis to support this supposition. Further, the accuracy of this claim is doubtful given that 207,433 sage grouse were harvested between 2001 and 2007 alone (Reese and Connelly (2009, 2011), and the level of predation on sage grouse reported by other authors. It is particularly questionable given the significance assigned to various threats for which there is little data on actual mortality,

2 Knick and Connelly 2009, 2011

such as livestock grazing, farming, or oil and gas development. Nevertheless the authors dismiss mortalities from hunting and predation, estimated to be as high as 10% of the population annually.

Knick and Connelly describe their rationale for delineation of a "Sage Grouse Conservation Area" to include a much larger area than that which sage grouse are currently or historically found. The area includes a 50km buffer surrounding a hypothetical "pre-European sage grouse distribution" and large areas within "historic range", but the authors provide no data or evidence of historic or current sage grouse populations (e.g. the desert of southeastern Utah). The 50km buffer increases the area of the author's proposed "Sage Grouse Management Area" by over 450,000km2. However, they provide no basis historical or otherwise to justify this change or reconcile their exclusion of areas where sage grouse are found and inclusion of areas where they have not been

found (historically or currently). No data is provided to support the rationale.

Knick and Connelly state that sagebrush ecosystems are naturally complex, hierarchically organized, and have an "integrated" structure and function:

"The model of sagebrush systems as a hierarchical organization arranged along spatial and temporal scales is one of the unifying concepts underlying the information presented in this volume (Fig. 4). This model presents ecological systems as an integrated assemblage of patterns and processes at smaller scales enclosed within successive levels at larger scales."

This approach evidences a belief that natural phenomena are governed by a predetermined purpose as opposed to blind natural laws. For such views to be expressed as a "unifying concept" by the editors and authors of an influential scientific monograph is highly unusual. The use of this approach would require experimental or empirical data to support the hypothesis and no such evidence is presented or referenced to support this model.

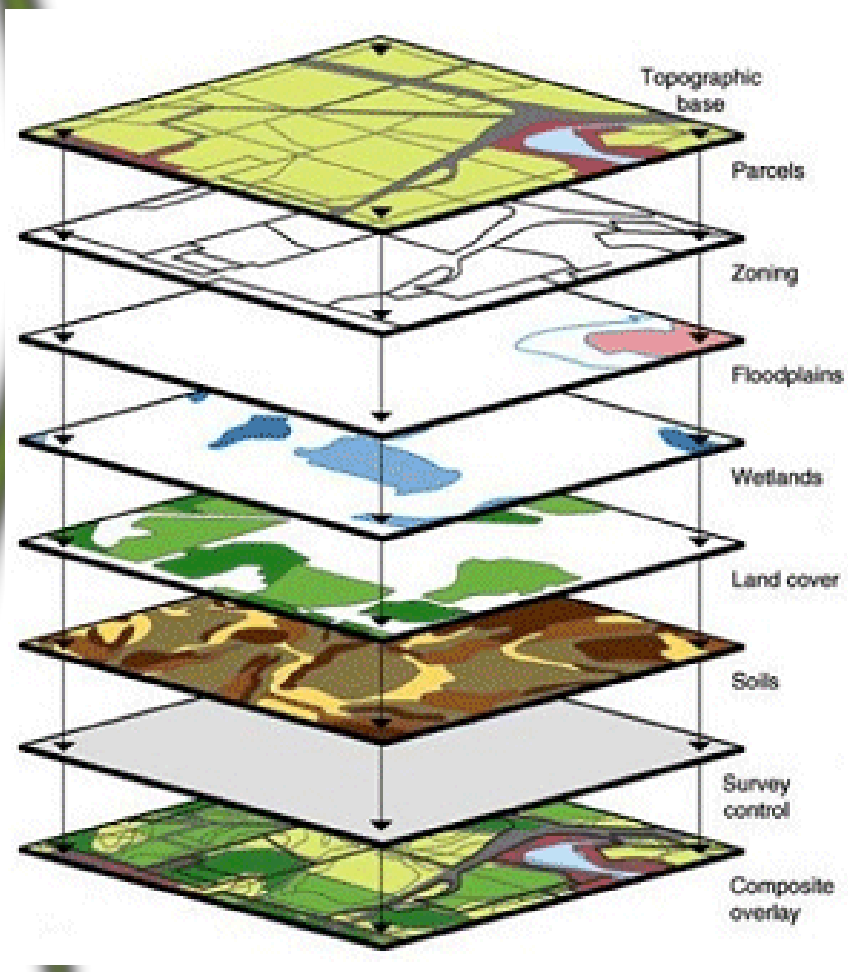
Knick and Connelly present an extensive list of potential threats to sage grouse, including:

- The conversion of sage brush to croplands (resulting in the reduction, elimination or fragmentation of sagebrush);
- Development of oil and gas resources;
- Exploration and development of wind and geothermal energy;
- Livestock grazing;
- Urbanization and increasing human densities ("as people choose to live near wilderness and recreation areas
- New corridors proposed for energy transmission;
- Roads;
- Increasing outdoor recreation (including off-highway vehicles and hiking); and,
- The "human footprint" (which "influences the landscape structure of sagebrush-dominated habitats for sage-grouse."

Oddly, hunting mortality and predation, two threats for which extensive data documenting their effects are available, were not included in this list. The authors do not explain exclusion of these threats.

Based on the opinions summarized above, the authors then conclude by translating this opinion into an unsupported policy rationale for federal regulation across eleven states, via federal law, the ESA.

The monograph relies critically on extensive GIS analysis to translate speculative habitat conditions into theoretical historical habitat, which is then compared to current potential sage grouse habitat. The theoretical habitat loss since European settlement is calculated through this exercise. As mentioned previously, areas known to be historically occupied by sage grouse were not included, and areas where there is no data of sage grouse occupancy are included. Speculative models are substituted for lack of historic data on sagebrush extent and sage grouse distribution, and are the basis of postulated historic habitat in the monograph. Thus, the "results" of this modeling exercise are misleading, as are the subsequent analyses that rely on it. In sum, it is not a scientific assessment relying on best available scientific data, but rather an advocacy document expressing the authors' preference for sagebrush ecosystem protection.



It is also worth noting that the scientific method was not used (no hypothesis testing) by any of the authors in this 25-chapter monograph. Instead, the authors rely on *post hoc* interpretation of results or purely descriptive approaches. The terms 'hypothesis' and 'hypotheses' appear only six times in the 25 chapters, and only to describe the work of cited authors. At the end of this review, we have included a chart identifying the data used to arrive at the conclusions in the report.

Chapter Analysis: Greater Sage-Grouse Population Dynamics and Probability of Persistence[3]

This paper was highly influential. The FWS relied on this chapter heavily in its 2010 sage grouse listing decision. Cited 65 times in that decision, the highest number of any chapter from the sage grouse monograph, it figured prominently in the FWS conclusion that the greater sage grouse deserved "threatened" status under the ESA. However, a close review of the analysis and data demonstrates flaws significant enough to completely undermine its conclusions. Specifically, both Garton et al. (2009, 2011) and the FWS (2010) downplayed or ignored known issues with the data provided in this paper, errors in formulas used, errors of omission, and bias with their analytical method. These errors were exposed when the Colorado Division of Wildlife, commissioned independent scientists to review its contents. These comments, which were formally submitted to the FWS, were uniformly ignored.

3 Garton et al. 2009, 2011

Sage grouse are ground dwelling, secretive birds with cryptic coloration, making census difficult. However, during the spring breeding season, sage grouse congregate at leks where the male sage grouse display conspicuously to attract potential mates. Beginning in the 1940's and 1950's, to gain information for setting hunter harvest levels, state biologists began counting adult male sage grouse attending the largest and most accessible leks. Over the next four decades, the number of leks counted increased approximately ten-fold.

Although male leks counts have been conducted by thirteen states and provinces for many years, there are numerous, well-known problems with this method, and these render it statistically invalid for estimating population number or trend. For example, the data gathered are a non-random sample of sage grouse leks and do not account for male sage grouse at unknown leks. Males move between leks which violates assumptions. Further, only males are counted at leks, and no provision is made for counting females or juveniles. As a result, the male lek count data represent an unknown proportion of total sage grouse.

Compounding the problem is the fact that thirteen different states and provinces collected data, often using different methods and unequal levels of effort. Repeated pleas from multiple authors to replace this traditional method with a statistically valid one have been ignored. As a result, determining population number and long-term trends across the entire range of sage grouse is not currently possible, no matter what analyses are applied to the data.

Despite these fundamental limitations, three attempts have been made to conduct range-wide analyses of male lek count data obtained from states and provinces: Connelly et al. (2004), Western Association of Fish and Wildlife Agencies (WAFWA 2008), and Garton et al. (2009, 2011). Each group employed different methods, including undocumented and subjective methods, for defining what constituted a “lek” and including/excluding lek counts obtained from them. As a result, even though each study used the same raw data provided by the states, the number of leks selected for analysis differed nearly three-fold (3,419 - 9,789 respectively) between WAFWA 2008 and Garton et al. (2009, 2011). A fundamental problem with this approach is that even if the raw lek-count data were publicly available (which it is not), subjective criteria were used to select the final data sets used in analyses, and therefore the analyses themselves, would not be reproducible.

The three studies also differed in their analytical methods and acknowledgement of the limitations of their data and analyses in inferring sage grouse population numbers or trends. While both Connelly et al. (2004) and WAFWA (2008) used a justifiably cautious approach and were unwilling to overstate the significance of their results to infer sage grouse population numbers or trends, the monograph authors[4] took the opposite approach. After acknowledging the potential limitations, these authors then use their analyses to make predictions of past and future population trends in sage grouse, and their probabilities of extinction, thirty and one hundred years into the future (from 2007) and emphasize the precision of their predictions.

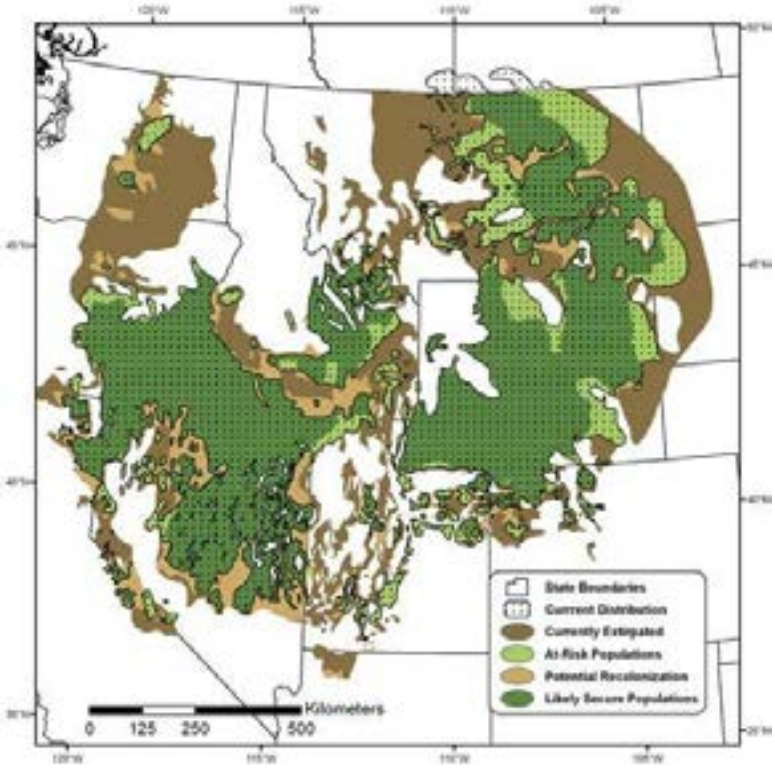
Specifically, the authors use lek count data to:

1) Estimate current population sizes (not valid for reasons discussed above);

2) Estimate past population sizes or "reconstructed population estimates" (backwards from 2007 to 1965);

3) Fit population growth models to these "reconstructed population estimates" (which

4 Garton et al. (2009, 2011)



are estimates and not empirical data); and 4) Forecast future population estimates and trends from the growth models, along with the probabilities of population persistence in the years 2037 and 2107. Probabilities of population persistence were based upon the proportion of model replicates where effective population size was above 50 or 500. Below these numbers, populations were considered extinct. (Note that future population estimates were based upon the earlier "reconstructed population estimates", and are not real data.)

The authors concluded by emphasizing the precision of their results and downplaying the limitations, ignoring the likely inaccuracy of their data and analysis. Then, inappropriately relying on precision rather than accuracy[5], the authors overstate the significance of the results to the future of sage grouse management.

The analysis fails to address the inherent bias[6] which occurs as a result of the data and analysis used. There are questions regarding the mathematical choices the authors make and the unacknowledged propagation of error in their models, that put their extinction predictions on par with guesswork. The data available to the authors of this article is acknowledged to be inadequate for the task.

The analysis and results included in the chapter contain mathematical errors and fail to clearly identify where assumptions have been made and, in some cases where assumptions are identified, they are questionable.

The analysis fails to address the inherent bias which occurs as a result of the data and analysis used. There are questions regarding the mathematical choices the authors make and the unacknowledged propagation of error in their models. The data available to the authors of this article is acknowledged to be inadequate for the task.

The article makes neither mention nor any effort to account for hunting mortality, even though over 207,000 sage grouse were taken between 2001 and 2007.

5 Imagine a bulls-eye target where an archer hits the bulls-eye repeatedly; this archer is both precise and accurate. The archer who hits the same point on the outside edge of the target repeatedly is precise, but not accurate; as he misses the bull's eye repeatedly. In this case, the authors can claim precision, but they have no rational basis for asserting the accuracy of their results.

6 In statistical analysis, the term 'bias' is a term of art describing a particular type of error that can occur in any given analysis. In a statistical context, 'bias' improperly skews the outcome of analysis making it unreliable.

Identified Threat	Data Supporting Threat	Comment
Loss of half of the historic sagebrush habitat has been destroyed, leading to the surmise that as a result, sage grouse populations have declined as a result of a hypothetical loss of habitat.	None (extent of historic sagebrush habitat is entirely hypothetical). No data demonstrating a relationship between habitat extent and sage grouse population abundance or trends.	Data include observations from exploration occurring in the early 1800's. The explorers documented sparse sage grouse populations. The loss of historic habitat used in the monograph is based on imprecise, hypothetical reconstructions of potential climax vegetation, by Kuchler (1964 and later). Our research indicates that Kuchler did not base his maps on data. All subsequent GIS mapping of historic habitat is based on extrapolations of Kuchler's work. There is no analysis comparing sage grouse populations with habitat availability over time. None of the discussions of sage grouse population in the context of habitat availability use data, account for the cyclic nature of sage grouse populations, or consider the significant increase and decreases in sage grouse habitat availability over time.

Table 1-A, **The Present or Threatened Destruction, Modification or Curtailment of Habitat or Range of the Greater Sage-Grouse**

[A chart of those threats identified in Knick et al., along with any supporting data we could identify.]

This number does not account for unrecovered wounded grouse which can substantially increase mortality rates by as much as 50%.

In addition to these compounding issues and errors, the authors started with an obviously low number of male sage grouse upon which to base all other analyses, starting with an estimated 88,816 male sage-grouse in 2007. If one uses the same assumptions of sex ratio that Garton et al. did, this produces an estimate of the total number of sage grouse that is approximately 42% lower than the combined estimate of 535,542 sage grouse from all thirteen states and provinces in 2007.

Starting with such an obviously low estimate, the authors inevitably reach a biased conclusion that sage grouse are threatened.

Finally, the authors base their key finding, that of persistence prediction, on a 'rule of thumb' which has been repeatedly disproved and repudiated. The 50/500 "rule of thumb" used to predict quasi-extinctions is not based on credible evidence and had been deemed contrary to empirical results

obtained from the wild and laboratory and reported by multiple authors. Simply put, there is no evidence of a universal *number* or ratio, below which a population is doomed to extinction. As a result, extinction predictions based on the 50/500 "rule of thumb" are essentially no better than guesswork. And as pointed out below by the reviewers, Garton et al.'s (2009, 2011) extinction predictions are not only unreliable they are biased.

Samples of the biases, errors, and omissions identified by the Scientists retained by the State of Colorado:

"*The authors present an analysis modeling trends in the rate of change in lek counts and then use the best fitting model to forecast trends to determine the probability of existence for varying subgroups of Greater sage-grouse. It is an ambitious, but flawed analysis. Model assumptions are not always made clear and when they are they open doubt about the results and the authors'*

Table 1-B, **The Present or Threatened Destruction, Modification or Curtailment of Habitat or Range of the Greater Sage-Grouse** [A chart of those threats identified in Knick et al., along with any supporting data we could identify.]

Identified Threat	Data Supporting Threat	Comments
Effect of habitat loss is compounded by the fragmented nature of the remaining habitat, as fragmentation results in functional habitat loss for greater sage grouse even when otherwise suitable habitat is still present.	No precise definition of habitat fragmentation provided. No data supporting the population-level demographic effect of fragmentation. No data documenting the differences in productivity between suitable occupied habitat and unsuitable occupied habitat (caused by fragmentation). No data quantifying the loss of function in terms of sage grouse population abundance or trends.	The papers in the monograph recite many changes in land use, ownership, regulation and management. They also document physical changes in the landscape. However, these recitations are not linked in any meaningful way to sage grouse population fluctuations. Further, little data is provided to support the premise that sage grouse populations have declined from those extant prior to European settlement due to inadequate habitat, particularly in light of the very small numbers of sage grouse documented by the first Europeans exploring sage grouse

interpretations. The authors note the complications *and inaccuracy of lek counts, but then proceed to* use *the data ignoring the inherent biases and uncertainties. The authors repeatedly state that a problem with forecasting population trends is that the models assume everything stays the same; but the real problem with these forecasts is the data used in the model is not accurate or very precise making model forecasts uninterpretable.*"

"… the authors fail to provide the mathematical foundation for the method they used to estimate trend. Key mathematical*/statistical errors are made in the analysis as a result. These errors go far beyond the usual debates of the quality of lek data or what type of trend should be fit. The mathematical development of the trend analysis is* wrong*. Third, because of the mathematical problems with the analysis, results are not* interpretable*. It is impossible to know how to consider the results presented because all of the variances are mathematically wrong.*

Samples of comments made by the scientists retained by the State of Colorado on the inadequacy of the data used

We assumed all lek data used in this *analysis were obtained following these* [established] *procedures. This is a naïve statement, and absolutely untrue and the authors know it. It is a fatal assumption and needs to be acknowledged"*

> *."“No state uses a random* sample *of leks, therefore **all**, not 'most', leks are not from a random sample.”*

"Since each state collects lek data *quite differently it is essential that the analysis describe what data were* used *in each state when populations or management zones overlap states. Experts in Colorado have grave concerns regarding data collected prior to 1986 and excluded* [it] *from the WAFWA report. There are also large data gaps in the Colorado data and the authors must describe how those data were handled or censored. The authors gloss over the severe problems with lek counts and consistency among states. The quality of the data needs to be discussed in the report. There*

is an assumption of quality and consistency among states that is a dangerous and invalid assumption. In addition, Colorado was never contacted regarding any inaccuracies or problems with the data set (if in fact data prior to 1986 were used). We know problems exist with the dataset, and none of the authors contacted the State of Colorado for clarification or corrections. Therefore, we can only assume that the data quality control for the manuscript is suspect or assumptions were made that are erroneous."

*"Small sample sizes would aggravate the problems of biased/ non-*representative *samples resulting from absence of probability sampling or a real sampling frame. In addition, the great variation in sample sizes between populations, and across years, means that the reconstructed indices are wildly different in terms of their statistical reliability (see below)."*

Table 1-C, The Present or Threatened Destruction, Modification or Curtailment of Habitat or Range of the Greater Sage-Grouse. [A chart of those threats identified in Knick et al., along with any supporting data we could identify.]

Loss of habitat connectivity	Undefined, and no data supports the conclusion.	The papers do not define connectivity based on documented dispersal distances for sage grouse. There is no data or analysis relating loss of "connectivity", (however it may be defined) to reductions in populations or any recent loss of genetic diversity.
Conversion for agriculture	No data provided to support the premise that sage grouse populations are declining due to past agricultural conversion.	While agricultural conversion undoubtedly has taken place since European settlement, no data links sage grouse population declines to agricultural conversion. Predator control may have aided in sage grouse population growth in the mid to late 19th century.
Urbanization	No data demonstrating loss of sage grouse populations due to urbanization.	
Infrastructure (e.g., roads, power lines, fences) in sagebrush habitats	No data demonstrating loss of sage grouse populations due to infrastructure construction or existence.	There is documentation of increased avian predator density resulting from power poles and fence post being used as perches. However, there is no data identifying significant changes in sage grouse populations as a result of increased predation (beyond background levels) due to power poles and fence post construction
Fire	No data linking increased fire frequency to sage grouse population declines.	The papers assert increased fire occurrence as a result of invasive species (primarily cheat grass) replacing native species, which result in population level effects on sage grouse. However, this changed fire regime has been functioning for well over 100 years and its extent and the magnitude of the change is speculative at best. There is conflicting data on the effect of increased fire on sage grouse populations.
Invasive plants	No data directly linking increased fire frequency to sage grouse population declines.	Invasive plants have been credited with changes in the fire regime. The question of what quantifiable effect those changes have directly on sage grouse populations is not addressed using data.
Pinyon-juniper woodland encroachment	No data linking woodland encroachment directly to sage grouse population declines.	

"Unfortunately, the lek count data used in these analyses seem to be vulnerable to many if not most of the problems above, in spite of efforts to cull the worst of the data. Notably, for some unspecified fraction of the counts, it could not even be determined if acceptable protocols for counting were used. Nonetheless these data were used in modeling unless excluded for other reasons (e.g., extremely low numbers of leks counted). In some cases low numbers of leks (<10) and males (<50) were the basis of estimates … and in some pairs of years there were no doubt fewer leks sampled in each year than the average.

The scientists retained by the State of Colorado also noted the dangers in making inferences or assertions about sage grouse populations based on lek counts:

"How many (or what proportion) of counts were eliminated, how many were retained but could not be affirmed as having followed procedures?"

"An average of 1 – 6 leks per 5-year period is practically no data."

"One of my primary concerns is in using lek counts to make inferences about sage-grouse populations. This is obviously not a novel concern, as it has been pointed out repeatedly in the literature, but it is a fundamental one. Given the population ecology of this species, males are not the limiting resource demographically, females are. So, fluctuations in the population of males may or may not be indicative of fluctuations in the population as a whole. Further, it is not clear to what extent lek counts even fully represent the population of males."

"Given that there is apparently no knowledge of the relationship between lek counts and true abundance, it obviously cannot be asserted that the male lek counts constitute a reasonable index to minimum number of males on leks just because effort has increased in recent years. To make this claim requires some knowledge of a "saturation curve" for the index/ abundance relationship, and that seems nonexistent."

Table 1-D, The Present or Threatened Destruction, Modification or Curtailment of Habitat or Range of the Greater Sage-Grouse. [A chart of those threats identified in Knick et al., along with any supporting data we could identify.]

Grazing	No data linking grazing to sage grouse population declines.	Wild horse grazing was examined with no data evident to support grazing as a threat.
Energy development	Available data is conflicting. The highest density of leks and sage grouse populations occur in or near areas where energy development is most intensive. While there is data to support the premise that energy development can have an effect on sage grouse, few studies break threats down into cause and effect mechanisms	The net effect on sage grouse populations is not clearly identified by data. Energy development has been underway in sage grouse habitats for nearly a century, and yet the areas with significant development (even development with no mitigation) are sage grouse population strongholds. Studies of impacts to sage grouse have been based on evaluation of outdated technology and minimal mitigation, compared to what is now required.
Climate change	No data provided to support the existence of a threat.	Current arguments on climate assert that climate changes, rather than global warming is occurring and that this change will manifest differently in different parts of the world. No data on recent climate changes within the sage grouse habitat is identified. All threats are speculative and based on an unsupported assumption that temperatures will increase in a predictable manner.

"The data set from which this analysis and all other population analyses of sage-grouse are built appears to be deeply flawed, because the sampling scheme is not representative."

Samples of comments regarding invalid assumptions and analyses

The scientists *retained* by the State of *Colorado* question the authors' assumptions and conclusions based on a flawed sampling process:

"I disagree with the assertion (7th page of text) that even if the sampling is not random, if analyzed in a repeated measures framework, 'may provide unbiased and precise measures of the rate of change of populations.' If the leks surveyed are not a random sample, for example if they tend to be easier to access, hence closer to roads or other human establishments, you might be measuring trends in a sample that is specifically more at risk. To use this analysis to draw inference to the whole population, the assumption made is that the sampling is representative. I think that's a challenging assumption to make."

"The sampling bias has also changed over time. As the sampling intensity has *increased, new, active sites are added, while old sites may become inactive. The decrease in the percentage of active sites over time in most populations is more likely an indication of a change in the sampling scheme, than a change in the activity of sites. All this does is highlight the*

problems with an unspecified sampling frame and an ad hoc sampling scheme. This greatly undermines the ability to make inference to the population as a whole.

"Small sample sizes would aggravate the problems of biased/ non-representative samples resulting from absence of probability sampling or a real sampling frame. In addition, the great variation in sample sizes between populations, and across years, means that the reconstructed indices are wildly different in terms of their statistical reliability."

"My concern regarding the first consequence is that by failing to account for the serially induced variance in the indices, fit of the time series of indices to alternative models could be overstated, and comparisons between alternative models of density dependence questionable. My concern about the second is that the way the indices are constructed might itself have induced patterns in these data that appear to represent density dependence but in fact are artifacts of the process of construction via backwards induction."

Table 2, Overutilization For Commercial, Recreational, Scientific or Education. [A chart of those threats identified in Knick et al., along with any supporting data we could identify.]

Identified Threat	Data Supporting Threat	Comments
Hunting	Current data support an estimated loss of up to 9% of the total population rangewide.	Hunting results in disproportionate killing of females.[1] Hunting is the highest documented source of mortality for sage grouse. The first extirpations of sage grouse populations occurred during the early 1900's and were attributed primarily to hunting[1].

The scientists retained by the State of Colorado also draw attention to inherently flawed formulae and mathematical approaches resulting in unreliable results and conclusions:

"Because the quantity [equation here] *appears on the left (prediction) and on the right (predictor) side of this equation as a reciprocal, we should expect support for b <0 even in the absence of density dependence."*

"The estimate of the total number of males is algebraically circular."

"Results indicate the reconstructed index values can be expected to exhibit high variability, with values in the first decades of the reconstructed period extremely variable. Depending on numbers of leks counted (which in the study data varied over the time horizon) coefficients of variation approaching 100% with correspondingly huge confidence/ credibility intervals should be expected. Apparently, however, these values (on the original abundance or log scale) were used as predictors in the Ricker/ Gompertz models (see below) without accounting for this sample variation."

"The results suggest to me that there is a real issue with 'built in' patterns in these reconstructed data that may create the appearance of density dependent effects where in fact none occur."

"On face value, the above is a reasonable approach. However, as I've already indicated, I have serious misgivings about the validity of the reconstructed index approach. AIC and other approaches fundamentally depend on the likelihood, and in this case, the likelihood has been filled with numbers that are not really data—the constructed index values. By treating these index values are known predictors, the residual variability in the models is being underestimated, and relative differences between models inflated. Furthermore, simple analytical considerations (the earlier algebra) and numerical simulations suggest that statistical patterns in the 'data' may introduce spurious interpretations about the effects of density and misleading inference about quasi-equilibrium."

"The process of reconstructing population sizes based on the 2007 count and the [?]produces a string of correlated estimates. If all leks were surveyed in all years, then the covariance [the extent to which variables are correlated or change

together] *would be zero because the counts from interim years cancel out. Given that different leks are included in different pairs of years the*

covariance is not zero. Deriving a mathematical formulation of the covariances among reconstructed population sizes is not simple given the convoluted definition of the reconstruction. Therefore, I have provided R code for a simulation to demonstrate the problem …"

"All of the data issues aside, parametric uncertainty (or if you will, confidence interval length) needs to be taken into account, and properly estimated (as already noted, it has surely been underestimated here)."

"This is a strange assertion. It is not clear how a nonrandom sample would be likely to provide an unbiased estimate of population trend. Only in the case that all leks are tracking the overall population trajectory would this be true. It is particularly worrisome in that some lek count comparisons are made on the basis of small numbers of sampled leks (n< 10)."

"I do not favor 'reconstructing' population numbers and then using these as data in statistical models as if these are observations. Likelihoods are based on sample data, and the sample data here are the lek counts (warts and all) and (possibly) the baseline index value. Retaining this distinction is important, because a key part of the statistical likelihood is the model for the sampling process — and that seems to have been completely lost in the model fitting, where the index values apparently are treated equally as data."

"The population growth models are fit to the reconstructed population indices. How was the induced covariance handled? These models typically assume the data are independent, these data are not independent."

"*It makes no sense to me to assert that any stochastic outcome has 0 (or 1) probability of occurrence. The probability (maybe) is quite low, but it cannot be zero until it has not happened."*

The scientists retained by the State of Colorado explain over-arching bias problems in the authors' approaches, conclusions, and underlying assumptions:

"Why do a population-by-population analysis at all? Why not analyze all populations within an SMZ (e.g., via a hierarchical metapopulation analysis)? Interest seems to focus at the level of the SMZ anyway, and many of these individual populations do not really support model building on their own."

"How then can it be asserted a couple lines later that this is 'remarkably precise index'? First, we know that the index's variance is guaranteed to expand in reverse time, even if we have decent sample sizes (numbers of leks counted) and meet assumptions of random sampling, unbiasedness, etc., which assuredly are not being met. Second, the index's precision (or lack thereof) seems to have been ignored in the model fitting exercise.

[Note: In other words, the confidence intervals in the reconstructed population estimates are so large that virtually no trend can be reported at the usual 95% confidence intervals. Garton et al. (2009) used a less rigorous 90% confidence interval.]

"They [the *reconstructed population* estimates] *are only 'remarkably precise' if one ignores the propagation of error in the index construction."*

"In addition, use of the lek counts both to reconstruct index values and to estimate population growth rates creates a dependency in these quantities that appears to bias conclusions in favor of negative density-dependence."

"In addition, treatment of populations as completely independent entities fails to take advantage of apparent correlations between populations, at least within SMZs. I recommend that (1) estimation and modeling be based only on actual sampled (and not reconstructed) data, (2) sampling variation from lek counts or other monitoring data be properly incorporated into model construction and inference, (3) data be integrated into a common modeling framework that takes advantage of spatial autocorrelations, (4) projections be based on short-term predictions of local occupancy and related parameters rather than long-term predictions of abundance and quasi-extinctions, with rapid feedback from monitoring, and (5) monitoring and modeling be explicitly connected to well-defined management objectives."

Table 3, Disease or Predation

[A chart of those threats identified in Knick et al., along with any supporting data we could identify.]

Identified Threat	Data Supporting	Comments
West Nile Virus	Data supports the existence of WNV effects on sage grouse mortality.	The data in the cited papers are not consistent with the CDC reported data. Data used to support WNV population level effects is suspect and out-dated by nearly 5 years. Habitat conditions affecting WNV are misstated. (See earlier chapter for a more in-depth discussion)
Predation	Data supports adverse effects of predation on nests and chicks.	The effect of ravens, foxes, and other predators is well documented. Anthropogenic influence on the incidence, variety, and number of predators is less well documented

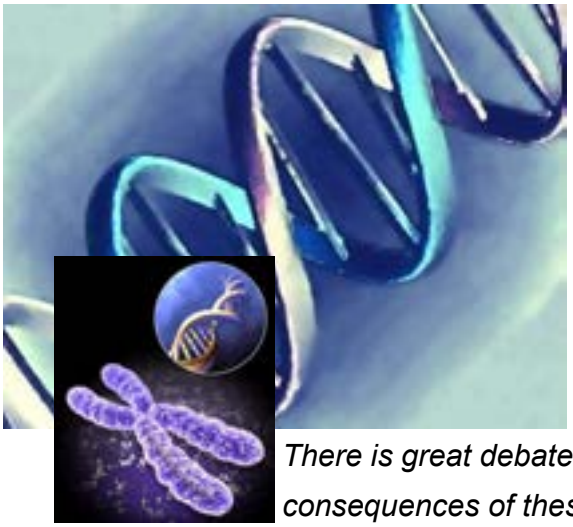
"'Even if the detection probability is unknown…' this statement is not defensible. It is simply a set of unquantifiable statements."

"The author's description of 'metapopulation' is inadequate for proper interpretation. It is questionable if the authors are using the concept correctly. A metapopulation is a collection of population linked by interdependent colonization and extinction probabilities. It appears the authors only go so far as to incorporate a probability of connectivity based on a GIS analysis (not dispersal or movement patterns)."

"If 44% of populations show a declining carrying capacity, that seems to imply that 56% are stable or increasing. Wouldn't you expect about half of the populations to be declining?"

The scientists retained by the State of Colorado raised questions regarding extinction predictions using the outdated and erroneous "50/500 rule of thumb"

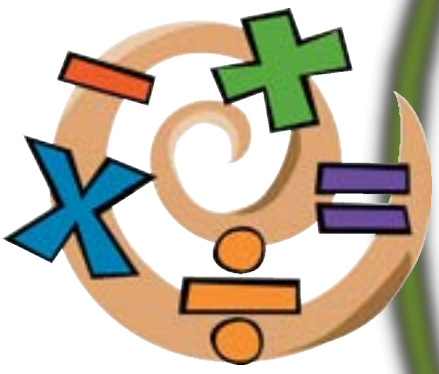
"The selection of effective population sizes are inconsistent and arbitrary… Unfortunately, they do not explain why they consider these thresholds relevant to their analyses. The numbers are based on general theory that states that populations with < 50 individuals are more likely to see the expression of deleterious alleles and inbreeding depression; while populations with < 500 individuals are more likely to see decreased genetic diversity due to increased rates of mutation and



genetic drift. The authors fail to discuss how this relevant to their analysis of lek counts. There is great debate about the consequences of these factors on the demography and long-term persistence of populations."

"For the uses in this paper, I'm not sure that effective population size (Ne) is the appropriate measure. Ne is important when talking about genetics and the preservation of genetic diversity within a population, but those dynamics tend to operate on the time scale of many generations, not years. The emphasis here is on the demographic, not the genetic, dynamics. That said, I cannot follow the calculations in the paper that link a lek count of 20 to an effective population size of 50. First, the equation on page 19 is incorrect; the numerator should be 4, not 1 (I think this is just a typo, not an error in calculation). Second, if there are 280 females and 140 males (46% of which successfully breed), the effective population size is 209, not 228, but maybe there's an assumption I'm missing. Third, Garton et al. mention a sex ratio of 1:2.5, but I cannot tell if that was used in their calculations."[7]

"…those dynamics tend to operate on the time scale of many generations, not years."

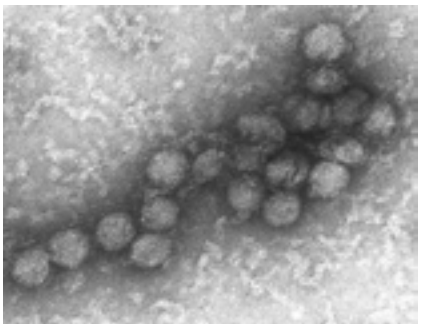


7Such errors lead to extinction predictions being grossly over-inflated by Garton et al. (2009, 2011).

"This is not a valid estimate of the variance of the probability of extinction. It fails to include the parameter uncertainty in the population models."

Chapter Review: West Nile Virus Ecology in Sagebrush Habitat and Impacts on Greater Sage-Grouse Populations[8].

This paper summarizes the literature published in 2008 or prior as well as unpublished information regarding West Nile



Virus (WNV) and its effects on sage grouse. Due to new regulations, much has changed since 2008. An example is the regulations introduced by BLM *in* 2009, which were designed to reduce or eliminate mosquito breeding *habitat* in artificial water impoundments, including those used by the oil and gas industry. Also, more advanced mitigation measures and technology have been developed for controlling mosquitoes. More advanced treatment options for produced water have also been developed, including the use of reverse osmosis, which allows water to be discharged into natural waterways without harm to the environment. Thus, Walker and Naugle's paper is based on outdated information and, in light of recent changes, overstates the influence of oil and gas development in providing mosquito breeding habitat *contributing* to

8 Walker and Naugle 2009, 2011

the threat of WNV to sage grouse. [9] Although the authors model three different scenarios of potential *demographic* impact to sage grouse populations, they devote only one paragraph to summarizing their results, and those results are not mentioned in the subsequent discussion or recommendations. As a result, the discussion is disconnected from the methods and results. Rather than an informed discussion of how their research results inform the management of sage grouse, the discussion and recommendations of the paper are composed of the authors' personal opinions regarding the severity of impacts to sage grouse, and surmises regarding potential strategies for mitigating the impacts of WNV to sage-grouse populations. There is no data or analysis presented that supports the recommendations.

The authors acknowledge that "marked spatial and annual fluctuations in nest success, chick survival, and other sources of adult mortality are likely to mask population-level impacts in most years." ***In other words, potential population -level effects of WNV on sage grouse may not be detectable because other sources of mortality tend to have a larger effect in any year.***

However, the *authors* do not *acknowledge* the well-documented fact that lek counts are not a reliable method for estimating population trends. And although Walker and Naugle suggest that "intensive monitoring of radio-marked birds" is needed to document the effects of low to moderate mortality due to WNV, that approach is severely limited, since WNV is highly variable in its spatial and temporal occurrence (see discussion below). It is also limited by practical constraints such as recovering carcasses from the field in time to determine cause of death (e.g. within 24 hours).

9This information was readily available to FWS when it undertook its 2010 listing determination since BLM is a sister Bureau under the Agency umbrella of the Department of the Interior.

A more appropriate methodology and one consistent with the best available science used in modern epidemiological studies would employ random sampling design across multiple *populations* for detecting the occurrence of WNV, followed by an intensive monitoring of individuals (via satellite GPS telemetry) within an affected population(s), once WNV has been detected above a certain threshold.

The authors' data and conclusions on WNV occurrence are immediately questionable because their map does not correspond with maps and data collected and produced by the Centers for Disease Control (CDC). These data and maps show a much more *heterogeneous* temporal and spatial distribution for WNV, and show a decline in WNV incidence in Montana and Wyoming since 2007. The data included in Figure 1 of Walker and Naugle combined data across multiple years, so no trend is discernible. Further, the data did not extend beyond 2007, although the data was clearly available to the FWS during their status review of the sage grouse[10].

In some cases, Walker and Naugle presume that some die-offs were the result of WNV, although no samples were taken. The authors do not provide their criteria for determining whether mortality was due to WNV, other factors, or simply unknown.

Although the authors cite several published sources on WNV occurrence, an undisclosed amount of data was *obtained* from "unpublished data provided by state agencies and researchers." It is unacceptable that the entire data set on WNV occurrence used by Walker and Naugle is not publicly available. Further, its provenance is uncertain. Since the CDC requires reporting of all cases of potential WNV due to public health concerns, all reputable data

[10] CDC WNV occurrence maps by state, county, year, and host (birds, humans, mosquitoes, sentinels, and veterinary), may be found on CDC's Arbonet at: www.cdc.gov/ncidod/dvbid/westnile/USGS_frame.html.

concerning WNV should and would have been reported to the CDC and included in their data sets.

The authors suggest that "Impacts from WNV in some populations such as northeastern Wyoming may act synergistically with other stressors like 'energy development and tillage agriculture'" to substantially reduce population size, distribution, or persistence. This statement is unsupported by data regarding relative mortalities associated with threats from energy development and tillage agriculture. As well, the authors did not mention or analyze the synergistic effects of one of the best documented sources of sage grouse mortality, hunting harvest, which can result in removal of up to 10% of the population annually. [11]

The authors state that: "Increasing temperatures associated with changing climate may exacerbate WNV risk for sage-grouse." They do not, however, present any data to support an actual or predicted rate of regional temperature increase, nor do they discuss which precipitation changes (i.e. drought) are likely to result from climate changes and why those changes could be more (or less) favorable to the proliferation of mosquitoes and transmission of WNV. Instead, despite the fact that global warming is now more properly acknowledged by proponents as climate change, recognizing the fact that climates the world over will *change*, rather than simply *warm*, the authors assume warming will invariably occur and its effects will lead to greater spread of WNV to sage grouse. This assumption is not accompanied by supporting data.

Chapter Review: Ecological Influence and Pathways of Land Use in Sagebrush (Knick et al. 2009, 2011).

Knick et al. (2009, 2011) discuss and analyze the effects of nearly every conceivable human activity on sage grouse distribution, including hypothetical ones, which the authors assume have a negative effect. Conspicuous in its absence is hunting harvest, which is the source of sage grouse mortality supported by mortality data rather than speculation and supposition (Reese and Connelly 2009, 2011).

Citing the work of previous authors, Knick et al. (2009, 2011) quantify the "effect area" around various types of development for their GIS analysis. However, Knick et al. do not accurately represent the results of cited authors but rather substitute their own values to delineate the effect area for each type of human activity: “We used an ecological rationale for estimating the area around points, lines, or polygons from which land use potentially influenced land cover or sage-grouse populations. Estimates for effect sizes into surrounding areas were based on foraging movements of human-subsidized predators, distance of exotic plant species spread, or on distribution data relative to land use." For oil and gas wells, the effect area used in the authors’ analysis includes a 3km

> **…do not accurately represent the results of cited authors but rather substitute their own values to delineate the effect area for each type of human activity…**

buffer around each oil or gas well pad, and in each direction from pipelines, roads, and transmission lines, regardless of their size or mitigation measures used. However, none of the cited three papers for oil and gas disturbance made such 3km recommendations, nor produced data that could be used to support such a buffer. The only mention of an effect at 3km in these papers had to do with cultivation rather than oil and gas development, or roads and powerlines. Those authors reported that "In 2001, cheatgrass was 20% more likely to be found within 3 km of cultivation, 13% more likely to be found within 700 m of a road, and 15% more likely to be found within 1 km of a power line." Again, no data support the use of a 3km buffer.

Similarly, another paper reported, "…we observed anecdotally that sites isolated (1000 m) from roads tended to contain fewer exotic species than sites near (50 m from) road," adding the caveat regarding their conclusions, “Exotic species richness tended to be greater and native species richness tended to be lower next to more improved roads, although we caution that our measurements of richness were a snapshot."

In summary, none of the studies cited by Knick et al. (2009, Chapter 13) justify their uniform 3km “effect area” around development and no other data is presented which supports this buffer.

The pre-European sage grouse distribution, as delineated by Schroeder et al. (2004), already includes large areas of non-habitat with no records of sage grouse occupancy. It also excludes areas of documented historic sage grouse occupancy that were clearly outside of identified sagebrush habitat. Using Schroeder et al. (2004) as a starting point, Knick et al. subsequently surround this "pre-settlement" range of sage grouse of within a 50km "buffer". There is no credible data that sage grouse ever occupied this buffer or that their populations were severely affected by activities within this buffer. Knick et al. thereby greatly *overestimate* the area in which sage grouse have been negatively affected by human development.

According to Knick et al., "All nonproprietary and nonsensitive spatial data sets used in our analysis are available for download on the SAGEMAP website http://sagemap.wr.usgs.gov; United States Department of the Interior 2001a)[?]. Each data set is accompanied by a metadata record documenting original source and GIS procedures." A search through this website, even searches using the term "sage grouse," does not yield the data sets used by Knick et al. in their analysis. Since the data used is deemed "proprietary" and "sensitive, and therefore withheld from the public" it is not possible to replicate the results of Knick et al. Thus, this study also fails the litmus test of sound scientific research since the results are not repeatable and verifiable. We question the use of 'secret' data for decision-making not involved with national security.

Conclusions and Recommendations

This and other reviews of the contents of the four key chapters of the highly influential monograph on sage grouse relied upon by the FWS in its 2010 listing decision identifies:

- significant mischaracterization of previous research,
- substantial errors and omissions,
- lack of independence in authorship and peer review,
- methodological bias, and
- a lack of reproducibility.

To ensure that the FWS upcoming sage grouse listing determination avoids these shortcomings and is based on an objective review of threats supported by data and demonstrated to affect sage grouse population trends, we recommend that the FWS undertake the following:

- Address the issues of omission, and mischaracterization identified in this review;
- Address issues identified by the scientists retained by the State of Colorado and quoted in this review;
- Require that for any studies used in the listing decision, authors make their data, analyses, and assumptions public and post the information in order to ensure their results are substantially reproducible;
- Post all peer review comments, in their entirety, from the editors of this volume, as well as future products, to elucidate issues for the public.

We note that had the FWS adhered to the Office of Management and Budget's Guidelines under the Information Quality Act many of the issues and errors identified in this review would not exist.

A Comprehensive Review of*:*

GREATER SAGE-GROUSE: ECOLOGY AND CONSERVATION OF A LANDSCAPE SPECIES AND ITS HABITATS

AND ADDITIONAL PAPERS OF RELEVANCE

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Authors: Douglas H. Johnson, Matthew J. Holloran, John W. Connelly, Steven E. Hanser, Courtney L. Amundson, and Steven T. Knick
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Authors: Steven E. Hanser and Steven T. Knick
(Chapter 20 of the 2009 version; Chapter 19, Pages 475-487, of the 2011 version)
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(Chapter 21 of the 2009 version; Chapter 20, Pages 489-503, of the 2011 version)
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***Energy Development and Conservation Tradeoffs: Systematic Planning for Greater Sage-Grouse in Their Eastern Range.**
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Authors: Michael A. Schroeder and W. Matthew Vander Haegen
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Future Trends for Greater Sage-Grouse and Sagebrush Habitats (2009 title)
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Authors: John W. Connelly, Steven T. Knick, Clait E. Braun, William L. Baker, Erik A. Beever, Thomas J. Christiansen, Kevin E. Doherty, Edward O. Garton, Steven E. Hanser, Douglas H. Johnson, Matthias Leu, Richard F. Miller, David E. Naugle, Sara J. Oyler-McCance, David A. Pyke, Kerry P. Reese, Michael A. Schroeder, San J. Stiver, Brett L.

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ADDITIONAL PAPERS OF RELEVANCE

*Copeland, H.E., K.E. Doherty, D.E. Naugle, A. Pocewicz, J.M. Kiesecker (2009) Mapping Oil and Gas Development Potential in the US Intermountain West and Estimating Impacts to Species. *PLoS ONE* 4(10).
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*Schroeder, M.A., Aldridge, C.L., Apa, A.D., Bohne, J.R., Braun, C.E., Bunnell, S.D., Connelly, J.W., Deibert, P.A., Gardner, S.C., Hilliard, M.A., Kobriger, G.D., McCarthy, C.W., McCarthy, J.J., Mitchell, D.L., Rickerson, E.V., Stiver, S.J. (2004) Distribution of sage-grouse in North America. *Condor* 106:363–373.
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Chapter 1 (2009), Introduction (2011):
GREATER SAGE-GROUSE AND SAGEBRUSH: AN INTRODUCTION TO THE LANDSCAPE

Authors: Steven T. Knick and John W. Connelly

No abstract

Review by: Dr. Rob Roy Ramey II

This is an introductory paper that provides background and context on the chapters that follow, as well as a brief presentation of previous research, including unpublished research on the sage grouse. The authors do not present new data or analyses.

1.1) The authors cite their own work frequently. Of 144 references in the text, 54 are of the author's own work (37.5%).

1.2) The peer review of this paper did not appear to meet the National Academy of Sciences criteria for independent peer review. Three peer reviewers on this paper were previous or current collaborators with the authors:
- Reviewer D.S. Dobkin was an author on Knick et al. (2003).
- Reviewer D.E. Naugle was author on three papers in the *Studies in Avian Biology* volume on sage grouse, and an author with Knick and Connlley on Chapter 25 in that volume.
- Reviewer J.T. Rotenberry was a coauthor on two papers with Knick: Knick and Rotenberry (1997) and Knick et al. (2003).

It is appropriate to ask what the rejection rate was on papers submitted to this volume. For comparison, *Frontiers in Ecology and the Environment*, published by the Ecological Society of America has a 53% rejection rate (Ecological Society of America 2004), and *Nature* has a >90% rejection rate.

Conflict on interest policies of the National Academies are available from their website: *Conflict of Interest Policy* under the sections: *Reviewing One's Own Work* and *Studies Related to Government Regulation.*

It is worth asking whether the review and publication process of this USGS-sponsored monograph was contrary to USGS peer review standards. (There may be more recent than the guidelines below.) The following excerpt is from the: "OMB, Final Information Quality Bulletin for Peer Review (December 16, 2004)" http://www.usgs.gov/usgs-manual/500/502-3.html

> *Even for these highly influential scientific assessments, the Bulletin leaves significant discretion to the agency formulating the peer review plan. In general, an agency conducting a peer review of a highly influential scientific assessment must ensure that the peer review process is transparent by making available to the public the written charge to the peer reviewers, the peer reviewers' names, the peer reviewers' report(s), and the agency's response to the peer reviewers' report(s). The agency*

selecting peer reviewers must ensure that the reviewers possess the necessary expertise. In addition, the agency must address reviewers' potential conflicts of interest (including those stemming from ties to regulated businesses and other stakeholders) and independence from the agency. This Bulletin requires agencies to adopt or adapt the committee selection policies employed by the National Academy of Sciences (NAS)[1] when selecting peer reviewers who are not government employees. Those that are government employees are subject to federal ethics requirements. The use of a transparent process, coupled with the selection of qualified and independent peer reviewers, should improve the quality of government science while promoting public confidence in the integrity of the government's scientific products.

1.3) The authors point out that declines of sage grouse are due to more than the loss of sage brush: ***"Concluding that loss and degradation of sagebrush-dominated landscapes cause sage grouse population declines is deceptively simple, much like the ecosystems themselves."*** **Consequently, they present a long list of threats to sage grouse, some of which are speculative, poorly defined, or have not yet occurred. The effect size and relative importance of each of these factors is not quantified nor discussed.** The list includes:

- *"Conversion to croplands which has eliminated or fragmented sagebrush in areas having deep fertile soils or irrigation potential."*
- *"Sagebrush remaining in these areas has been reduced to agricultural edges or to relatively unproductive environments."*
- *"Oil and gas resources are being developed primarily in the eastern portion of the sage-grouse range"*
- *"exploration and development of wind and geothermal energy"*
- *"Livestock grazing"* which has a *"diffuse influence"*
- *"Urbanization and human densities are increasing in the western US as people choose to live near wilderness and recreation areas."*
- *"new corridors proposed for energy transmission"*
- *"mapped roads"*
- *"recreation, including off-highway vehicles, is rapidly increasing on public lands"*
- *"human footprint influences the landscape structure of sagebrush-dominated habitats for sage-grouse."*

1.4) The authors suggest that harvest and predation do not have a range-wide effect. This assumption is questionable given the high harvest rates cited in Chapter 6 of this monograph: "*Predation (Hagen,this volume), harvest (Reese and Connelly, this volume), and disease (Christiansen and Tate, this volume) are significant to individuals or local groups but are not significant factors influencing population trends. Similarly, West Nile virus (Walker and Naugle, this volume) has the potential to significantly decrease sage-grouse numbers or eliminate relatively small peripheral populations but the effect on range-wide trends is less clear."*

1.5) The authors describe the rationale for their delineation of a ***"Sage Grouse***

***Conservation Area"* which encompasses a broader area than where sage grouse are currently or historically found.** It is notable that in Figure 4, "Core Areas" (favored by the authors) and "Management Zones" (developed by the Western Association of Fish and Wildlife Agencies (WAFWA)) are approximately equivalent in size and temporal scale (>50) years (note the log scales used in Figure 4).

1.6) The author's portrayal of patterns found in sagebrush ecosystems is more akin to a belief in natural design (teleology) than mainstream ecology and evolutionary biology, where such beliefs disappeared long ago (Mayr 1961; Gould and Lewontin 1979). Here is one example of the author's portrayal of the sagebrush ecosystem as complex, hierarchically organized, and with "integrated" structure and function: *"The model of sagebrush systems as a hierarchical organization arranged along spatial and temporal scales is one of the unifying concepts underlying the information presented in this volume (Fig. 4). This model presents ecological systems as an integrated assemblage of patterns and processes at smaller scales enclosed within successive levels at larger scales."* [My underlining for emphasis.]

1.7) The authors make a number of vague statements using undefined terms to describe upsets to the natural order of sagebrush ecosystems: *"Unbalanced dynamics of disturbance relative to recovery at smaller scales can change patterns observed at larger scales."* In this sentence, the terms "*unbalanced dynamics", "disturbance",* and *"recovery"* are undefined. Similarly, the term: *"human footprint"* is undefined.

1.8) In conclusion, the author's suggest that the sagebrush ecosystem can only be conserved through an integrated programmatic approach, providing a biological rationale for unified federal land use control, such as that under the Endangered Species Act: *"Conserving an area sufficiently large to contain an intact sagebrush system complete with disturbance and recovery dynamics is especially challenging because of the large spatial area and long temporal scale that will be required. Available financial and logistic resources limit the extent of conservation and management actions. However, core areas (Doherty et al., this volume), population units (Garton et al., this volume), or population components (Knick and Hanser, this volume) can help focus planning on large areas needed to sustain populations, thus avoiding a spatial checkerboard of unrelated actions that have less benefit to long-term conservation."*

Chapter 2 (2009), Chapter 1 (2011):
PRINCIPAL FEDERAL LEGISLATION AND CURRENT MANAGEMENT OF SAGEBRUSH HABITATS: IMPLICATIONS FOR CONSERVATION

Author: Steven T. Knick

Abstract from Knick (2009):
"The historical disposition and development of sagebrush (Artemisia spp.) landscapes has resulted in land ownership mosaics and differences in environmental qualities among land managers that influences today's conservation planning. Early land-use policies following major land acquisitions in 1776–1867 in the western US were designed to transfer the vast public resources to private ownership. Federal legislation enacted during the late 1800s and early 1900s encouraged development of arable regions, facilitated livestock grazing, created transportation corridors, and provided for access to minerals, coal, and petroleum. Productive lands characterized by deeper soils and access to water were transferred to private entities and converted from native habitats to agriculture. Privately owned lands are a major constituent of sagebrush landscapes in the Great Plains and Columbia Basin and are intermixed with public lands in other sage-grouse (Centrocercus spp.) management zones. The public still retains large areas and 70% of current sagebrush habitats. The USDI Bureau of Land Management has responsibility for almost half of the sagebrush habitat in the US; however, those lands are relatively unproductive and characterized by xeric environments and shallow soils. More recent legislation reflects changing public values to maintain or restore natural components, such as plants and wildlife, and minimize the impact of land uses in sagebrush landscapes. Multiple use dominates the management policy of most sagebrush habitat on public land; very little of the lands used by Greater Sage-Grouse (Centrocercus urophasianus) has protected status in national parks or reserves. Conserving sagebrush landscapes required by Greater Sage-Grouse and other wildlife will depend on engaging the mosaic of public agencies and private ownerships in management programs, understanding the broad diversity of habitat characteristics, and recognizing the limitations of environments supporting the majority of sagebrush habitat on public lands."

Review of:
PRINCIPAL FEDERAL LEGISLATION AND CURRENT MANAGEMENT OF SAGEBRUSH HABITATS: IMPLICATIONS FOR CONSERVATION

Review by: Dr. Rob Roy Ramey II

This "paper" is not a scientific paper. It is a review of legislation, ownership, and management of land considered by the author to be in sagebrush habitat. The history of land transfer from public to private ownership in the western U.S. and Canada receives lengthy treatment. The acreage of each land ownership category is quantified. The author's personal views on private land and federal land management policy are apparent.

2.1) The pre-European distribution of sage grouse is far more uncertain than the author and others suggest (e.g. Connelly et al. 2004; Schroeder et al. 2004).
Uncertainty stems from: an incomplete historic record, imprecise estimation of sagebrush extent (impossible to know from existing historic record) estimated from Kuchler's vegetation models, and the historic absence of sage grouse from northern Montana (absence of sage grouse from Lewis and Clark expedition and later records). A more extensive peer review of Schroeder et al. (2004) details these shortcomings.

2.2) The author makes a number of other statements suggestive of a preference for public ownership, a departure from multiple-use, and stricter regulation of private land:

"Almost two-thirds of the total sagebrush distribution in the US still remains within the public ownership."

"Multiple use dominates the management policy of most sagebrush habitat on public land; very little of the lands used by Greater Sage-Grouse (Centrocercus urophasianus) has protected status in national parks or reserves."

"Conserving sagebrush landscapes required by Greater Sage-Grouse and other wildlife will depend on engaging the mosaic of public agencies and private ownerships in management programs, understanding the broad diversity of habitat characteristics, and recognizing the limitations of environments supporting the majority of sagebrush habitat on public lands."

"The human footprint, a collective measure of anthropogenic use, was greatest in high productivity regions defined by deep soils, high precipitation, and shallow topographic terrain (Leu et al. 2008). This disproportionate loss of more productive regions to agriculture or from diversion of water for irrigation or other consumption, carries disproportionate impacts to sagebrush landscapes and their capacity to maintain themselves by leaving regions that are most sensitive to disturbance and less able to recover."

"Almost all sagebrush habitat in primary regions for Greater Sage-Grouse is undergoing

use and resource development (Knick et al. 2003, Wisdom et al. 2005, Holechek 2007, Knick et al. a, this volume). Wildlife conservation is not the exclusive or dominant objective on any major federal lands, except for the National Wildlife Refuge System (Bean and Rowland 1997). Consequently, conservation objectives often compete with commodity production and nonconsumptive uses, such as off-road vehicles for recreation, under the multiple-use mandate. Challenges to land uses increasingly are brought under the National Environmental Policy Act (1969) or to protect plants and animals through the Endangered Species Act (1973) (Bean and Rowland 1997, Quigley 2005). Petitions to list Greater Sage-Grouse (United States Department of the Interior 2005), restrictions on land use, and wilderness designations across sagebrush lands have significant implications for energy, national security, grazing, and recreation interests (Wambolt et al. 2002, Holechek 2007)."

"Land use would need to be restricted on 50,000 km^2 of sagebrush habitats if 10% of the total geographic area, a minimum target to conserve species distributions (Svancara et al. 2005), is to be protected across the SGCA or set aside in a reserve system (Bock et al. 1993). Much larger areas, ranging from 33–75% of the range-wide distribution, may be necessary to conserve biodiversity and ecosystem integrity (Soulé and Sanjayan 1998). Extensive restrictions are unlikely because of the resource value of these lands for non-consumptive and traditional uses. Thus, a large proportion of sagebrush habitat will continue to be managed for multiple purposes. Ultimately, our ability to develop long-term conservation strategies that maintain or increase populations of Greater Sage-Grouse will depend on involving a wide array of interests and perspectives in managing a broad diversity of uses for sagebrush habitats."

Chapter 3 (2009), Chapter 2 (2011):
THE LEGAL STATUS OF GREATER SAGE-GROUSE: ORGANIZATIONAL STRUCTURE OF PLANNING EFFORTS

Author: San Stiver

Abstract from Stiver:
"Range-wide conservation efforts to benefit Greater Sage-Grouse (Centrocercus urophasianus) began in 1954 with the Western Association of Fish and Wildlife Agencies' establishment of the Sage-Grouse Technical Committee. Contemporary conservation efforts expanded in the mid-1990s in response to increased concern about declining trends of sage grouse populations and habitats. Seven petitions have been filed with the USDI Fish and Wildlife Service to protect Greater Sage-Grouse under provisions of the Endangered Species Act (1973). Endangered species protection for Greater Sage-Grouse in the state of Washington was warranted but precluded. The 90-d finding determined that endangered species status was not warranted for the three petitions to protect Greater Sage-Grouse in Mono Basin, California and Nevada, the western subspecies of sage-grouse, and the eastern subspecies of sage-grouse. The remaining three petitions requesting range-wide protection for Greater Sage-Grouse were combined into one 12-mo finding. The USDI Fish and Wildlife Service completed a finding in 2005 and determined that listing was not warranted. This decision was litigated and remanded to the USDI Fish and Wildlife Service in December 2007 and currently is being reviewed. All western states and both Canadian provinces in the range of Greater Sage-Grouse have completed state or provincial strategic plans to manage Greater Sage-Grouse. Some conservation planning and conservation actions are being accomplished by local sage-grouse working groups. These groups are locally-based with membership composed of agency representatives and stakeholders in sagebrush (Artemisia spp.) ecosystems. More than 60 community-based sage-grouse conservation groups are active in the western US and Canada. Conservation actions are planned, coordinated, funded and accomplished by a partnership of state and federal agencies, landowners, industry, non-governmental organizations and the public."

Review of:
THE LEGAL STATUS OF GREATER SAGE-GROUSE: ORGANIZATIONAL STRUCTURE OF PLANNING EFFORTS

Review by: Dr. Rob Roy Ramey II

This is not a scientific paper. It is a legal and policy analysis that summarizes the petitions to list sage grouse under the ESA and summarizes non-ESA federal, state, community and NGO conservation efforts.

3.1) Environmental NGOs are mentioned by name but industries contributing to this effort are not:

> *"Traditional non-governmental organizations (NGO) and newly formed organizations have and continue to contribute to sage-grouse and sagebrush conservation efforts…NGOs including but not limited to the National Wildlife Federation, National Audubon Society, North American Grouse Partnership, The Nature Conservancy, Environmental Defense, and the Cooperative Sagebrush Initiative are working on sage-grouse and sagebrush conservation issues. Industries including mineral and coal mining, oil and gas exploration and production, renewable energy, energy transmission, ranching, and farming have a vested interest in the sagebrush steppe. These industries have and continue to support sage-grouse conservation within the constraints of conducting their business. Industries have provided funding and support for conservation actions, monitoring, and planning."*

3.2) Here and elsewhere, authors of this monograph refer to multiple ESA listing petitions that had been filed on sage grouse. Conspicuously absent from these discussions is any mention of *who* filed the petitions or the quality of their information. As shown below, all of the petitions to date have been filed by and litigated by activist organizations. This information is available from the USFWS sage grouse website.

> **1) Petition Date:** May 14, 1999 (74 pages)
> **Petitioners:** Northwest Ecosystem Alliance and Biodiversity Legal Foundation
>
> **2) Petition Date:** January 25, 2000 (254 pages)
> **Petitioners:** Mark Salvo, American Lands Alliance; Randy Webb, Net Work Associates; Andy Kerr, The Larch Company; Jasper Carlton, Biodiversity Legal Foundation; Susan Ash, Wild Utah Forest Campaign; Rob Edwards, Sinapu.
>
> **3) Petition Date:** December 28, 2001 (493 pages)
> **Petitioners:** Donald Randy Webb, Institute for Wildlife Protection

4) Petition Date: January 24, 2002 (468 pages)
Petitioners: Donald Randy Webb, Institute for Wildlife Protection

5) Petition Date: June 18, 2002 (7 pages)
Petitioners: Craig Dremann

6) Petition Date: July 3, 2002 (524 pages)
Petitioners: Donald Randy Webb, Institute for Wildlife Protection

7) Petition Date: March 19, 2003 (992 pages; this is a combination of the previous petitions for Western and Eastern subspecies)
Petitioners: Donald Randy Webb, Institute for Wildlife Protection

8) Petition Date: December 22, 2003 (218 pages)
Petitioners: Mark Salvo American Lands Alliance, Biodiversity Conservation Alliance, Center for Biological Diversity, Forest Guardians, The Fund for Animals, Gallatin Wildlife Association, Great Old Broads for Wilderness, Hells Canyon Preservation Council, The Larch Company, Northwest Ecosystem Alliance, Northwest Council for Alternatives to Pesticides, Oregon Natural Desert Association, Oregon Natural Resources Council, Predator Defense Institute, Sierra Club, Sinapu, Western Fire Ecology Center, Western Watersheds Project, Wild Utah Project, Wildlands CPR, and Center for Native Ecosystems

9) Petition Date: November 10, 2005 (87 pages plus appendices)
Petitioners: Submitted by Stanford Law School Environmental Law Clinic on behalf of The Sagebrush Sea Campaign (WildEarth Guardians), Western Watersheds Project, Center for Biological Diversity and Christians Caring for Conservation.

Chapter 4 (2009), Chapter 4 (2011):
CHARACTERISTICS OF GREATER SAGE-GROUSE HABITATS: A LANDSCAPE SPECIES AT MICRO AND MACRO SCALES

Authors: John W. Connelly, E. Thomas Rinkes, and Clait E. Braun

Abstract from Connelly et al.:
"Greater Sage-Grouse (Centrocercus urophasianus) depend on sagebrush (Artemisia spp.) for much of their annual food and cover. This close relationship is reflected in the North American distribution of sage-grouse, which is closely aligned with sagebrush, and in particular big sagebrush (Artemisia tridentata) and silver sagebrush (A. cana). This association is most pronounced in late autumn, winter, and early spring when sage-grouse are dependent on sagebrush for both food and cover. However, sage-grouse also rely on sagebrush at other times of year, especially for nesting cover during the breeding season. Other habitat characteristics may not be as obviously important as sagebrush, but may be nearly as essential. For example, herbaceous vegetation provides important food and cover during nesting and early brood-rearing seasons, and thus has a major role in the population dynamics of sage-grouse. Available evidence clearly supports the conclusion that conserving large landscapes with suitable habitat is important for conservation of sage-grouse. Moreover, natural variation in vegetation and the dynamic nature of mature sagebrush stands should be considered for all habitat descriptions and prior to any management action. Sagebrush habitats have been lost, fragmented, and degraded as a result of many different anthropogenic disturbances. Complicating matters, the traditional nature of seasonal movements by Greater Sage-Grouse suggests this species has little ability to adapt to habitat change. Therefore, land management agencies must establish sagebrush conservation as one of their highest priorities if remaining habitats are to be maintained. Additionally, these agencies must develop and implement effective habitat reclamation measures to offset unavoidable losses. Given the strong dependence of Greater Sage-Grouse on sagebrush habitats, failure to protect what is left and fix what is broken will likely result in extirpation of many populations of Greater Sage-Grouse."

Review of:
CHARACTERISTICS OF GREATER SAGE-GROUSE HABITATS: A LANDSCAPE SPECIES AT MICRO AND MACRO SCALES

Review by: Dr. Rob Roy Ramey II

This unremarkable paper is a compilation and review of existing information on sage grouse.

4.1) Absent from this paper is any discussion of one of the most ubiquitous hazards to sage grouse across their range: wire fencing. This is a hazard to sage grouse because they fly low and fast. Sage grouse also may avoid fences because of predation risk from perching raptors. The USFWS devoted an extensive discussion to this hazard in their 2008 Interim Status Update (USFWS 2008) and Environmental Defense has issued a white paper on the subject (Environmental Defense 2009)

Other obvious hazards found in sage grouse habitat, but not mentioned, include: hunting harvest, which occurs across most of sage grouse habitat, and predation, which only received one mention in the context of nest predation when nesting is at high densities. In contrast, the deleterious effects of energy development are mentioned three times.

4.2) The author claims that sage grouse are a "landscape species," citing Connelly et al. (2004). However, a search for "landscape species" in Connelly et al (2004) yields an ambiguous use of the term:

"Sage-grouse populations typically inhabit large, interconnect expanses of sagebrush and thus have been characterized as a landscape-scale species (Patterson 1952, Wakkinen 1990)."

"Although sage-grouse are considered a landscape species, conclusive data are unavailable on minimum patch sizes of sagebrush necessary to support viable populations of sage-grouse.

4.3) There are several references that suggest that sage grouse have a broader habitat tolerance than just sage brush. For example:

"Historically, the distribution of sage-grouse was closely tied to the distribution of the sagebrush ecosystem (Wambolt et al. 2002, Schroeder et al. 2004). However, populations of sage-grouse have been extirpated at places throughout their former range (Schroeder et al. 1999, Wambolt et al. 2002), concomitant with habitat loss and degradation, so that the species' current distribution is less closely aligned with that of sagebrush."

"Sage-grouse typically occupy habitats with a diversity of species and subspecies of

sagebrush, but may also use a variety of other habitats including riparian meadows, agricultural lands, steppe dominated by native grasses and forbs, shrub willow (Salix spp.), and sagebrush habitats with some conifer or quaking aspen (Populus tremuloides) (Patterson 1952, Dalke et al. 1963). These habitats are usually intermixed in a sagebrush-dominated landscape (Griner 1939, Patterson 1952, Dalke et al. 1963, Savage 1969). Sage-grouse have used habitats altered by man throughout the species' range including crested wheatgrass (Agropyron cristatum) seedings, and different agricultural crops (Patterson 1952, Gates 1983, Connelly et al. 1988, Blus et al. 1989, Sime 1991). Leks are often in altered areas including dirt roads and areas seeded with crested wheatgrass; however these areas are adjacent to sagebrush stands that provide nesting and early brood-rearing habitat. By itself, evidence of use does not imply importance. The value of these habitats to sage-grouse in meeting their seasonal habitat requirements is dependent on the juxtaposition of these habitats in relation to sagebrush and the hazards (Connelly et al. 2000a, Beck et al. 2006) to grouse using these areas."

Chapter 5 (2009), Chapter 3 (2011):
CHARACTERISTICS AND DYNAMICS OF GREATER SAGE-GROUSE POPULATIONS

Authors: John W. Connelly, Christian A. Hagen, and Michael A. Schroeder

Abstract from Connelly et al.:
"Early investigations supported the view that Greater Sage-Grouse (Centrocercus urophasianus) population dynamics were typical of other upland game birds. More recently, greater insights into the demographics of Greater Sage-Grouse revealed this species was relatively unique because populations tended to have low winter mortality, relatively high annual survival, and some populations were migratory. We describe the population characteristics of Greater Sage-Grouse and summarize traits that make this grouse one of North America's most unique bird species. Data on movements, lek attendance, and nests were obtained from available literature, and we summarized female demographic data during the breeding season for the eastern and western portions of the species' range. Lengthy migrations between distinct seasonal ranges are one the more distinctive characteristics of Greater Sage-Grouse. These migratory movements (often >20 km) and large annual home ranges (>600 km^2) help integrate Greater Sage-Grouse populations across vast landscapes of sagebrush (Artemisia spp.)-dominated habitats. Clutch size of Greater Sage-Grouse averages seven–eight eggs and nest success rates average 51% in relatively non-altered habitats while those in altered habitats average 37%. Adult female Greater Sage-Grouse survival is greater than adult male survival and adults have lower survival than yearlings, but not all estimates of survival rates are directly comparable. The sex ratio of adult Greater Sage-Grouse favors females but reported rates vary considerably. Long- term age ratios (productivity) in the fall have varied from 1.4–3.0 juveniles/adult female."

Review of:
CHARACTERISTICS AND DYNAMICS OF GREATER SAGE-GROUSE POPULATIONS

Review by: Dr. Rob Roy Ramey II and Dr. Laura M. Brown

The abstract accurately summarizes the chapter and gives the main conclusions. Data are from a very large number of studies, over many decades, and summary statistics are reported. No hypotheses were tested, as this was a summary of the population data collected from the different states over the years. Authors indicated where data could not be summarized because of inconsistencies in data collection. The most interesting findings are that sage grouse have generally high winter survival rates, relatively high annual survival rates, and are more migratory over greater distances than previously thought.

The authors are correct in suggesting that: *"Sage-grouse do not fit the commonly accepted paradigm of upland game bird demographics (Allen 1962)."* This is because sage grouse are long-lived birds that do not have a high rate of reproduction as found with many shorter-lived game birds. What escapes these authors is the implications of this for hunting: the intensity of sage grouse harvests in the past were a likely contributor to their overall decline.

The authors also suggest that sage grouse require "vast landscapes" (the term "landscape species" being an invention of the lead author). While sage grouse occupy a large range, they do persist in many semi-isolated populations interconnected by occasional dispersal (migration among populations). The seasonal migration distances (*"often >20km"*) and home ranges (*">600km"*) are not remarkable compared to other species (e.g. virtually all mobile species could be termed "landscape species", rendering the term meaningless).

Chapter 6 (2009, Chapter 7 (2011):
HARVEST MANAGEMENT FOR GREATER SAGE-GROUSE: A CHANGING PARADIGM FOR GAME BIRD MANAGEMENT

Authors: Kerry Paul Reese and John W. Connelly

Abstract by Reese and Connelly:
"Harvest of Greater Sage-Grouse (Centrocercus urophasianus) has occurred throughout recorded history, but relatively few studies addressed the impact of harvest on sagegrouse numbers. Harvest of Greater Sage-Grouse occurs in 10 of 11 western states in which they reside. Hunting seasons, and bag and possession limits have often become more conservative over the species' range during the past decade as states responded to changing population numbers and perceived threats to the birds, and then acted to reduce harvest opportunities. By 2007, hunting season lengths ranged from 2–62 d with a mean length of 10 d. Annual harvest estimates range from 10 birds in South Dakota to 10,378 in Wyoming. Total estimated annual harvest of Greater Sage-Grouse in the 10 states in 2007 was 28,180 birds. The effects of hunting on sage-grouse populations remains equivocal based on published literature, but the paradigm of harvest as compensatory may be shifting as evidence accumulates that populations of Greater Sage-Grouse require more conservative hunting regulations to reduce the potential for excessive harvest. Recent research suggests that because Greater Sage-Grouse normally experience low mortality over winter, mortality from hunter harvest in September and October may not be compensatory. Harvest mortality on most populations of Greater Sage-Grouse appears to be low, but both harvest levels and population abundance must be closely monitored in every population to improve management regulations for the harvest of the species. Biological data obtained from harvested birds is vital for continued management of sage-grouse populations. No studies have demonstrated that hunting is a primary cause of reduced numbers of Greater Sage-Grouse, and cessation of harvest in Washington 20 yr ago has not resulted in increasing population levels. Continued concern over general population declines in Greater Sage-Grouse populations from known (disease, habitat loss, and habitat fragmentation) and unknown origins, requires new research and continued routine collection of biological data for each population to optimize future harvest strategies."

Review of:
HARVEST MANAGEMENT FOR GREATER SAGE-GROUSE: A CHANGING PARADIGM FOR GAME BIRD MANAGEMENT

Review by: Dr. Rob Roy Ramey II and Dr. Laura M. Brown

This chapter gave a history of sage grouse hunting, and harvest rates from the states that allow hunting (only Washington State and Canada do not allow sage grouse hunting). It described the paradigm change that came about as a result of research that shows sage grouse are a K-selected species (high winter survival, longer lifespan than most upland birds (3-6 y), smaller clutch sizes (6-9). Reese and Connelly recommend that harvests should be 5-10% of the fall population, however, this recommendation is not based on a quantitative analysis and there are no reliable methods currently in use to determine population size. It is worth asking the question: With this species in decline, why are we allowing any harvest at all? If there is a desire to maintain harvest for cultural reasons then why not limit harvest to male sage grouse only, or to populations that are stable?

6.1) The annual harvest data of sage grouse from each state are shown in Table 3 (*Annual harvest estimates for greater sage-grouse by state, 2001–2007*). The population-level impact to sage grouse however, cannot be evaluated because there are no reliable estimates of annual population size. This represents a situation where there is a known source of sage grouse mortality, in the tens of thousands annually. Yet its effect is dismissed (here and by other authors in the volume) as unimportant, while other, hypothetical or undocumented sources of mortality are proposed to be regulated.

6.2) The paper cited by Reese and Connelly in support of hunt harvest not exceeding 10% of the fall population (Connelly et al. 2000c) was actually a qualitative assessment (no supporting quantitative analyses). In this case, the use of *"careful assessments"* of hunting harvest is undefined by the authors. It must be assumed that these *"careful assessments"* are qualitative because there are no reliable data to estimate population size.

> *"6) Hunting seasons for sage grouse should be based on careful assessments of population size and trends... sage grouse tend to have relatively long lives with low annual turnover (Zablan 1993, Connelly et al. 1994) and a low reproductive rate (Gregg 1991, Connelly et al. 1993). Consequently, hunting may be additive to other causes of mortality for sage grouse (Johnson and Braun 1999, Connelly et al. 2000a). However, most populations appear able to sustain hunting if managed carefully (Connelly et al. 2000a)."*

6.3) Reese and Connelly suggest that harvest quotas are "conservative," however they also admit that there is no data or reliable method with which to determine population size: *"Harvest regulations as currently structured (Table 1) tend to be conservative and may keep harvest (Table 3) <10% of fall population size. However,*

states do not presently measure fall population size of Greater Sage-grouse and no recognized protocol has been established to do so."

6.4) This paper identifies hunting as a major source of female sage grouse mortality. This would suggest a need for limiting the hunting of female sage grouse in order to avert population level declines that have occurred in combination with other factors. One study cited by Reese and Connelly reported that: *"Fall harvest caused 15% of known male mortality and 42% of known female mortality. Forty-six percent of all female mortality occurred during the hunting season (September–October) and harvest accounted for 91% of female deaths. In contrast, only 2% of the deaths of either sex occurred during the four post-hunting season months of November through February. The low over-winter mortality rate supports the contention that winter is not typically a difficult season for Greater Sage-Grouse (Beck and Braun 1978, Remington and Braun 1988, Sherfy 1992, Sika 2006)."*

"Connelly et al. (2000a) concluded that for adult females hunting losses are likely additive to winter mortality and may result in lower breeding populations."

6.5) The authors point out that there are no studies that indicate population-level impacts from sage grouse hunting, but they also point out that reliable population data is not available.
"No studies have demonstrated that hunting is a primary cause of reduced numbers of Greater Sage-Grouse. Many studies support habitat-based reasons for sage-grouse population declines (Swenson et al. 1987, Dobkin 1995, Connelly and Braun 1997, Connelly et al. 2000a, b: Leonard et al. 2000, Aldridge and Brigham 2002, Pedersen et al. 2003, Walker et al. 2007a, Doherty et al. 2008)."

The guesswork that typified decades of sage grouse harvest management can be summed up in the following statement in Reese and Connelly: *"An appropriate harvest rate has not been determined for Greater Sage-Grouse populations. Harvest equal to 5–10% of the fall population may be appropriate, but assumes detailed and specific knowledge of population size in September or October. Given the uncertainty in abundance estimates for breeding season populations, expecting any state to adequately determine size of any population of Greater Sage-Grouse in fall is not realistic."*

According to Reese and Connelly, *"The effects of hunting on sage-grouse populations remains equivocal based on published literature, but the paradigm of harvest as compensatory may be shifting as evidence accumulates that populations of Greater Sage-Grouse require more conservative hunting regulations to reduce the potential for excessive harvest."*

6.6) An aspect of hunting that is not mentioned by the authors is aversive conditioning, which can contribute to birds avoiding humans. Therefore, if there is concern that sage grouse avoid areas of human development, then limiting hunting in those areas has the potential to reduce aversive conditioning and thus the secondary effects of avoidance.

Chapter 7 (2009), Chapter 5 (2011):
MOLECULAR INSIGHTS INTO THE BIOLOGY OF GREATER SAGE-GROUSE

Authors: Sara J. Oyler-McCance and Thomas W. Quinn

Abstract from Oyler-McCance and Quinn:
"Recent research on Greater Sage-Grouse (Centrocercus urophasianus) genetics has revealed some important findings. First, multiple paternity in broods is more prevalent than previously thought, and leks are not comprised of kin groups. Second, the Greater Sage-Grouse is genetically distinct from the congeneric Gunnison Sage-Grouse (C. minimus). Third, the Lyon-Mono population in the Mono Basin, spanning the border between Nevada and California, has unique genetic characteristics. Fourth, the previous delineation of western (C. u. phaios) and eastern Greater Sage-Grouse (C. u. urophasianus) is not supported genetically. Fifth, two isolated populations in Washington show indications that genetic diversity has been lost due to population declines and isolation."

Review of:
MOLECULAR INSIGHTS INTO THE BIOLOGY OF GREATER SAGE-GROUSE

Review by: Dr. Rob Roy Ramey II

This paper represents a summary of genetic studies on Greater Sage-Grouse. Of the five main conclusions, the second and third are not supported by the data. That is because the Gunnison sage grouse was described as a new species based upon a low level of genetic divergence, a level typically found among nearly populations rather than species. The primary author of these studies, Oyler-McCance, uses a low threshold for considering species and populations as "distinct."

7.1) The following excerpts from a manuscript in preparation for publication (Ramey, in prep) provides a concise summary of the questionable basis of the recognition of the Gunnison sage grouse as a new species:

> *"The Gunnison sage grouse (Centrocerus minimus) was described as a new species by Young et al. (2000) based on body weight, courtship behavior, plumage, geographic isolation, and genetic data.*
>
> ***Size differences were based on selective use of data***
> *Although the body size of the Gunnison sage grouse is smaller than those reported for the greater sage grouse (Centrocerus minimus), Young et al. (2000) exaggerated the differences between the Gunnison sage grouse and greater sage grouse by not including intermediate populations in the comparison.*
>
> ***Qualitative descriptions were used to describe courtship displays***
> *Reported differences between the Gunnison sage grouse and greater sage grouse in plumage and courtship behavior are mostly qualitative: they rely on line drawings, artist renderings, or pictures of "typical" individuals; and they lack statistical analysis. No quantitative comparison of these traits was made across the range of variation found in the greater sage grouse.*
>
> ***Vocalization experiment not rigorous***
> *A vocalization playback experiment, used as evidence of reproductive isolation, lacked a reciprocal design, and the conclusions are unsupported by any rigorous hypothesis testing.*
>
> ***Geographic isolation not supported***
> *The presumed geographic isolation of Gunnison sage grouse due to mountainous terrain is contrary to observations of sage grouse in the alpine, nor a lack of isolating topography. MtDNA and microsatellite data, and a documented population located east of the Continental Divide also refute the presumption of geographic isolation.*

Extent of historic decline is speculative
The presumed loss of Gunnison sage grouse from >90% of its historic range is speculative (not supported by physical evidence).

No diagnostic genetic markers
Nine out of ten mtDNA haplotypes found in Gunnison sage grouse were also found in the greater sage grouse. The one unique mtDNA haplotype found in Gunnison sage grouse has only a single mutational difference from the most common mtDNA type found in both species. While frequency differences exist between the Gunnison sage grouse and greater sage grouse in microsatellite alleles, there were no unique microsatellite alleles in Gunnison sage grouse.

Taken collectively, much of the evidence used in support for species status for the Gunnison sage grouse is questionable."

Chapter 8 (2009), CHAPTER 6 (2011):
PREDATION ON GREATER SAGE-GROUSE: FACTS, PROCESS, AND EFFECTS

Author: Christian A. Hagen

Abstract from Hagen:
"Although Greater Sage-Grouse (Centrocercus urophasianus) face a suite of predators in sagebrush (Artemisia spp.) communities across the species' range, none of these predators specialize on sage-grouse. Greater Sage-Grouse are susceptible to predation from egg to adult leading to the hypothesis that predator control would be an effective conservation tool for sage-grouse populations. Therefore, I reviewed the literature pertaining to predator communities across the range of Greater Sage-Grouse and assessed the effects of predation on sage-grouse life history. I then provided a framework for evaluating when predator management may be warranted. Generally, nest success rates and adult survival are high, suggesting that on average predation is not limiting. However, in fragmented landscapes or in areas with subsidized predator populations predation may limit population growth. Few studies linked habitat quality to mortality rates, and fewer still linked these rates to predation. Predator management studies have not provided sufficient evidence to support implementation over broad geographic or temporal scales, but limited information suggests predator management may provide short-term relief for a population sink. Evaluating the need for predator management will require linking reduced demographic rates to habitat quality (fragmentation or degradation) or predator populations out of the natural range of variability (exotic species of subsidized populations). Alternatively, managers might consider predator management in translocation efforts to buffer recently released individuals from potentially elevated predation rates. Future work should quantify predator and alternate prey communities in habitats used by Greater Sage-Grouse."

Review of:
PREDATION ON GREATER SAGE-GROUSE: FACTS, PROCESS, AND EFFECTS

Review by: Dr. Rob Roy Ramey II and Dr. Laura M. Brown

This paper summarizes literature and unpublished research about predation on sage grouse. All of the predators on sage grouse are generalists, meaning that they prey on other species as well. Sage grouse eggs are preyed upon by red foxes, coyotes, badgers, common ravens, black-billed magpies. Common predators of juvenile and adult sage-grouse include golden eagles, prairie falcons (as well as other raptors), coyotes, badgers, and bobcats. Younger birds are thought to be preyed on by common ravens, red fox, northern harrier, ground squirrels, snakes, and weasels.

8.1) The author found fault with most studies that had reported a positive effect of predator management and concluded its effectiveness was generally short term. A single paragraph was devoted to *"Predator Control as a Conservation Tool."*
Important research not cited by the author includes Coates and Delehanty (2004), who reported a 73.6% nest success compared to a mean of 42.6% based on 14 studies from 1941-1997.

8.2) There is no discussion of potential benefits of utilizing anti-perch devices on powerpoles and fence posts to discourage raptors and ravens in sage grouse habitat.

8.3) There is no discussion of potential benefits of burying powerlines, thus eliminating perches for raptors and ravens.

8.4) There is no discussion of potential benefits of trash control measures to eliminate food subsidies to ravens, magpies, red foxes, and coyotes.

8.5) There was no discussion of using predator management in an adaptive management framework (e.g. to be implemented under specific circumstances when it would be most effective and on those species where it would have the greatest positive effect for sage grouse).

Instead, the author suggests an untested approach, for which supporting data are lacking: *"A more recent recognition is that the broader financial and political cost to removing predators at a scale and extent which may be effective is no longer socially or ecologically viable (Messmer et al. 1999). The most effective long-term predator management for sage-grouse population may be through maintaining connectivity of suitable habitats (Schroeder and Baydack 2001). However, most sage-grouse research has failed to quantify predator community structure or predation rates in relation to habitat variables, let alone within the landscape context. Thus, it is not currently possible to understand relationships among habitat structure, demographic rates of sage-grouse, and the predator community of an area and to incorporate these into a broad-based predator-management program for sage-grouse."*

While there may be merit in some aspects of the author's suggestion, experience has shown that reducing predation on a species of concern requires an *integrated predator management* approach. Such an approach was recently proposed by Coates and Delehanty (2010), specifically to reduce predation on sage grouse nests.

Chapter 9 (2009), Chapter 8 (2011):
PARASITES AND INFECTIOUS DISEASES OF GREATER SAGE-GROUSE

Authors: Thomas J. Christiansen and Cynthia M. Tate

Abstract from Christiansen and Tate:
"We report the parasites, infectious diseases, and non-infectious diseases related to toxicants found in the Greater Sage-Grouse (Centrocercus urophasianus) across its range. Documentation of population-level effects is rare although researchers have responded to the recent emergence of West Nile virus with rigorous efforts. West Nile virus shows greater virulence and potential population level effects than any infectious agent detected in Greater Sage-Grouse to date. Research has demonstrated: (1) parasites and diseases can have population- level effects on grouse species, (2) new infectious diseases are emerging, and (3) habitat fragmentation is increasing the number of small, isolated populations of Greater Sage-Grouse. Natural resource management agencies need to develop additional research and systematic monitoring programs for evaluating the role of micro- and macroparasites, especially West Nile virus, infectious bronchitis and other corona viruses, avian retroviruses, Mycoplasma spp., and Eimeria and associated enteric bacteria affecting sage-grouse populations."

Review of:
PARASITES AND INFECTIOUS DISEASES OF GREATER SAGE-GROUSE

Review by: Dr. Rob Roy Ramey II and Dr. Laura M. Brown

This paper is a summary of the literature and unpublished information on parasites and infectious disease in sage grouse. It does not report original research and no hypotheses were tested. Considerable attention is devoted to West Nile virus, although mostly summarizing existing information.

9.1) The authors note that research to date has not shown more than short-term population-level effects of disease and parasites. West Nile virus (WNV) is discussed as having a *potential* population-level effect and concern is expressed about the combined effects of WNV, climate change, and habitat fragmentation. This paper basically calls for increased surveillance on diseases, although no specific questions are laid out and no plan provided on how such data will be used to guide management decisions. If data were gathered in the context of an adaptive management framework with specific questions, sampling design, and triggers for management actions, it would be more likely to produce results than the authors' vaguely defined "integrated, multidisciplinary approach."

9.2) Christiansen and Tate paint a simplistic picture of WNV epidemiology and fail to discuss implications of relevant recent literature on WNV. They refer to susceptibility of sage grouse to WNV as *"extreme,"* citing a study of captive inoculated birds (Clark et al. 2006) and an unpublished personal communication. Here is what Clark et al. (2006) actually reported:

> "Although data on mortality rates for other species of birds are few, greater sage-grouse should be considered a highly susceptible species among birds since all greater sage-grouse died after being experimentally infected with WNV. Of the 25 species of birds experimentally infected by Komar et al. (2003), 8 showed mortality, and 4 of these showed 100% mortality: American crow (*Corvus brachyrhynchos*), black-billed magpie (*Pica hudsonia*), ring-billed gull (*Larus delawarensis*), and house finch (*Carpodacus mexicanus*). Mortality was high for other species as well (33–75%)."

Clark et al. (2006) reported mortality from experimental inoculation with $10^{3.2}$ PFU equivalents was 9/9 for unvaccinated birds and 4/5 for vaccinated birds. Mortalities were obviously high yet, as noted by Christiansen and Tate, the reported resistance of sage grouse to WNV in the wild was 1.8–10.3%. And the documented percentage of infection in the wild was low to moderate, 2.4–28.9%. Thus, while susceptibility of sage grouse to WNV is high at present, the mortality in the wild is not 100%, nor are all populations or all birds affected.

Experience with other species affected by WNV (or other flaviviruses) has shown that natural selection plays a role both in the evolution of WNV resistance and moderation of viral virulence over time (Ferguson et al. 2008; Brault 2009). This aspect of flavivirus

epidemiology is not acknowledged in the simplistic presentation of information by Christiansen and Tate (or other contributions in this monograph).

The distribution of documented infections at the Center for Disease Control (please refer to CDC data discussed in the review of Chapter 10) clearly show that infections have been highly variable across the West. Recent research shows that WNV does not affect all populations equally, because transmission is dependent upon a wide variety of factors. These include: the abundance of vector populations (mosquitoes) which depend both on climate perturbations and abundance of suitable water sources (not just coal bed methane ponds), population fluctuations and the spatial distribution of intermediate hosts that serve to spread WNV (e.g. corvids), spatial variation in species diversity (high diversity can dilute the spread within individual species), differences in passive transfer of maternal WNV antibodies to offspring, variation in virulence among WNV strains, introduction of novel strains introduced by rising global trade, and viral dose which has been shown to affect WNV viremia (Hahn et al. 2006; Ferguson et al. 2008; Artsob et al. 2009; Brault 2009; Weissenbock et al. 2010). The epidemiology of WNV in the wild is a far more complex situation that the simplistic presentation in this and other chapters in this monograph.

Chapter 10 (2009), Chapter 9 (2011):
WEST NILE VIRUS ECOLOGY IN SAGEBRUSH HABITAT AND IMPACTS ON GREATER SAGE-GROUSE POPULATIONS

Authors: Brett L. Walker and David E. Naugle

Abstract from Walker and Naugle:
"Emerging infectious diseases can act as important new sources of mortality for wildlife. West Nile virus (Flaviviridae, Flavivirus) has emerged as a potential threat to Greater Sage-Grouse (Centrocercus urophasianus) populations since 2002. We review the ecology of West Nile virus in sagebrush (Artemisia spp.) ecosystems of western North America, summarize the influence of the virus on Greater Sage-Grouse mortality and survival, use demographic models to explore potential impacts on population growth, and recommend strategies for managing and monitoring such impacts. The virus was an important new source of mortality in low and mid-elevation Greater Sage-Grouse populations range-wide from 2003–2007. West Nile virus can simultaneously reduce juvenile, yearling, and adult survival—three vital rates important for population growth in this species, and persistent low-level West Nile virus mortality and severe outbreaks may lead to local and regional population declines. West Nile virus mortality in simulations was projected to reduce population growth (i.e., finite rate of increase, λ) of susceptible populations by an average of 0.06–0.09/yr. However, marked spatial and annual fluctuations in nest success, chick survival, and other sources of adult mortality are likely to mask population-level impacts in most years. Impacts of severe outbreaks may be detectable from lek-count data, but documenting effects of low to moderate mortality will require intensive monitoring of radio-marked birds. Resistance to West Nile virus-related disease appears to be low and is expected to increase slowly over time. Eliminating mosquito breeding habitat from anthropogenic water sources is crucial for reducing impacts. Better data are needed on geographic and temporal variation in infection rates, mortality, and seroprevalence rangewide. Small, isolated, and peripheral populations, particularly those at lower elevations, and those experiencing large-scale increases in distribution of surface water may be at higher risk."

Review of:
WEST NILE VIRUS ECOLOGY IN SAGEBRUSH HABITAT AND IMPACTS ON GREATER SAGE-GROUSE POPULATIONS

Review by: Dr. Rob Roy Ramey II

The authors' stated objectives of this paper are:

> *(1) review the ecology of* [West Nile Virus] *WNV in sagebrush ecosystems of western North America,*
> *(2) summarize recent data on distribution of WNV mortality events, impacts on mortality and survival rates, and resistance to WNV disease,*
> *(3) use demographic models to explore potential impacts of WNV related mortality on population growth, and*
> *(4) recommend strategies for monitoring and mitigating impacts of the virus on sage-grouse populations.*

10.1) What is unusual about this paper is the fact that only ten lines of text are dedicated to results (#3 above) and those results are in no way mentioned in the discussion and recommendations (#4). Instead, the paper is primarily a summary of existing literature and unpublished information on WNV and sage grouse.

10.2) The authors have a narrow focus on WNV and sage grouse, and their paradigms are dated. They do not make use of the recent epidemiological literature on WNV and vector control. That literature would alter their conclusions and lead to more effective allocation of conservation effort.

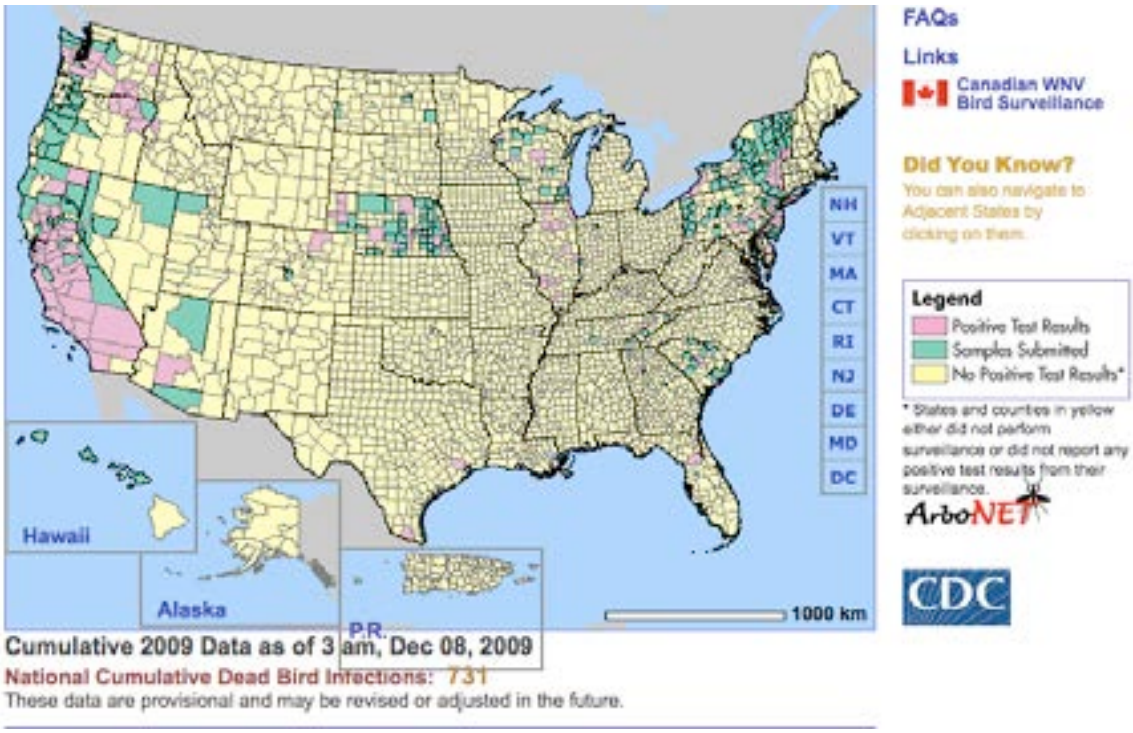
10.3) The role of hunting harvest on vital rates and demography are not mentioned.

10.4) The risk of artificial reservoirs for WNV is overstated, especially because current regulations (e.g. from the BLM) require mosquito control at ponds associated with energy development. In summarizing information from the literature, the authors overstate or misrepresent what the original authors wrote, which detracts from their presentation of valid information.

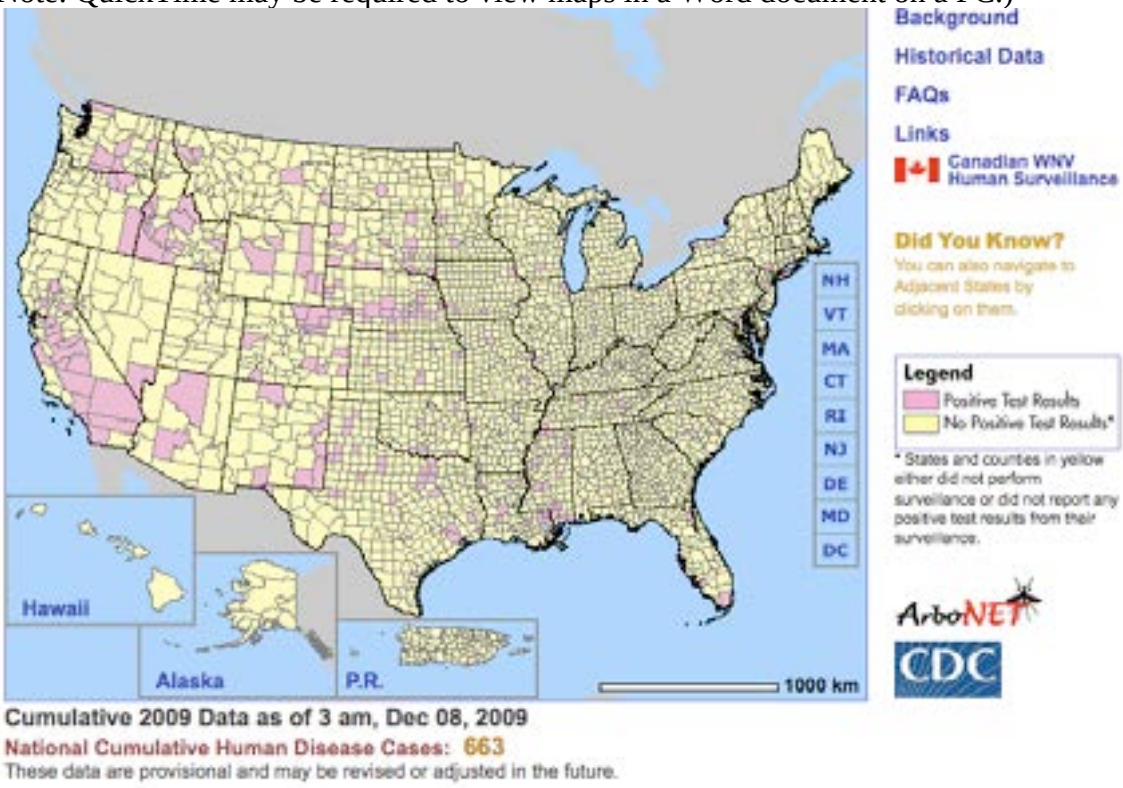
10.5) The authors are correct about the need to monitor populations for WNV mortality, however, there need to be more clear-cut criteria for what constitutes WNV mortality. While clearly WNV is a hazard, the authors do not provide adequate information to evaluate a number of qualitative statements and anecdotal information regarding mortality and extirpations.

10.6) The authors present information on the widespread nature of WNV, and their map (Figure 1) is a composite of multiple years of data. However, annual WNV results from the Center for Disease Control reveal a more heterogeneous pattern of WNV occurrence than portrayed by the authors. Below (and attached) are figures

showing reported WNV human and bird cases in 2009. Maps are available here: http://diseasemaps.usgs.gov/2006/wnv_us_bird.html



(Note: QuickTime may be required to view maps in a Word document on a PC.)



10.7) Hunting mortality not mentioned as an effect. One would think that hunting mortality would be of some importance to calculating vital rates, especially since 9% of the sage grouse population was estimated to have been harvested in 2007.

10.8) The modeling of spread of resistance to WNV among sage grouse is less than what would be expected from population genetic models. The authors' model predicts resistance would not exceed 18% in 20 years. However, from a a population genetics standpoint, if the fitness is due to a single gene, two allele system, and individuals possessing a resistant allele confers a survival advantage of as little as 20% over non resistant genotypes (assuming dominance), then approximately half of the population should be resistant in as few as 10 generations (30 years) given the initial frequency of resistant individuals in the population. A higher level of survivorship by resistant individuals would result in a "selective sweep" of resistant genotype(s) through a population at an even faster rate.

10.9) A conservation strategy to reduce mortality due to WNV, that is not mentioned by the authors, could involve translocating resistant individuals among populations. This would speed the spread of resistant genotypes and reduce the demographic impact of the virus to populations that are not resist.

10.10) The authors are cautious in their view of mosquito control measures but express more optimistic views elsewhere. For example, Walker and Nagle suggest that**:** *"It may also be possible to control mosquitoes with mosquitofish (Gambusia sp.) or native fish species that eat mosquito larvae, biological or chemical larvicides (BTI, Bacillus thuringiensis v. israelensis), or spraying for adults (Doherty 2007)."* And, *"Mosquito control programs appear effective for reducing WNV risk."*

However, the lead author (Walker) expressed a more positive view of the efficacy of these control measures when he testified in his official capacity as Avian Research at the Colorado Division of Wildlife, before the Oil and Gas Commission of the State of Colorado on DOCKET NO. 0803-RM-02. In that testimony, Walker spoke favorably about how the proposed rule would control mosquitoes that vector West Nile virus at water sources associated with energy development. Below are excerpts from his testimony:

> *"Q. HOW WOULD THE PROPOSED RULE HELP SOLVE OR ADDRESS THE PROBLEM**?***
> *A. The proposed rule, for operators to "treat waste water pits and any associated pit containing water that provides a medium for breeding mosquitos with Bti (Bacillus thuringiensis v. israelensis)" or to "take other effective action to control mosquito larvae" will reduce the distribution and abundance of mosquitos that vector West Nile virus and reduce the risk of West Nile virus transmission to wildlife (particularly birds).*
>
> *Mosquito control has proven effective in reducing the risk of West Nile virus transmission, but only when consistently and appropriately implemented by*

qualified mosquito control personnel (Gubler et al. 2000, Reisen and Brault 2007). Hiring qualified mosquito control personnel would ensure effective mosquito control from water sources associated with energy development. Because temperature and mosquito activity both decrease with elevation and mosquito development is temperature-dependent (Reisen et al. 2006), mosquito control would only need to be implemented at elevations where Culex mosquitos occur. Dusky (Blue) Grouse have been documented to have died from West Nile virus infection up to 2100 m (7000 ft.) in Wyoming (T. Cornish, Wyoming State Veterinary Laboratory, unpublished data). Sage-grouse in Colorado have died of West Nile virus up to 5,000 ft. (CDOW data)."

"Requiring control of mosquitos that vector West Nile virus from water sources associated with energy development will reduce risk of West Nile virus transmission for wildlife. This in turn will prevent population impacts to culturally, politically, or economically important bird species, particularly native grouse, and other sensitive and potentially threatened or endangered species."

In fact, the newly issued (Dec 2009) BLM guidelines require mosquito control specifically for WNV:

*"**Policy Statement 7: West Nile Virus***
Artificial water impoundments will be managed to the extent of BLM's authority to prevent the spread of West Nile virus where the virus poses a threat to sage-grouse. This may include but is not limited to: a) the use of larvicides and adulticides to treat reservoirs; b) overbuilding ponds to create non-vegetated and muddy shorelines; c) building steep shorelines to reduce shallow water and aquatic vegetation; d) maintaining the water level below rooted vegetation; e) avoiding flooding terrestrial vegetation in flat terrain or low lying areas; f) constructing dams or impoundments that restrict seepage or overflow; g) lining the channel where discharge water flows into the pond with crushed rock, or use a horizontal pipe to discharge inflow directly into existing open water; h) lining the overflow spillway with crushed rock and construct the spillway with steep sides to preclude the accumulation of shallow water and vegetation; and i) restricting access of ponds to livestock and wildlife (Doherty 2007).
Field Offices should consider alternate means to manage produced waters that could produce vectors for West Nile virus such as injection under an approved UIC permit, transfer to single/centralized facility, etc.

This does not apply to naturally occurring waters. Impoundments for wildlife and/or livestock use should be designed to reduce the potential to produce vectors for West Nile Virus where the virus may pose a threat to sage-grouse. "

It is difficult to understand the full extent of mortality due to WNV and there are numerous unpublished sources and personal communications cited. A more compelling presentation of the evidence would be to collate these data into a table, especially the number of birds sampled and found infected, and the methods

used to determine of WNV caused mortality. The use of anecdotal evidence in some cases detracts from the author's case (e.g. the case of 60 carcasses found by landowners and a WNV hawk nearby, and the authors assuming the sage grouse all died of WNV.)."

10.11) The authors portray the ponds associated with energy development as uncontrolled breeding habitat for mosquitos. This ignores the fact that regulations currently exist to control mosquitos, thus greatly reducing or virtually eliminating this hazard. The authors also ignore literature showing the more pronounced effect of irrigation on mosquito populations. For example, the authors state: *"Man-made water sources may also facilitate the spread of WNV within sage-grouse habitats (Zou et al. 2006b, Doherty 2007, Walker et al. 2007b). For example, construction of ponds for water produced during coal-bed natural gas extraction increased larval mosquito habitat around pond edges by 75%, from 619 to 1,085 ha, during a 5-yr period of development (1999–2004) across a 21,000-km2 area of northeastern Wyoming (Zou et al. 2006b). These ponds support abundant Culex tarsalis, and they support them longer than natural, ephemeral water sources (Doherty 2007)."*

This thesis (Doherty 2007) is based on research conducted on WNV before the requirement for mosquito control programs in ponds associated with energy development (the study took place in 2004 and 2005). It showed that while coal bed methane production had increased pond water in the Powder River Basin of Wyoming, it was not the major contributing factor to the spread of the vector for WNV: *"Culex tarsalis, the vector responsible for transmitting WNV in northeastern Wyoming, is a native species of mosquito to the PRB (Hayes 2005, Turell et al. 2005); however their population levels have increased in some areas due to human development in both agriculture and CBNG fields. This in combination with my research data allows me to reject my hypothesis that CBNG development has increased mosquito production in the PRB including the WNV vector Cx. tarsalis. "*

Also, empirical data show that *"for every tenth of a percent rise in irrigated land, the incidence of disease is expected to increase by a factor of 1.50 for people and 1.63 for veterinary species"* (Gates and Boston 2009). As reported by Doherty (2007) irrigated land has had an effect on WNV, not just oil and gas production (see comment 11 above).

10.12) The authors rely on dated information regarding biological control of WNV mosquitos vectors. However, new recombinant bacterial larvicides (Federici 2010) significantly improve the efficacy of Bacillus thuringiensis subsp. Israelensis (Bti) currently used to control larvae of important mosquito disease vectors. According to this author, these *"combine the most potent insecticidal proteins from Bti, B. thuringiensis subsp. Jegathesan (Btj), and B. sphaericus (Bs) into new bacterial strains that are ten-fold more toxic than wild type species of Bti and Bs used in current commercial formulations."*

10.13) The authors suggest that: *"Increasing temperatures associated with changing climate may exacerbate WNV risk for sage-grouse"* however, they do not present

evidence as to predicted rate of temperature increase, nor the confounding effects of predicted precipitation changes resulting from climate change.

10.14) Empirical data have shown that host species diversity reduces the spread of WNV because the vector encounters fewer competent reserviors. This source of variation in attenuating WNV activity is not mentioned by the authors (Allan et al. 2009).

10.15) The authors suggest that little is known about the reservoirs for WNV, however, that is not true given the abundance of recent papers on the subject, not cited by the authors. For example, the authors state: *"Much is known about WNV vectors in sagebrush habitat, but reservoirs for WNV are poorly understood."* Juxtapose that statement with a recent (2009) paper on WNV epidemiology published in the Journal of Preventive Veterinary Medicine: "*Experimental studies have identified that the common grackle is a highly competent avian reservoir for WNV, with the second highest reservoir index ranking found among 25 bird species tested, with a higher resistance to WNV mortality among infected individuals than observed in most other passerine species tested."*

10.16) The authors twice reference repeated attempts for a sage grouse ESA listing. The authors of this paper make the point twice that there have been repeated attempts to list the sage grouse under the Endangered Species Act and they do not acknowledge that those petitions were made by advocacy organizations rather than scientific organizations, and that listing was denied based on evaluation of relevant scientific information.

"Previously widespread, both species of sage grouse have been extirpated from much of their original range (Schroeder et al. 2004) and experienced long-term population declines due to loss, fragmentation, and degradation of sagebrush habitat (Connelly et al. 2004). <u>This has precipitated repeated attempts to list the species under the Endangered Species Act and rangewide efforts to assess risks to populations (Connelly et al. 2004, Stiver et al. 2006, Aldridge et al. 2008)."</u>

"Historical population declines and range contraction and continued loss and degradation of sagebrush habitat have led to concern over the conservation status of sage-grouse (Schroeder et al. 1999, Connelly et al. 2004, Schroeder et al. 2004, Stiver et al. 2006) and <u>repeated attempts to list both species under the Endangered Species Act of 1973.</u> Understanding the impact of WNV on Greater Sage-Grouse populations is important for assessing this species' conservation status, but requires an updated synthesis of recent scientific data." However, the authors do not mention how that conservation status would be determined based on their analysis, and the only dedicate ten lines of text to their results.

Naugle et al. (2004) previously made the following provocative comment regarding an ESA listing: *"The emergence of WNV further complicates the difficult task of conserving sage-grouse in western North America. Efficacy of mosquito control with pesticides over vast areas of sage-grouse range remains untested, and the suggestion of land-use change*

only fuels conflict over water management in the west. Petitions to list sage-grouse under the federal Endangered Species Act are intended to force decisions on issues that could change the management of public and private lands. Regardless, if we are to prevent sage-grouse from going extinct on their remaining range, we must find a way to provide high-quality habitats that support robust, genetically diverse populations capable of withstanding stochastic disease events."

Chapter 11 (2009), Chapter 10 (2011):
CHARACTERISTICS OF SAGEBRUSH HABITATS AND LIMITATIONS TO LONG-TERM CONSERVATION

Authors: Richard F. Miller, Steven T. Knick, David A. Pyke, Cara W. Meinke, Steven E. Hanser, Michael J. Wisdom, and Ann L. Hild

Abstract from Miller et al:
"The distribution of sagebrush (Artemisia spp.) within the Sage-Grouse (Centrocercus spp.) Conservation Area (SGCA; the historical distribution of sage-grouse buffered by 50 km) stretches from British Columbia and Saskatchewan in the north, to northern Arizona and New Mexico in the south; and from the eastern slopes of the Sierra Nevada and Cascade mountains to western South Dakota. The dominant sagebrush (sub)species as well as the composition and proportion of shrubs, grasses, and forbs varies across different ecological sites as a function of precipitation, temperature, soils, topographic position, elevation, and disturbance history. Most important to Greater Sage-Grouse (Centrocercus urophasianus) are three subspecies of big sagebrush (Artemisia tridentata)—basin big sagebrush (Artemisia tridentata ssp. tridentata), Wyoming big sagebrush (A. t. ssp. wyomingensis), and mountain big sagebrush (A. t. ssp. vaseyana); two low (or dwarf) forms—little sagebrush (A. arbuscula), and black sagebrush (A. nova); and silver sagebrush (A. cana), which occurs primarily in the northeast portion of the sage-grouse range. Invasive plant species, wildfires, and weather and climate change are major influences on sagebrush habitats and present significant challenges to their long-term conservation. Each is spatially pervasive across the Greater Sage-grouse Conservation Area and has significant potential to influence processes within sagebrush communities. Cheatgrass (Bromus tectorum), the most widespread exotic annual grass, has invaded much of the lower elevation, more xeric sagebrush landscapes across the western portion of the Greater Sage-Grouse Conservation Area. A large proportion of existing sagebrush communities is at moderate to high risk of invasion by cheatgrass. Juniper (Juniperus spp.) and pinyon (Pinus spp.) woodlands have expanded into sagebrush habitats at higher elevations creating an elevational squeeze on the sagebrush ecosystem from both extremes. Number of fires and total area burned have increased since 1980 throughout the Greater Sage-Grouse Conservation Area except in the Snake River Plain, which has a long-term history of high fire disturbance. Climate change scenarios for the sagebrush region predict increasing trends in temperature, atmospheric CO_2, and frequency of severe weather events that favor cheatgrass expansion and increased fire disturbance resulting in a decline in sagebrush. Approximately 12% of the current distribution of sagebrush is predicted to be replaced by expansion of other woody vegetation for each 1 C increase in temperature. Periodic drought regularly influences sagebrush ecosystems; drought duration and severity have increased throughout the 20th Century in much of the interior western US. Synergistic feedbacks among invasive plant species, fire, and climate change coupled with current trajectories of habitat changes and rates of disturbance (natural and human-caused) will continue to change sagebrush communities and create challenges for future conservation and management."

Review of:
CHARACTERISTICS OF SAGEBRUSH HABITATS AND LIMITATIONS TO LONG-TERM CONSERVATION

Review by: Dr. Vernon C. Bleich

This very well written manuscript describes the distribution of sagebrush (*Artemisia* spp.) within the Greater Sage-Grouse (*Centrocercus urophasianus*) Conservation Area (SGCA; the historical distribution of sage-grouse buffered by 50 km). The distribution of the various species and subspecies of *Artemisia* are described in the context of edaphic, climatological, and topographic parameters. The authors note that, in general, ecological sites supporting sagebrush are among the most imperiled ecosystems in North America, and that few, if any landscapes remain intact and unchanged throughout the SGCA. It seems to be implicit in the descriptions of impacts already incurred that these ecosystems cannot remain functional and that, in order for functionality to persist, the systems must be restored. The authors further note that sagebrush habitats in the Columbia Basin, Northern Great Basin, Snake River Plain, Wyoming Basin, Southern Great Basin, and Silver Sagebrush floristic provinces are of primary importance to Greater Sage-Grouse. A strength of this paper is that it primarily is a compilation of the work of others investigators, and the authors have pulled information from a large number of sources together in a single contribution in their effort to describe sagebrush habitats.

11.1) The authors describe in detail the distribution of sagebrush, and provide a general description of sagebrush alliances and plant associations, all of which will be useful to those with an interest in the conservation or restoration of these areas. Further, they focus on three (of approximately 25; Wisdom et al. 2005b)) stressors that represent significant threats to the maintenance of sagebrush ecosystems. These stressors are invasive plants, wildfire, and climate. The authors did not prioritize the importance of these stressors, but such might be inferred from the order in which they were discussed. Of the three, it is my personal opinion that invasive plants would be priority one, because their presence alters the entire fire regime in sagebrush systems, making them more prone to wildfire. The absence of fire in some areas, potentially an initial result of overgrazing, and later fire suppression, has decreased competition for coniferous species, primarily pinyon and juniper. I would place climate change in last among these threats because it is (1) speculative; (2) the effects can only be modeled; (3) if it occurs to the extent that ecosystem-level changes result, it probably will be well into the future; and, (4) it may not become reality.

11.2) Prior to exploring the impacts, whether real or potential, of invasive plants, changes in the fire regime, and climate change, the authors discuss the long-term and short-term dynamics of sagebrush habitats. Long-term dynamics that occurred prior to settlement by western Europeans were influenced primarily by long-term changes in climate or severe disturbances, likely occurred over periods ranging from centuries to several millennia, and resulted in changes in abundance between sagebrush and graminoids, and the distribution of pinyon, juniper, sagebrush, grassland, and salt desert communities. Short-term dynamics, which occur over years or decades, are largely a function of weather or

disturbance that result in fluctuation or permanent change in relative abundance of species and structure of plant communities. Representative of such changes is the widespread distribution of cheat grass (*Bromus tectorum*) among sagebrush ecosystems in western North America.

11.3) The authors attempt to convey some measures of changes in the distribution of sgebrush that have occurred by comparing the current distribution of sagebrush habitats (using high-resolution and sophisticated mapping techniques) to the potential vegetation map for Great Basin, sagebrush steppe, and wheatgrass-needlegrass shrubsteppe. The authors appropriately acknowledge the problematic nature of comparing the differences between the potential vegetation type that could occur, and what currently was present. Further, the authors also appropriately noted that their attempt to identify broad-scale differences between current and potential distribution of sagebrush was not intended to identify specific locations where habitat for sage-grouse had been lost. Nevertheless, the authors note substantial differences between the amount of area currently mapped as sagebrush and the potential distribution of sagebrush based on maps prepared by A. W. Kuchler (1970). Given that Kuchler's maps depicted "potential" vegetation, a downward bias in the estimate of the proportion of sagebrush habitat currently present, when compared to potential vegetation, is probable. If we assume that Kuchler’s maps depicted only the potential for sagebrush vegetation (which is implied by the title), the actual amount of sagebrush may have been less than actually available. If such was the case, the proportion of sagebrush habitat remaining would actually be greater than if Kuchler’s maps reflected the true amount of sagebrush habitat. Hence, there would be a downward bias in the amount of sagebrush remaining if maps of “potential” sagebrush habitat are the basis for the calculations.

11.4) The authors have summarized reports of invasive species and their impacts to sagebrush habitats, but their measure of the areas impacted by those invaders may be biased upwards because, in the database used, counties are considered occupied by an invasive plant if even one occurrence of a species has been verified in those counties. The authors acknowledge that invasive species may be widely distributed, but that infestations likely are localized because of the narrow ecological requirements of those invaders.

11.5) Cheatgrass and medusahead were identified as among the most problematic of invasive exotic plants in sagebrush habitats, and cheatgrass has been a major factor in the loss of Wyoming big sagebrush communities. Between them, cheatgrass and medusahead dominate, or have a significant presence, on approximately 20% (70,000 of 400,000 km^2) of public lands surveyed. The authors also correct a major overestimate of the proportion of lands now dominated by cheatgrass, an important point to make. Indeed, Whisenant (1990) had misinterpreted the report of Mack (1981), who had indicated that cheatgrass dominates on many rangelands within 400,000 km^2 of potential steppe vegetation, and wrote that cheatgrass was the major herbaceous species on more than 400,000 km^2 of the West. The true figure varies from area to area, ranging from about 70,000 km^2 in Washington, Oregon, Idaho, Nevada, and Utah (Pellant and Hall

1994) to about 20,000 km^2 in the northern Great Basin (Bradley and Mustard 2005, 2006; Peterson 2005).

11.6) As an original contribution, the authors modeled the probability of cheatgrass occurring among 5 floristic provinces of the intermountain west, and determined a moderate to high probability of cheatgrass presence throughout much of the intermountain west. They reported that approximately 54% of the 1,500,000 km^2 Great Basin ecoregion has environmental conditions suitable for cheatgrass invasion, and that 38% of existing sagebrush was at moderate risk, and 20% was at high risk. Impacts of cheatgrass to sagebrush ecosystems occur primarily as a result of the heavy fuel load that results from cheatgrass invasion, and the fact that, with few exceptions, sagebrush species are not fire adapted and are destroyed by fire. Moreover, fire affects the distribution of sagebrush seeds, with fewer, more widely dispersed seed sources in remaining unburned sagebrush islands. Thus, native species die, and are not replaced at the same rate they re destroyed; as a result, native species can eventually be eliminated from the species pool in areas dominated by exotic species that increase the frequency and severity of fire. The authors go on to discuss additional ecosystem-level changes associated with invasions of exotic annual grasses, citing largely reports by other researchers.

11.7) Substantial woodland expansion, specifically by pinyon (*Pinus* spp.) and juniper (*Juniperus* spp.) is occurring as those conifers encroach and infill large portions of sagebrush habitat, particularly at higher elevations. These expansions co-occurred with the introduction of livestock, and surface fire exclusion. As tree cover increases, cover of sagebrush and associated shrubs declines, and the authors cite evidence (Tausch et al. 1981, Johnson and Miller 2006, Miller et al. 2008) that as much as 90% of areas currently dominated by pinyon and juniper were predominantly sagebrush types prior to the late 1800s, with the majority of encroachment occurring at higher elevations. The level of uncertainty associated with that estimate is unclear, but they conclude that millions of hectares of potential sagebrush vegetation types are at high risk of displacement by conifer invasion. In this situation it should be noted that this value may be biased upward because the impacts are presented in the context of "potential" sagebrush habitat. Nevertheless, the authors note that pinyon and juniper currently occupy far less land than their potential under current climatic conditions, and that tree densities continue to increase, resulting in the continued loss of sagebrush habitat.

11.8) The authors describe the characteristics of fire and fire regimes and, to their credit, note that a clear picture of the complex spatial and temporal patterns of historic fire regimes prior to European settlement is unlikely. They note, however, that early explorers reported fires in higher elevations, but seldom reported fires in the sagebrush valleys at lower elevations. They also argue that prior to settlement most Wyoming big sagebrush communities in the Intermountain West generally did not carry fires except under extreme conditions of low humidity or high winds. Invasion of cheatgrass has facilitated the spread and intensity of wildfire, and is suspected to have substantially altered the historical fire regime.

Ironically, the absence of fire or the decline of fire frequency, has likely been an important factor in the expansion of coniferous trees into areas formerly dominated by sagebrush. The initial decline in fire frequency was associated with the early introduction of sheep, goats, and cattle, and occurred prior to fire suppression efforts that now are commonplace. Livestock grazing is thought to have reduced the availability of fine (native) fuels, and the authors speculate that heavy use by livestock reduced fire occurrence across western landscapes during the late 1800s, thereby facilitating the proliferation of pinyon and juniper species. They acknowledge, however, that evidence for a direct relationship between livestock grazing and woodland encroachment is difficult to document.

11.9) As an original contribution, the authors developed a database of fire statistics, and tested for changes in the frequency and size of fires, and in the total area burned in each of the geographic subdivisions of the SGCA. Among these areas, size of fires and total area burned increased in each, with the exception of the Snake River Plain, but average fire size increased only in the southern Great Basin. Within-year fire size decreased in all geographic regions except the Snake River Plain, which has a long history of presence of cheatgrass, and has been well-defined by fires. Consistent with the hypothesis that cheatgrass invasion affects the fire regime is the result that fires within the cheatgrass region have been more pronounced since 1980, but that fires in the eastern section of the SGCA have been recorded only in more recent years.

11.10) The authors speculate that the postulated changes in global climate will impact sagebrush dominated ecosystems, which are well-adapted to aridity, further altering those systems. If substantial alterations to climate occur, changes in the amount and timing of rainfall, and in increases in temperature are predicted to result in the displacement of sagebrush from large areas currently dominated by that species, as the competitive advantage of plants that currently are frost-sensitive is enhanced, and they are able to extend their ranges northward into areas not currently within their distributions. The authors also speculate that the ability of cheatgrass to compete in sagebrush ecosystems affected by increased annual precipitation or temperature will facilitate the spread of that annual plant, and further exacerbate the cycle of fire and cheatgrass dominance. Finally, the authors cite the report of Neilson et al. (2005) that, in the event of global warming, each 1° C increase in temperature is expected to result in the loss of 87,000 km^2 of existing sagebrush habitat, and that if a 6.6° C change occurs, only 20% f the current sagebrush distribution would remain.

11.11) The authors have presented a useful summary of information regarding the taxonomy, distribution, and composition of sagebrush dominated ecosystems occurring in western North America. They have described the primary threats to these systems as the presence and continued spread of exotic annual grasses, encroachment of pinyon and juniper into areas formerly dominated by sagebrush, and changes associated with hypothesized shifts in global climate. Shifts in fire regimes (in the form of more frequent and larger fires) are anticipated to continue to occur as a result of the spread of annual grasses, with resultant impacts to sagebrush-dominated ecosystems. Similarly, altered fire regimes (with fires occurring at lower frequencies) will continue to result in

encroachment of pinyon and juniper into areas currently dominated by sagebrush. Both scenarios of altered fire regimes that have resulted in conifer expansion at high elevation interfaces, and in exotic weed encroachment at lower elevations have caused significant losses in the amount of area dominated by sagebrush, with resultant losses of habitat potentially inhabited by Greater Sage-Grouse. The authors also note the potential for changes in global climate to exacerbate changes in fire regimes, and resultant losses of sagebrush habitat, but note that projections of the effects of global warming become increasingly unreliable as they extend further into the future.

11.12) Sagebrush habitats appear to have been impacted in modern times, and the authors postulate a continuing decline as a result of invasive annual species, invasion and displacement of sagebrush by coniferous species, shifts in fire regimes, and will be altered (potentially) further by climate change. These conclusions are based largely on the works of others, which are nicely summarized in this contribution. The paper will be useful to those concerned with changes that have occurred in the distribution and amount of sagebrush-dominated ecosystems, the mechanisms by which changes likely have occurred, and the potential for climate change to further exacerbate shifts in the composition and distribution of sagebrush. The authors have been open and forthcoming in noting the limitations of their original calculations and models, as described above, and which are appreciated by the reviewer. This paper is a potentially valuable addition to the literature, but it seems less than appropriate for the authors to have made reference to "accelerated declines on [sic] many sage-brush-dependent species..." given that their approach was almost entirely from a botanical standpoint. I think it would have been of greater value for other authors to use this review paper to emphasize the potential for the changes described by Miller et al. to make that point, especially in the context of other stressors associated with development or alteration of areas dominated by sagebrush.

Chapter 12 (2009), Chapter 11 (2011):
PRE-EUROAMERICAN AND RECENT FIRE IN SAGEBRUSH ECOSYSTEMS

Author: William L. Baker

Abstract from Baker:
"Sagebrush (Artemisia spp.) ecosystems are under threat from a variety of land uses, disturbance, invasive species, and are also thought by some to have been affected by fire exclusion and require burning as a part of restoration. To better understand the historical range of variation (HRV) of fire in sagebrush ecosystems and whether sagebrush fire regimes today have too much or too little fire, I estimate fire rotation (expected time to burn the area of a landscape) in sagebrush ecosystems under the HRV. Estimates derived from five sources are >200 yr in little sagebrush (Artemisia arbuscula), 200–350 yr in Wyoming big sagebrush (A. tridentata ssp. wyomingensis), 150–300 yr in mountain big sagebrush (A. tridentata ssp. vaseyana), and 40–230 yr in mountain grasslands containing patches of mountain big sagebrush with longer rotations in areas where sagebrush intermixes with forests. Landscape dynamics under the HRV were likely dominated in all sagebrush areas by infrequent episodes of large, high-severity fires followed by long interludes with smaller, patchier fires, allowing mature sagebrush to dominate for extended periods. Fire rotation, estimated from recent fire records, suggests fire exclusion had little effect on fire in sagebrush ecosystems. Instead, cheatgrass (Bromus tectorum), human-set fires, and global warming may have led to too much fire relative to the HRV in four floristic provinces within the range of sagebrush in the western US. Sagebrush ecosystems would generally benefit from rest from disturbance. Global warming is likely to increase fire, and widespread prescribed burning of sagebrush is unnecessary. Where cheatgrass occurs, fire suppression is sensible. In areas of depleted understories, restoration to re-establish native plants is needed if sagebrush ecosystems are to effectively recover from future disturbance".

Review of:
PRE-EUROAMERICAN AND RECENT FIRE IN SAGEBRUSH ECOSYSTEMS

Review by: Dr. Rob Roy Ramey II

12.1) This paper provides a summary of information on fire frequency and estimates periodicity of large wildfires based on historic information. As noted by the author, smaller fires may not be revealed by that record. A larger problem with attempting to estimate average fire frequency on a time scale greater that 150 years is that the climate has fluctuated over time, with cooler and drier climate from ~1400 to 1850 as a result of the little Ice Age. As noted by the author, over the long term, *"as the climate became wetter and sagebrush increased, so did the fire frequency (Fig. 2)."*Therefore, while such fire frequency estimates may be useful approximations, they must be viewed with caution. The author questions the use of prescribed fire as a restoration tool and suggests that fire frequency has increased as a result of invasive cheatgrass in combination with human-set fires and global warming.

12.2) The author's suggestion that "ecosystem rest" should be part of a management program, is undefined: *"If the goal is to mimic the disturbance regime in sagebrush under the HRV, <u>these ecosystems need rest and recovery</u> from past disturbances, particularly disturbances by land uses (Knick et al., this volume) and fire, not additional disturbance."* The length of time necessary for "rest and recovery" from past disturbance is not specified.

12.3) The most relevant finding to energy development has to do with the need to prevent wildfire and suppress it when it occurs. This was summarized in the final paragraph:

> *"Where the management goal is protection, active fire control is sensible wherever cheatgrass occurs. This includes much of the range of Wyoming big sagebrush and at least the lower elevations of the mountain big sagebrush zone. These sagebrush areas are vulnerable to potentially irreversible replacement by cheatgrass following fire, leading to sagebrush regeneration failure (Pellant 1990, Fig. 1c). Current fire rotations are likely too short in these areas to allow full recovery of Wyoming big sagebrush after fire. These areas warrant complete protection from fire until a solution is found to effectively control cheatgrass and until plant diversity can be sufficiently restored to allow natural recovery after fire."*

Chapter 13 (2009), Chapter 12 (2011):
ECOLOGICAL INFLUENCE AND PATHWAYS OF LAND USE IN SAGEBRUSH

Authors: Steven T. Knick, Steven E. Hanser, Richard F. Miller, David A. Pyke, Michael J. Wisdom, Sean P. Finn, E. Thomas Rinkes, and Charles J. Henny

Abstract from Knick et al.:
"Land use in sagebrush (Artemisia spp.) landscapes influences all sage-grouse (Centrocercus spp.) populations in western North America. Croplands and the network of irrigation canals cover 230,000 km2 and indirectly influence up to 77% of the Sage-Grouse Conservation Area and 73% of sagebrush land cover by subsidizing synanthropic predators on sage-grouse. Urbanization and the demands of human population growth have created an extensive network of connecting infrastructure that is expanding its influence on sagebrush landscapes. Over 2,500 km2 are now covered by interstate highways and paved roads; when secondary roads are included, 15% of the Sage-Grouse Conservation Area and 5% of existing sagebrush habitats are >2.5 km from roads. Density of secondary roads often exceeds 5 km/km2, resulting in widespread motorized access for recreation, creating extensive travel corridors for management actions and resource development, subsidizing predators adapted to human presence, and facilitating spread of exotic or invasive plants. Sagebrush lands also are being used for their wilderness and recreation values, including off-highway vehicle use. Approximately 12,000,000 s animal use months (AUM = amount of forage to support one livestock unit per month) permitted for grazing livestock on public lands in the western states. Direct effects of grazing on sage-grouse populations or sagebrush landscapes are not possible to assess from current data. However, management of lands grazed by livestock has influenced sagebrush ecosystems by vegetation treatments to increase forage and reduce sagebrush and other plant species unpalatable to livestock. Fences (>2 km/km2 in some regions), roads, and water developments to manage livestock movements further modify the landscape. Oil and gas development influences 8% of the sagebrush habitats with the highest intensities occurring in the eastern range of sage-grouse; >20% of the sagebrush distribution is indirectly influenced in the Great Plains, Wyoming Basin, and Colorado Plateau management zones. Energy development physically removes habitat to construct well pads, roads, power lines, and pipelines; indirect effects include habitat fragmentation, soil disturbance, and facilitation of exotic plant and animal spread. More recent development of alternative energy, such as wind and geothermal, creates infrastructure in new regions of the sage-grouse distribution. Land use will continue to be a dominant stressor on sagebrush systems; its individual and cumulative effects will challenge long-term conservation of sage-grouse populations."

Review of:
ECOLOGICAL INFLUENCE AND PATHWAYS OF LAND USE IN SAGEBRUSH

Review by: Dr. Rob Roy Ramey II

This lengthy (162 page) paper presents another cumulative effects analysis that covers nearly every conceivable deleterious human activity on sagebrush and sage grouse.

13.1) Notably absent from this analysis is any mention of the effects of hunting harvest, even though this is a major, documented source of sage grouse mortality (with 207,430 grouse killed just between 2001 and 2007, and higher annual take in the preceding years). Instead, the authors devote pages of attention to a number of hypothetical effects: *"Even activities, such as hiking and mountain biking, which often are perceived as low impact or benign, have an influence wildlife (Miller et al. 1998, Taylor and Knight 2003). Any human activity of high frequency along established roads or corridors, whether motorized or non-motorized, can affect wildlife habitats and species negatively through habitat loss and fragmentation, facilitation of exotic plant spread, population displacement or avoidance, establishment of population barriers, or increased human-wildlife encounters that increase wildlife mortality (Gaines et al. 2003). These effects appear to be common across a variety of habitats and species that span the full range of forested to arid terrestrial environments (Gaines et al. 2003, Ouren et al. 2007)."* However, when one looks closely at the cited literature, these supposed population-level effects are speculative. The omission of documented sources of mortality and inclusion of speculative sources, indicate a less than objective analysis by Knick et al.

13.2) To quantify the influence of human activities on patterns and processes of sagebrush habitats and sage-grouse populations, the authors rely on the previously designated Sage-Grouse Conservation Area or the pre-settlement distribution of sage-grouse buffered by 50 km (Connelly et al. 200; Schroeder et al. 2004). As noted in the reviews of Schroeder et al. (2004), the pre-settlement distribution was a subjective assessment of pre-European sage grouse distribution that included both habitat and non-habitat, and selectively excluded some areas of documented sage grouse occupancy. The widening of the pre-settlement range by a 50km "buffer" (by Knick et al.) inflates the size of the area affected by human activities, even though sage grouse may have never occurred there.

13.3) As with other disturbances in sage grouse habitat, Knick et al. quantify the "effect area" that surrounds any kind of development based on other studies. In the case of oil and gas wells, the effect area includes a 3km buffer around each well pad, and the affected area of a pipeline was 3km in total width because of presumed spread of invasive plants (although Table 16 shows in many cases the authors used a higher figure). A 3km effect area was also applied to all transmission lines. These effect areas were applied across the study area, substantially inflating the effects of these activities, even if mitigation, such as conservation offsets, had been implemented. However, the cited paper for oil and gas construction (Lyon and Anderson 2003) made no such 3km

recommendations. They simply recommended that the BLM regulations in place at the time be "reexamined." Knick et al. also misrepresented cited studies regarding the affected area of roads, pipelines, and transmission lines. Examples are provided below:

1) Lyon and Anderson (2003) also reported observations contrary to the one-size-fits-all effect areas used by Knick et al. For example, Lyon and Anderson (2003) reported that:

"On the Pinedale Mesa, potential disturbances associated with natural gas development were restricted to vehicular traffic on the pre-existing main haul road. All males from the 3 disturbed leks in our study strutted either on or within 15 m of this road. However, the mean number of vehicles using the mesa road in a 24-hour period during spring and summer of 1998 and 1999 was <12."

2) Instead of reporting a 3km effect area, Bradley and Mustard (2006) instead reported the following limited effects from roads and transmission lines:

"In 2001, cheatgrass was 20% more likely to be found within 3 km of cultivation, 13% more likely to be found within 700 m of a road, and 15% more likely to be found within 1 km of a power line."

3) Similarly, instead of finding a 3km effect area, Gelbard and Belnap (2003) reported:

"…we observed anecdotally that sites isolated (1000 m) from roads tended to contain fewer exotic species than sites near (50 m from) road."

"We found a significant effect of road improvement on both exotic and native species richness in interior communities 50 m beyond the edge of the road cut, suggesting that road improvement influences the distribution of both exotic and native species in lands beyond the influence of roadside disturbance. Exotic species richness tended to be greater and native species richness tended to be lower next to more improved roads, although we caution that our measurements of richness were a snapshot."

Knick et al. stated that *"We used an ecological rationale for estimating the area around points, lines, or polygons from which land use potentially influenced land cover or sage-grouse populations. Estimates for effect sizes into surrounding areas were based on foraging movements of human-subsidized predators, distance of exotic plant species spread, or on distribution data relative to land use."* However, because of the misrepresentations detailed above, this reviewer recommends that other "effect sizes" and "ecological rationale" used by Knick et al. be closely reexamined.

According to Knick et al. *"All nonproprietary and nonsensitive spatial data sets used in our analysis are available for download on the SAGEMAP website http://sagemap.wr.usgs.gov; United States Department of the Interior 2001a). Each data set is accompanied by a metadata record documenting original source and GIS procedures."* It is presently unknown how much of the data are proprietary or sensitive.

Chapter 14 (2009), Chapter 13 (2011):
INFLUENCES OF THE HUMAN FOOTPRINT ON SAGEBRUSH LANDSCAPE PATTERNS: IMPLICATIONS FOR SAGE-GROUSE CONSERVATION

Authors: Matthias Leu And Steven E. Hanser

Abstract from Leu and Hanser:
"Sagebrush (Artemisia spp.) ecosystems in the western US have changed in quantity and configuration from a variety of causes including agriculture and human population growth since Euro-American settlement. Activities sustaining human society can decrease or fragment land cover and alter ecological processes within sagebrush systems. The extent of these activities, cumulatively called the human footprint, within the range of sage-grouse (Greater Sage-Grouse [Centrocercus urophasianus] and Gunnison Sage-Grouse [C. minimus]) has not been evaluated. Using a recent human-footprint model of the western US, we evaluated human footprint intensity (1) across the sage-grouse range within seven sage-grouse management zones (SMZ), (2) across five sagebrush land-cover classes and a non-sagebrush land-cover class within SMZ, and (3) on landscape pattern of sagebrush land cover in relation to three scenarios differing in human-footprint effect area. Based on four criteria, we ranked SMZ from most to least human footprint influence as follows: Columbia Basin, Colorado Plateau, Wyoming basins, Great Plains, Snake River Plain, southern Great Basin, and northern Great Basin. Range-wide, black (Artemisia nova) and little (A. arbuscula) sagebrush land covers were least affected by the human footprint. Increasing human-footprint effect area decreased sagebrush land cover in the landscape between 33.5% and 97.0% and reduced mean patch size by 18.7–60.5%. A landscape pattern analysis, using a lacunarity index, or measure of sagebrush patchiness, revealed sagebrush landscapes to be multi-scaled, with dispersed sagebrush patches at small and clumped distributions at large scales, and organized at a scale between 4.5–9.0 km. This scale overlaps with published sage-grouse average dispersal and movement patterns. Our study supports growing evidence that sage-grouse respond to environmental factors at larger scales than those currently applied in management."

Review of:
INFLUENCES OF THE HUMAN FOOTPRINT ON SAGEBRUSH LANDSCAPE PATTERNS: IMPLICATIONS FOR SAGE-GROUSE CONSERVATION

Review by: Dr. Rob Roy Ramey II

This paper utilizes a complex spatial analysis to predict impact of the "human footprint" on sagebrush habitat (termed *"sagebrush landscape"* by the authors). This is the same approach used previously to describe the "human footprint" across the west, by two of the same authors as Leu et al. (2008). The third author of Leu et al. (2008), is Knick, also an editor and frequent contributor to this sage grouse monograph.

The paper contains considerable jargon, making a comprehensive read a time-consuming task.

14.1) The model used to study the "human footprint" is dependent upon the inputs of other models, but the error associated with these inputs, and their effect on results, were not addressed by Leu and Hanser. Use of the terms "error," "uncertainty," and "confidence interval" are absent from this paper. The authors did not appear to us statistical methods that deal with stochastic variation to estimate the magnitude of the error variance and propagate it through to the confidence intervals.

14.2) The significance of this paper lies in its likely utilization by the USFWS for a range wide or regional "cumulative effects analysis" of various human land uses and activities on sage grouse. Therefore, a more in-depth review of this paper may be desirable. The authors describe their approach as: *"The cumulative effects of human actions on landscapes, the human footprint, can be delineated as the physical and/or ecological human footprint."*

14.3) In this paper, as with Leu et al. (2008) no hypotheses are tested. Instead, the authors rely a *post hoc* interpretation of results and make recommendations derived from their complex spatial analysis. That paper interprets the results using a descriptive, story-telling approach. The authors recommend that certain landscapes in a given human footprint class be *"carefully evaluated,"* although the criteria by which such an evaluation would be objectively conducted is not described. The results are deemed supportive of those obtained by other authors in this volume, however no criteria were provided that would potentially falsify previous conclusions. The authors believe raven control to be ineffective and suggest that all future transmission lines follow existing high impact corridors, an expensive proposition to be based on surmise.

14.4) The size of the affected area surrounding each type of land use was developed from one or few studies, and applied across the range of sage grouse. This is a questionable one-size-fits-all approach to quantifying potential disturbance. For example, the corvid (e.g. raven, crow, and magpie) and domestic cat and dog predator risk models (regressions of probability of occurrance vs. distance from human habitations) were based on extremely limited data (4, 2, and 3 data points respectively)

and with no tests of significance or confidence intervals. Such poorly supported inferences cannot be viewed as reliable. (The impact of oil and gas wells is treated as a disturbance area around fixed points and their supporting infrastructure (roads and transmission lines) is quantified separately.) The authors provided a handful of citations including an unpublished masters thesis in support of data used to develop input models.

14.5) The authors analysis rests on the use of fractals (as opposed to Euclidean geometry) and modeled artificial landscapes, to summarize aspects of habitat fragmentation, including patch shape, edge, and size in terms of *lacunarity*. A concise definition of *lacunarity* used in ecology may be found in Halley et al. (2004): *"In general terms, however, lacunarity is an index of texture or heterogeneity [of a fractal object]. Highly lacunar objects possess large gaps or low-density holes, while low-lacunarity objects appear homogeneous. Thus, for example, in observations of vegetation cover using quadrats, lacunarity is low if we find very similar levels of cover in every quadrat (Plotnick et al. 1993). More precise definition of lacunarity has been problematic."*

Leu and Hanser's rationale for using this method is as follows:

> *"We analyzed artificial landscapes due to the lack of previous research evaluating lacunarity in natural landscapes demarcated by convoluted patch boundaries and to aid interpretation of lacunarity analyses from natural landscapes (Elkie and Rempel 2001)."*
>
> *"Lacunarity has several advantages over other more common fixed-scale landscape metrics because it consists of a single metric evaluated at multiple scales, is not influenced by edge effects, nor restricted to landscapes with high occurrence of habitat of interest (Plotnick et al. 1993). Lacunarity metrics can also be used to assess degree of relative fragmentation across diverse landscapes (Wu et al. 2000)."*
>
> *"Despite its ease in calculation, l<u>acunarity analyses have been rarely used to study patterns of natural landscapes</u> (but see Wu et al. 2000, Derner and Wu 2001, Elkie and Rempel 2001) perhaps, because interpretation of lacunarity curves can be difficult. However, we found that using lacunarity analyses of simulated landscapes, where degree of fragmentation and proportion of land cover reflect the range of values of landscapes studied, greatly aids in the interpretation of lacunarity functions of landscape patterns."*

Other authors have raised issues as to whether these models accurately represent real-world situations, and the conditions under which its use may be questionable. The uses and abuses of fractals in ecology are thoroughly discussed in Halley et al. (2004).

The original paper (Leu et al. 2008), a general description of the approach used in this paper, and data appendicies may be found at the following websites:
http://www.esapubs.org/archive/appl/A018/039/default.htm
http://sagemap.wr.usgs.gov/HumanFootprint.aspx

Chapter 15 (2009), Chapter 14 (2011):
INFLUENCES OF FREE-ROAMING EQUIDS ON SAGEBRUSH ECOSYSTEMS, WITH FOCUS ON GREATER SAGE-GROUSE

Authors: Erik A. Beever And Cameron L. Aldridge

Abstract from Beever and Aldridge:
"Free-roaming equids (horses [Equus caballus] and burros [E. asinus]) in the US were introduced to North America at the end of the 16th century, and have unique management status among ungulates. Legislation demands that these animals are neither hunted nor actively managed with fences and rotation among pastures, but instead constitute an integral part of the natural system of the public lands. Past research has elaborated that free-roaming horses can exert notable direct influences in sagebrush (Artemisia spp.) communities on structure and composition of vegetation and soils, as well as indirect influences on numerous animal groups whose abundance collectively may indicate the ecological integrity of such communities. Alterations to vegetation attributes and invertebrates can most directly affect fitness of Greater Sage-Grouse (Centrocercus urophasianus) and other sagebrush-obligate species; alterations of soils and other ecosystem properties may also indirectly affect these species. Across 3,030,000 ha of the western Great Basin, horse-occupied sites exhibited lower grass, shrub, and overall plant cover; higher cover of unpalatable forbs and abundance of cheatgrass; 2.2–10.0 times lower densities of ant mounds; and 2.9–17.4 times greater penetration resistance in soil surfaces, compared to to sites from which horses had been removed for 10–14 yrs. As is true for all herbivores, equid effects on ecosystems vary markedly with elevation, stocking density, and season and duration of use. However, they may be especially pronounced in periods of drought, which are forecasted to occur with increasing frequency in the southwestern US under climate change, and when they interact synergistically with livestock-grazing effects. Equids' use of sagebrush landscapes will have very different ecological consequences than will livestock grazing, at both local and landscape scales. Spatially, the addition of horses to sagebrush landscapes means more of the landscape receives use by non-native grazers than if domestic cattle alone were present. In spite of recent advances in ecological understanding of equid synecology, much remains to be learned. Life-history characteristics of Greater Sage-Grouse and other sagebrush-obligate species suggest the great value in evaluating equid effects more broadly than through a horses-vs.-livestock perspective, and in monitoring ecosystem components such as soil-surface hardness and ant-mound density that have ecological and management relevance yet data for which are relatively inexpensive to collect."

Review of:
INFLUENCES OF FREE-ROAMING EQUIDS ON SAGEBRUSH ECOSYSTEMS, WITH FOCUS ON GREATER SAGE-GROUSE

Review by: Dr. Rob Roy Ramey II

This paper reviews information and highlights the emerging conflict between the Wild Free-Roaming Horses and Burros Act of 1971 (that mandates the management of wild horses and burros on public lands) and sage grouse conservation, which likely to soon be under the Endangered Species Act of 1973. There is conflict because horses and burros are actually *invasive* species introduced to North American by Europeans and subsequently maintained on public lands for cultural reasons. The authors term these species *"free-ranging equids."*

15.1) While other papers in this monograph have pointed to roads, pipelines, well pads, and transmission lines as sources of invasive plants, this paper points out that wild horses and burros spread invasive species of plants, compact soils, trample nests, and affect sage brush community structure. For example:

> *"Domestic livestock consume an estimated 7,100,000 animal-unit months (AUMs) of forage annually (Table 3) within the current range of Greater Sage-Grouse. We estimate that free roaming equids consume an additional 315,000–433,000 AUMs annually within the current range of sage-grouse (Table 3). It is unknown whether effects of cattle grazing, horse grazing, and native-ungulate browsing are synergistic or simply additive."*
>
> *"Areas that have been managed for horses and/or burros during 1971–2007 constitute ~18% (119,703 km2) of the currently occupied Greater Sage-Grouse range. This estimate excludes dispersal and extralimital movements by equids (i.e., outside of management areas), which are difficult to quantify but may be widespread; considering these would appreciably increase the percentage of Greater Sage-Grouse habitats affected by equid grazing. About 12% (78,380 km2) of the current range of Greater Sage-Grouse is now managed for free-roaming equids (Table 1). Thus, there may be unmeasured consequences for a significant portion of sage-grouse habitat throughout the species' range, because of the aforementioned ways in which free-roaming equids can directly or indirectly impact sagebrush habitats.*
>
> *Burro movements overlap sage-grouse habitats in multiple areas across the southwestern US, and although the overlap is less extensive than is the overlap with horse habitats, burros tend to spend more time in lower-elevation habitats, as do sage-grouse."*

15.2) The authors propose more intensive research and management, including limiting population numbers of wild horses and burros:

> *"Free-roaming burros and especially horses are undeniably charismatic and enigmatic, and have been used to symbolize power, freedom, wildness, and toughness. Given the multiple stresses that interact to influence ecosystem dynamics across western North America, however, the benefits these non-native herbivores provide for various publics within society must be weighed against actual and potential ecological costs."*

15.3) This paper may be of significance to the argument that wild horses and burros are themselves invasive species managed to the detriment of sage grouse, yet more benign activities are potentially regulated.

The overlap. By state, of wild horse and burros with sage grouse habitat may be found in Table 1 (in 2007 there were 78,380km^2 of overlap, 19,290km^2 of which were within Wyoming).

Chapter 16 (2009), Chapter 15 (2011):
GREATER SAGE-GROUSE POPULATION DYNAMICS AND PROBABILITY OF PERSISTENCE

Authors: Edward O. Garton, John W. Connelly, Jon S. Horne, Christian A. Hagen, Ann Moser, And Mike Schroeder

Abstract from Garton et al.:
"We conducted a comprehensive analysis of Greater Sage-Grouse (Centrocercus urophasianus) populations throughout the species' range by accumulating and analyzing counts of males at 9,870 leks identified since 1965. A substantial number of leks are censused each year throughout North America providing a combined total of 75,598 counts through 2007 with many leks having >30 yr of information. These data sets represent the only long-term data-base available for Greater Sage-Grouse. We conducted our analyses for 30 Greater Sage-Grouse populations and for all leks surveyed in seven sage-grouse management zones (SMZ) identified in the Greater Sage-Grouse Comprehensive Conservation Strategy. This approach allowed grouping of leks into biologically meaningful populations of which 23 offered sufficient data to model annual rates of population change. The best models for describing changes in growth rates of populations and SMZs, using information-theoretic criteria, were dominated by Gompertztype models assuming density dependence on log abundance. Thirty-eight percent of the total were best described by a Gompertz model with no time lag, 32% with a 1-yr time lag, and 12% with a 2-yr time lag. These three types of Gompertz models best portrayed a total of 82% of the populations and SMZs. A Ricker-type model assuming linear density dependence on abundance in the current year was selected for 9% of the cases (SMZs or populations) while an exponential growth model with no density dependence was the best model for the remaining 9% of the cases. The best model in 44% of the cases included declining carrying capacity through time of -1.8% to -11.6% per year and in 18% incorporated lower carrying capacity in the last 20 yr (1987– 2007) than in the first 20 yr (1967–1987). We forecast future population viability across 23 populations, seven SMZs, and the range-wide metapopulation using a hierarchy of best models applied to a starting range-wide minimum of 88,816 male sage-grouse counted on 5,042 leks in 2007 throughout western North America. Model forecasts suggest that at least 13% of the populations but none of the SMZs may decline below effective population sizes of 50 within the next 30 yr, while 75% of the populations and 29% of the SMZs are likely to decline below effective population sizes of 500 within 100 yr if current conditions and trends persist. Preventing high probabilities of extinction in many populations and in some SMZs in the long term will require concerted efforts to decrease continuing loss and degradation of habitat as well as addressing other factors (including West Nile virus) that may negatively affect Greater Sage- Grouse at local scales. Key Words: carrying capacity, Centrocercus urophasianus, density dependence, effective population size, Greater Sage-Grouse, lek counts, management zones, models, N_e, probability of extinction, quasi-equilibrium, time lags."

Review of:
GREATER SAGE-GROUSE POPULATION DYNAMICS AND PROBABILITY OF PERSISTENCE

Review by: Dr. Rob Roy Ramey II

Introduction:
In the sage grouse lek mating system, males congregate in the spring at traditional sites and display in order to attract and mate with females. Of the western states that have sage grouse and conduct lek counts, all but one began counting the number of males on leks in the 1940's and 1950's. Garton et al. (in press) used count data of the maximum number of males observed on a lek each year (from thousands of leks in eleven states and three provinces) to estimate trends in population size and population persistence on 30 and 100 year time horizons. Modeling population change and testing for trend in data are challenges for conservation research (Edwards 1998) and is complicated when surveys were not designed to address present day questions.

In this study, Garton et al. used male lek count data that was collected by different state agencies without a standardized methodology or a random sample design. Relying on decades of non-standardized data of male lek couts is a fundamentally flawed approach to estimating sage grouse population number and trends. This problem has been long recognized. First, the data were not collected in a standardized way and lek counts were not randomly distributed or sampled. Second, there is no accounting for the number of females or juveniles in the populations sampled, their sightability, or how these differ across different sagebrush habitats. And third, there is no accounting for impact of hunter harvest on the the populations in question. Garton et al. make only passing mention of the fact that male lek counts are *"less than ideal"* and that improved methods exist but have not been adopted (Garton et al. 2007). Therefore, any analysis based on the current lek count data has a great deal of error and uncertainty associated with it. An ideal approach would involve redesigning leks counts to provide for a stratified random sampling approach to obtain an accurate estimate of grouse numbers, and then measuring trends over a multi-year period.

From a demographic perspective, what matters most in a polygynous mating system (like lekking) are *the females*. However, under the current method of lek counts, data on females (as well as juveniles) is not systematically gathered. Female sage grouse are cryptic in their plumage and behavior (to avoid predation) and therefore few are typically observed on a lek, whereas adult males are far easier to find and count because of their conspicuous lekking behavior in the spring. The following results from Walsh et al. (2004), who used radio tracking to quantify sightability in one population, illustrates this fundamental problem: *"On average, 42% of marked adult males, 4% of marked hens, and 19% of yearling males were observed on leks per sighting occasion with all 15 known leks being intensively counted."* With such low probabilities of detection (especially for females and juveniles) coupled with a lack of systematic data collection and non random sampling, lek counts of adult males, as currently conducted, are far from accurate for estimating sage grouse population trends.

Garton et al. used 30 and 100-year population forecasts to predict whether sage grouse populations would be extirpated. Predictions were based on whether the estimated effective population (N_e) sizes fell below 50 or 500, in which case populations were deemed quasi-extinct. (Simply put, effective population size is an estimate related to the level of inbreeding in a population.) There are a number of problems with this approach, not the least of which is the fact that many natural populations have fallen below these thresholds and they have persisted. There is no magic number that reliably predicts population persistence or extinction for any species. And finally, population the farther into the future population forecasts are made the more less accurate they become. A history of the derivation of the 50/500 rule of thumb is presented as part of this review.

The authors acknowledge few of the limitations of the data, statistical assumptions, and analyses and portray their results as having great precision and providing unbiased estimates. Here are unresolved issues related to how the data were collected, the criteria by which the data were filtered to produce the final data set, and the validity of assumptions and their effect on the analyses. Taken collectively, there are large uncertainties associated with the results and interpretation of information from this paper. Yet when Garton et al. acknowledge a limitation to their data or analysis, they immediately follow it with a more optimistic assessment. For example, after an incomplete four sentence discussion on the limitations of lek count data, the authors state: *"Nevertheless, long-term lek counts comprise the largest range-wide data base available for sage-grouse populations and provide the basis for reconstructing a remarkably precise index to minimum male abundance at a relatively broad spatial scale (Connelly et al. 2004)."* And after another brief acknowledgement that data were collected in a *"somewhat haphazard fashion, and permit no means of assessing the true magnitude of the population change"*, the authors conclude that *"Confidence intervals for population reconstructions for all populations and SMZs clearly show that precision of recent population indices are dramatically smaller than the earlier ones based on smaller samples of leks in the 1960–1980 decades."* The authors also propose that *" these forecasts will be useful in guiding decisions concerning the future of sage-grouse and the sagebrush communities upon which they depend."*

The authors reveal a *predetermined* bias towards federal threatened status in their introductory paragraphs: *"Ideally <u>populations threatened by extinction</u> should be monitored by censusing breeding males and females and their progeny annually…"*

DATA QUALITY ISSUES

16.1) Garton et al. used less stringent criteria for filtering data than the two previous studies relying on the same raw data:

The numbers presented by multiple authors (Conneley et al. 2004; WAFWA 2008; and Garton et al., in press) reveal that data from a large number of leks were eliminated in each study's filtering process, although the exact number of leks culled from the raw data is not reported by any of these authors, nor are their precise methods for rejecting some lek counts while keeping others. The following comparison gives some indication of the

shifting number of leks used in various analyses and that Garton et al. used less stringent criteria for filtering data than the two previous studies relying on the same data.

AUTHOR	YEARS	LEKS COUNTED	TOTAL COUNTS
Garton et al.	(1965-2007)	9,780 leks counted	75,598 lek counts total
2008 WAFWA	(1965-2007)	3,419 leks counted	34,441 lek counts total
2004 Conneley et al.	(1965-2003)	5,585 leks counted	not reported

16.2) Garton et al. overstated the number of leks with long term data (i.e. >30 years):
There is only one source of data used by this and the two previous population trend studies (Connelley et al. 2004 and WAFWA 2008). That data was collected by states and provinces, and updated annually.

Garton et al. report that data from 9,780 leks were used and 75,598 lek counts, including *"many having >30 yr of information."* However, it is clear that the majority of leks have less than 30 years data because 75,598 divided by 9,780 yields an average of only 7.73 years of data per lek. Additionally, the WAFWA 2008 report showed that fewer than 300 leks had been counted since 1968 (p12). Therefore, it is an overstatement for Garton et al. to claim that "many" of the leks used in their analyses had *" >30 yr of information."*

16.3) There are unexplained issues that influence how the data were filtered prior to analysis. Specifically, it is unknown how Garton et al. resolved the following data issues:
1) ambiguous locations, including those prior to the development of GIS technology;
2) how leks that had shifted in location over time were distinguished from new leks;
3) how the distances of observers from leks affected counts and what the observer distances were for each lek count;
4) the amount or type of disturbance (e.g. presence of raptors) that was required to drop a lek count because it would bias estimates downward;
5) although Garton et al. provide criteria for time of day for lek counts, they did not report use of any quantitative criteria for spatially defining a lek (e.g. the distance from a main lek for a satellite lek to be considered independent).
6) estimated number of uncounted leks.
Significance: The data set used by Garton et al. cannot be replicated because the methods used to include and exclude data were not adequately defined.

16.4) Vague assurances regarding data quality are not a substitute for detailed methodology. Example: *" We examined all lek data prior to analysis to ensure they were obtained following these procedures, and in some cases we had to assume that they were collected properly."* And "This allowed us to use all lek counts <u>meeting our standards for quality…</u>" the authors also suggest that "*problems* [with conducting lek counts] *generally seem to be related to disregarding accepted techniques."* However, the authors do not acknowledge that there are major issues with using lek count data to estimate population trends (see Walsh et al. 2004 and discussion below), nor did they provide specifics as to what their "standards of quality" actually were.

16.5) The lek count data analyzed by Garton et al. started in 1965, yet the lek count method papers cited in support of consistent methodology were published 13 and 19 years later (Jenni and Hartzler 1978, Emmons and Braun 1984). Additionally, states differed in how they gathered data or had missing location information (WAFWA 2008). For the reasons above, the same lek count methods were not applied across the entire data set. These issues, not acknowledged in Garton et al., are well illustrated by the following quotes from the WAFWA (2008) report:

1) *"Complete standardization was not possible, because most states provided summary data rather than raw data, and individual states may have had slightly different criteria."*

2) *"We assumed that if a state reported count data for a specific lek, those data were spatially associated with the location reported for that lek. In practice, the definition of a lek is more complicated. For example, individual males can shift among lek locations within and between years, smaller "satellite" leks can form near leks with large numbers of males, and observers sometimes report multiple activity centers within a large group of displaying males as separate leks, all of which can affect count data reported for a specific lek location."*

3) *"Other features of the dataset should also be noted. We excluded data from many leks in South Dakota because they lacked location information. We also excluded data from Colorado prior to 1986 because numerous errors in the state's database prior to 1986 could not be resolved in time for inclusion in these analyses. In North Dakota, all lek counts were conducted during the third week of April, but the state has used this approach >30 years."*

The two papers cited by Garton et al. in support of reassurances that the data they relied upon used accepted methods, are only descriptions and were inconsistent. These were published more than a decade after the initial high counts of the 1960s and 1970s. Jenni and Hartzler (1978) only evaluated Patterson's census technique and said nothing about a spatial definition of a lek. Jenni and Hartzler (1978) reported on:

1) <u>optimal time of day for peak counts</u> (i.e. 1/2 hour before and after sunrise);

2) <u>seasonal patterns of attendance</u> (i.e.*"Censusing the birds over the first 3 weeks after the peak of breeding does yield maxi- mum estimates of the number of males."*); and

3) <u>observation methods</u> (*"We censused the lek almost daily, and usually made several counts during each period of attendance. Two small igloo shaped tents were used as observation blinds. To minimize disturbance, the observer usually entered a blind before the evening lek, stayed overnight, and did not leave until after the grouse had departed the next morning. Observations were made through windows cut in the blinds."*).

4) Emmons and Braun (1984) described their criteria for including a nearby male as part of a lek and they started counting lek attendance earlier: *"Lek attendance was defined as being on or within 0.1 km of a lek between 0430 and 0730."* They also reported methods for data analysis which differed from the methods described by Garton et al. It is not known if Garton et al. used this 100m criterion for defining leks. If so, numerous ephemeral satellite leks would be coded as separate leks in the data, leading to a negative trend bias. This situation has been exacerbated in recent years as noted by Garton et al:, "*Sampling effort devoted to counting leks has varied from year to year and grew appreciably in the last 10 yr."*

Significance: The data analyzed by Garton et al. was *not* gathered using standardized methods, especially during early decades used in their study. This introduces error and bias not accounted for by Garton et al. For example, the number of grouse counted at a lek will depend in large part upon the spatial definition of a lek: a more inclusive definition will include satellite leks and result in a higher count while a more restrictive definition will result in more leks with fewer birds counted in each lek.

16.6) Garton et al. made no mention of bias in not estimating the number of unknown leks in their data set. As pointed out byWalsh et al. (2004): *"Estimating the number of unknown leks is a critical component in calculating detection probability and allowing lek counts to be properly related to trends in population size. Disregard for unknown leks does not allow for rigorous inference from lek-count data and will negatively bias estimates of total birds attending leks and cause possible misinterpretation of trend data (Anderson 2001)."*

16.7) The data used in Garton et al., as well as Connelly (2004) and the WAFWA (2008) report is not publicly available. Without the data used by these authors, the results cannot be replicated and many of the questions raised in this review will remain unanswered. To remedy the situation, I have made attempts to obtain the final data from Connelly,WAFWA, Garton, and others. Despite these repeated requests, the data are not publicly available. Answers to my requests have cited inconsistent reasons. Please refer to Appendix 1 for my correspondence in trying to obtain these data.

Significance: There is no way to independently verify the results of the analyses because the data are not publicly available. The authors do not provide a list of leks that were included in, or excluded from, the final data set. A partial list of data for Colorado obtained by this reviewer from the Division of Wildlife, however, it was provided with the locations of leks on private land deleted.

Even if the raw data were obtained from states, it is doubtful that the same final data set used by Garton et al. would be reproduced from it because the methods of Garton et al. were not adequately described. Simply put, the results cannot be replicated because the methods used to produce the final data set could not be replicated.

DATA ANALYSIS ISSUES

16.8) A logical first step in an attempt to estimate population trends would be to incorporate data on well-documented sources of mortality. However, this was not done by Garton et al. There is no accounting for spatial or temporal variation in hunter harvest, or its impact on sage grouse populations, even though these data are readily available.

Harvest rates change over time and from management unit to management unit, based on goals set from lek counts, wing counts, and aerial counts (depending upon procedures of each state/province). Monitoring to better manage the harvest of sage grouse is the reason that lek counts were initiated by states over 60 years ago. The harvest of sage grouse is not insignificant, as illustrated by the harvest numbers presented in Chapter 6 of this monograph (Reese and Connelly, *in press*). In 1992, 34,000 grouse were harvested from Wyoming and 30,000 from Idaho. Even in recent years, this harvest has been substantial: the total reported harvest from ten western states from 2001 to 2007 was 207,433 sage grouse. This does not include the number of grouse that were wounded and not recovered.

16.9) Garton et al. acknowledge that the lek count data violate statistical assumptions in that they are not random samples, yet they ignore other well known issues with the data. Instead, they state: "*yet when analyzed in a repeated measures framework,*[lek count data] *may provide unbiased and precise measures of the rate of change of populations."* The term "may" is speculative in this case. Garton et al. attempt to support their assertion by citing Connelly et al. (2004, Appendix 3) who 'tested' the lek count procedure using simulated populations. Garton et al. then summarize the simulation results of Connelly et al. (2004, Appendix 3): *"Precision of the estimates, measured by coefficient of determination of estimates with true simulated rates of change, increased with the simulated rate of population change from > 80% for populations with an observed annual rate of change of at least 0.03 and greater than 95% with rates of a least 0.07. Thus, while use of lek counts to assess change over a relatively large scale appears sound, we make no attempt to assess population dynamics at relatively small scales (e.g., harvest units, allotments) or estimate true population abundance using lek."* At face value, such statement gives an appearance of reliable estimates. However, Garton et al. failed to mention the other findings of Connelley et al. who clearly stated that such estimates had to be viewed with <u>caution</u>. These include:

1) *"An evaluation of accuracy suggested that accuracy increased with the observed rate of population change."* In other words, only large scale declines or increases (>0.07 per year) were significant.

2) Of the 41 populations and 24 subpopulations (65 total) subsequently evaluated

by Connelley et al., those authors stated that most *"fit at least one of the following categories: 1) too few years for analysis; 2) too few data for analysis; and/or 3) population changes during the last 20 years were not apparent or not significant."* In fact, only 11 of 65 population/subpopulations had significant trends (≥95% probability of being accurate).

3) In contrast to Garton et al's portrayal, Connelly et al. considered their results promising but preliminary. *"It is impossible to include every source of variation and there may always be effects such as annual variation in the number of counts per lek. Because most of these sources of variation have not been examined in detail, these results should be viewed with caution (see Walsh et al. 2004)."*

16.10) **In their methods, Garton et al. stated:** ***"We made no attempt to ... estimate true population abundance using leks counts."*** **Yet, these authors violate this assurance by subsequently using lek count data for creating a series of population estimates including:** ***"index of historical abundance", "population reconstructions,"*** **and a probability of extinction based on those estimated population sizes and forecasts on 30 and 100 year time horizons.**

16.11) There is an undisclosed issue with the Wyoming data set. For example, 2008 WAFWA report state that the Wyoming data set was apparently "corrupted and had to be rebuilt from raw data". It is not clear what this statement means (i.e. whether the authors were using data provided by Wyoming, or a previously filtered data set produced and maintained by WAFWA). For example, Wyoming lek counts were eliminated before 15 March and after 15 May, whereas other leks were apparently included from March, April, and May. Also eliminated were leks with less than 2 visits per year, and other criteria. The effect of treating Wyoming differently was not discussed in the report.

16.12) The way the count data are coded, leads to a negative trend bias in the data. The authors of the 2008 WAFWA report raised an important issue relative to how the method of defining leks and handling missing data lead to negatively biased trends in their analysis and the same issue applies to Garton et al. On page 7 they identify the issue: *"One problem associated with missing values should be noted with this data set. Because the current sampling scheme is lek-based rather than area-based, locations are not considered a lek and therefore, not reported in databases, until grouse are found using them. Therefore, very few leks in the data set started with a zero. As a result, the initial establishment of a lek with a small number of male grouse and its concurrent increase from zero to a positive number of grouse is missing from these data, while long sets of zero counts often exist after a lek has become inactive.* ***This could lead to negatively biased estimates of trend in male count."*** Garton et al., however, say nothing about this issue or its implication for their analyses, yet as reported by WAFWA 2008, the data set is riddled with such incomplete counts. **Garton et al.'s averaging of rates of change across populations using counts from leks does not remove this bias.**

16.13) Garton et al. cited (Humbert et al. 2009) in support of their use of their exponential growth models. However, the data set analyzed by Garton et al.

represents a very different situation than that described in Humbert et al. (2009), making Garton et al.'s use of these models questionable. In that paper, the authors were tackling the problem of deriving trend estimates from incomplete data sets obtained from single locations that were the result of counts being skipped. In contrast, the lek count data analyzed by Garton et al. is much more complicated because:

1) the data were not randomly collected (spatially or temporally),
2) data collection was not uniform between states and sometimes within states,
3) sampling effort has changed over time,
4) the number of sage grouse leks being counted has increased over time,
5) the personel monitoring the leks changed over time,
6) the locations of sage grouse leks were imprecise prior to GPS,
7) ephemeral satellite leks are known to form adjacent to main leks,
8) smaller leks frequently are extirpated or abandoned, and
9) environmental factors cause fluctuation in sage grouse numbers.

16.14) The locations of leks used in the analyses (and their sampling period) is not reported. Without access to the underlying data, including the locations of leks, we cannot know to what extent the sampling effort is representative of the distribution or population density of sage grouse. For example, if lek counts are concentrated in a limited area of a management zone, those data would disproportionately influence results for the entire management zone.

16.15) Garton et al. cite Walsh et al. (2004) only once and with regard to the observation that some male sage-grouse may not attend a lek or may attend two or more leks. What Garton et al. did not acknowledge are the numerous biases and uncertainties of lek counts that were raised by Walsh et al. (2004). Several issues not addressed by Garton et al. are listed below:

1) Walsh et al. (2004) reported that*: "observer bias was a major source of variation and a major confounding variable associated with indices including lek counts (Bibby et al. 1992, Buckland et al. 1993, Anderson 2001). Observer bias arises from variation in observers' inherent characteristics such as visual acuity, interest, experience, and training (Bibby et al. 1992, Anderson 2001). Observer bias can also arise from counting effort and techniques, date and time of lek counts, and distance from observer to leks. Large distances affect ability to properly enumerate individual birds on leks which results in negatively biased counts that underrepresented yearling and nonstrutting cocks (Rogers 1964). Many wildlife managers in our study site historically viewed leks from extreme distances of up to 3.2 km for fear of disturbing lekking activities. Rogers (1964) recommended counting at a distance of <50 m in a vehicle when possible."* It is unknown if any of these variables are quantified in the raw data from states or whether they were used in the attempt to standardize data by Garton et al.

2) Walsh et al. (2004) provide evidence that a long standing assumption used in applying lek count data to population trends is not supported by data: *"Wildlife managers have long assumed that lek-attendance rates of adult male greater*

sage-grouse are high and constant (Patterson 1952, Emmons and Braun 1984). Findings of this study corroborate those of several other studies that provide evidence of much lower attendance rates than previously suspected, based on individually marked grouse." However, while the cited study involving a handful of lek counts (n=12) in southern Idaho may have used *"established guidelines"* (from Connelly 2004) it is clear that states have conducted tens of thousands of lek counts using *inconsistent* methods for long periods, both before and long after the establishment of these guidelines. The unpublished data cited by Garton et al. (J. Baumgardt) does not resolve this issue.

3) Multiple lek counts are typically conducted each year for each lek and the maximum number of males from these counts in a season are the data recorded. However, the extent to which males move between leks (which would lead to individuals being counted in more than one lek in a season) is unknown, as is the probability of detecting males in different environments or at different densities. The detection probabilities of male sage grouse has only been described in one paper Walsh et al. (2004) which addressed the fundamental issue of using lek counts to estimate population number

16.16) The data interval used in this report begins in 1965, a starting date selected at the request of the U.S. Fish and Wildlife Service for the WAFWA (2008) report, although most states have lek count data going back one or two decades earlier. Oregon began counting leks and recording data in 1944, Wyoming in 1948, Idaho and North Dakota in 1951, Montana in 1952, California and Colorado in 1953, Washington in 1954, Nevada in 1956, Utah in 1959, and South Dakota in 1971 (Connelly and Schroeder 2007). The effect of *not* including those earlier data are not mentioned by Garton et al., however, it is worth asking what difference(s) there would be if these data were included in the population level analyses.

16.17) A fundamental issue when comparing current population number and distribution to historic levels is *"how far back should we reach to set the baseline from which measurement will start?"* And does setting the historic baseline at 1965 result in biased trends? This is an important issue because ecological communities change over time for multiple reasons (e.g. climate, predation, invasive species) leading to shifts in the abundance and distribution of the species of interest. If a baseline for analysis is selected during a period of high abundance, then the results are likely to show a decline, whereas if the baseline is selected during a period of lower abundance, then the results may show an increase. Therefore, selection of a baseline year can influence results. Forty-two years is a very short run of data to establish long-term population trends for a system that has seen wide fluctuations in ecological and land use conditions.

The authors make no mention of the fact that that during the years 1965-1985 there were widespread sage brush eradication programs that could be expected to impact sage grouse populations. For example, during this period, sage brush was controlled or eradicated using mechanical removal (chaining, brush beating, disking and harrowing), prescribed fire, late-fall grazing, and herbicide application (including 2,4,5-T and 2,4-D). Therefore,

it is reasonable to expect evidence of a sage grouse decline during that period and in the most affected areas. Since the 1980s, however, management of sagebrush has moved toward conservation/reestablishment, which could be expected to benefit sage grouse populations and lead to a population increase.

Reaching farther back in time before 1965, it is worth asking, *"in what ways have historic conditions for sage grouse been different?"* For example, would predator eradication programs (particularly wolves and coyotes) and hunting of golden eagles, have reduced predation pressure on sage grouse, artificially allowing them to expand their range and numbers into the 1960's? By 2003 the golden eagle population in the west had expanded to an estimated 27,392 (with a 90% confidence interval of 21,352-35,140). And reaching farther back to the time of Lewis and Clark's expedition in the early 1800's, it is clear that sage grouse had a more limited northern distribution, as none were seen along the Missouri River or east of the Continental Divide. The Lewis and Clark expedition occurred during the climate anomaly called the Little Ice Age, which could account for a more limited northern distribution of sage grouse than present.

The farther back in time that comparisons are made, the greater the uncertainty in population sizes and the greater the potential bias in how data were collected (e.g. only from few large, and easy to find leks). The degree of this inherent uncertainty is found throughout the results of Garton et al. and is clearly illustrated in Figures 2 through 8. For example, the 90 percent confidence intervals for the population estimate from the Powder River Basin in 1968 was between 180,000 and near zero (Figure 2C). If a higher, 95 percent confidence intervals were applied, these confidence intervals would reveal even greater uncertainty.

16.18) There is reason to expect non-stationarity of the data over the time intervals examined. Population trends are influenced by changing conditions over time, including major shifts in the relative importance of environmental variables, or changes in their level of interaction (all three produce non-stationarity). In other words, external effects can change or reset the equilibrium properties of a system. In the case of sage grouse, multiple variables have been identified as affecting abundance and distribution over time, including: climate, sage brush control, hunting/harvest, predation (which also affects lek attendance by males), density dependence, invasive species, wildfire, parasites, infectious disease, and land use (Connelly et al. 2004). The effects of each of these variables cannot be expected to remain temporally or geographically constant across the range of sage grouse because natural conditions and land use practices change across management zones, states, and time periods. Changes in methods of data collection over time can also produce non stationarity.

Non-stationarity is a potentially significant issue here because there are relatively short runs of data between ecological shifts for most of the leks counted (including sage brush control and hunting harvest) and these are not likely to be equivalent across regions. This and the practice of combining data from multiple states that use different methods can violate statistical assumptions, obscure biologically meaningful management zone trends, and produce erroneous results. Non-stationarity is masked by use of procedures that

result in averaging rates of change across populations and management zones. Yet, without the underlying data, it is not possible to estimate the magnitude of this issue.

16.19) Confidence intervals may not adequately represent the actual uncertainty associated with the estimates and predictions of Garton et al.
Because of unknown biases in the data collection (the data are not publicly available, nor are the quantitative criteria used to filter the data), complexity of the analyses, and model selection uncertainty (associated with the generally poorly fitting models reported), the confidence intervals reported by the authors may not adequately represent the actual uncertainty associated with the estimates (Burnham and Anderson 2002). The fact is that sage grouse population dynamics is, as numerous authors in this volume attest to, a complex biological system with numerous inputs of varying importance operating at different spatial and temporal scales, and with far more inputs and uncertainty in estimation than considered or acknowledged by the Garton et al.

16.20) The authors make repeated references to the precision of their estimates but no reference to accuracy of those predictions appears anywhere in the text. The adjective "precise" is mentioned 11 times, and "precision" 14 times in the text, yet "accurate" and "accuracy" are not used. While Garton et al.'s population estimates may be precise, there is no way to know whether they are accurate for three reasons. First, the data that they are based upon is not publicly available; 2) the methods used to cull the data are inadequately described, and 3) predictions about future outcomes on such time-scales are untestable hypotheses about the future. **Significance**: Predictions on such long time-scales, while potentially useful heuristic tools, are notoriously inaccurate and can easily be overapplied (Pielke, Jr. and Conant 2003).

16.21) Model selection procedures were used by Garton et al. to select among alternative population models (based on ΔAIC values) but there was no biological justification as to why one model would be expected to perform better than another under a give set of circumstances (e.g. among populations or management zones).
The fitting of 26 population models to each SMZ and population, as described by Garton et al. under *"Fitting population growth models,"* is equivalent to a data fishing expedition to find statistical significance (using AIC) without questioning the biological relevance of these results. It is far more biologically relevant and objective to take a small subset of biologically meaningful models and treat those as alternative hypotheses and test those against the data. The approach of this paper is exemplified by the fact that the authors offered no tests in advance that could explain *why* one model succeeds over another in AIC value under a given set of ecological or demographic circumstances. Model selection results are presented yet not explained, so the reader is left without any meaningful understanding of *why* one model would be expected to fit a particular population better than another. And the predictions of future population sizes are *not* empirically testable, unless one is willing to embark on a monitoring program to test them over decades. No such program was proposed by Garton et al.

16.22) Several of the authors had previously suggested a new approach be used as the basis for future population estimates. However, that method has not yet gained

widespread acceptance. The recommended method was proposed by Garton et al. (2007) and subsequently implemented on a local scale. This reviewer concurs with this suggestion as it could produce statistically valid population estimates, although greater field effort would potentially be required. As described by Garton et al. (2007): *"We propose that lek counts be conducted with a 2-stage cluster-sampling approach embedded within a stratified random sample of geographic areas hierarchically structured to describe populations within metapopulations of greater sage grouse."* This approach counts both males and females, focuses on areas rather than specific lek sites, and most importantly, it employs a probabilistic sampling scheme - all of these are lacking in current lek count and analysis methodologies. Differences in sampling would preclude comparison to existing data sets, but would offer a more accurate picture of sage grouse population numbers and trends.

16.23) To date, no consistent, quantifiable link has been demonstrated between the male lek counts and *actual* population trends. Walsh et al. (2004) suggested a way this might be done using a different study design and lek counts of both males and females. They pointed out that: *"Until lek counts are calibrated to actual population parameters by estimating detection probability, managers must realize the limitations of lek-count data and should be cautious when reporting trend data based on them."* The authors of the WAFWA 2008 report clearly stated these shortcomings: *"Many assumptions and potential sources of error limit inferences that can be made from the data presented in this report. First, because the data are counts with no measure of detection probability and no probability-based sampling design, trends refer only to the maximum male count of sampled leks. Consequently, statistical inference does not extend to sage-grouse population size."* Despite these cautionary statements, Garton et al. estimate population trends, reconstruct population numbers, *and* forecast future population numbers.

16.24) Because of the spatial and temporal non-stationarity of sagebrush ecosystems (e.g. variation in rainfall, predation, hunter harvest, agricultural development, sage brush control) teasing out the relative importance of variables and their effect on sage grouse population size will continue to be a challenge. The limitations of lek counts will continue to hinder our understanding until such time that more biologically relevant and statistically defensible census methods are adopted. Garton et al. are correct regarding the need for states to adopt a uniform, biologically meaningful, and statistically valid data collection methodology for sage grouse. As noted by these authors, these methods have been field-tested but not widely accepted: *"Methods to replace this weak foundation of lek counts representing an unknown proportion of leks in a spatial region by a true probability sample of leks and breeding males and females in defined spatial areas have been proposed but not widely adopted at this time (Garton et al. 2007)."*

16.25) Garton et al. based their conclusion on analysis of data which was gathered over 42 years without standardization or a random sampling design. As a result, there are numerous limitations to the inferences in this study. If one were to design a study to monitor sage grouse population trends, the methods for data collection and analysis would be quite different from those used in Garton et al., (see suggestions by

Walsh et al. 2005, Garton et al. 2007, and the management recommendations of the WAFWA 2008 report). Such an effort would require a level of standardization in data collection that has not yet been achieved across states, and an intensive level of research and monitoring to reach the desired level of precision and accuracy. The data gathered would not be directly comparable to the non-standardized lek count data collected to date, but would provide a valid method of estimating sage grouse population trends.

16.26) Hunting harvest is the major documented source of adult mortality, with more than ten percent of total sage grouse number harvested annually. Yet this receives no mention from Garton et al. **From a demographic perspective, the harvest of female sage grouse will have a far greater impact than the hunting of males, yet only males are counted.** Garton et al. estimated 88,816* male grouse in 2007 or a total population size of 310,856 (using their assumption of 2.5 adult females per male to obtain total population). That was the count in the spring while leks were active. However, in the fall of 2007, a total of 28,180 sage grouse were harvested, or 9 percent of the estimated number of this species. And in four of the six pervious years, the take was even higher (up to 37,607 in 2006). To date, there has not been field-verified studies of maximum sustainable yield applied to this species and this intensity of harvest. The state of the science does not provide an empirical basis that is solid enough to forecast the future of sage grouse with any degree of accuracy, especially when known sources of mortality are not included.

Significance: While the estimates developed by Garton et al. are of questionable accuracy**, it is clear that hunting harvest is at a level that cannot reasonably be assumed to be insignificant to the population as a whole. There is no mention of hunting in Garton et al. even though this documented source of mortality could reasonably be expected to have an effect on trend analyses and extinction probabilities.

*In their abstract, Garton et al. estimated 88,816 male grouse in 2007, however, when totals are summed across SMZs, the total is different (87,3376). A reason for this discrepancy is not explained.

**The reason that no one has reported a negative effect from hunting harvest may be attributable to: 1) lek count data are an unreliable index of population size and trends, 2) the harvest of male vs. female sage grouse can be expected to vary by location and year, introducing noise into demographic data, 3) non-stationarity, and 4) the confounding effects of other variables, including environmental variation.

16.27) In contrast to Garton et al. the authors of the WAFWA 2008 report clearly stated their shortcomings: *"Many assumptions and potential sources of error limit inferences that can be made from the data presented in this report. First, because the data are counts with no measure of detection probability and no probability-based sampling design, trends refer only to the maximum male count of sampled leks. Consequently, statistical inference does not extend to sage-grouse population size."*

16.28) It is notable that Garton et al. lacks any mention of hypothesis testing and validation (against independent empirical data). Nor does the word 'hypothesis' appear anywhere in this paper. The approach used by Garton et al. involved the basic elements of data exploration: data filtering, model selection, estimation, prediction, description and interpretation. The approach used by Garton et al. was inductive (data exploration), as opposed to a hypothetico-deductive approach. The latter is the epistemological paradigm that has been the primary driver of modern scientific advances.

If Garton et al. had followed their data exploration with development of refined hypotheses *to be tested*, rather than a series of untestable predictions, it would have crossed this threshold. A fundamental epistemological problem with predictive modeling, such as that presented in Garton et al., is that it is not falsifiable. Garton et al.'s approach to predicting extinction is equivalent to making quantitative predictions as if they were certain and then never testing them. This has major consequences for policy intervention. A preferred method would be to test these models as proposed by Corkett (2002): *"The inductive approach… should be replaced by a critical rational approach in which management decisions would be based, not on those nonfalsifiable models best supported by the facts, but on those falsifiable models that have been tested by the facts."*

Significance: The use of model selection by Garton et al. introduces data exploration and inductive reasoning into policy decisions such as the proposed ESA list of the sage grouse. This represents a departure from the hypothesis testing (deductive reasoning) that has been the hallmark of scientific advances, successful problem solving, and informed decision making.

EXTINCTION PREDICTIONS

16.29) Garton et al. misapply the 50/500 effective population size "rule of thumb" to make erroneous predictions on the probability of population and metapopulation extinction on 30 and 100 year time scales. It is clear that Garton et al. is unfamiliar with the derivation or validity of these rules of thumb, despite numerous published papers on this subject. This ignorance is exemplified by Garton et al. calling this a "rule" instead of a rule of thumb.*"Thresholds of 20 and 200 were chosen to correspond approximately to the standard 50/500 rule for effective population sizes (Ne; Franklin 1980, Soulé 1980)"*

Garton et al's use of model averaging to forecast future population abundances and probablility of extinction based on those forcasts and the 50/500 rule of thumb is laid out below*: "In other words, forecasting future probability of a local population or a SMZ declining below effective population size of 50 breeding adults (N_e = 50 corresponding to an index based on minimum males counted at leks of 20 or less) identifies populations or SMZs at short-term risk for extinction (Franklin 1980, Soulé 1980) while a local population or SMZ declining below effective population size of 500 breeding adults (N_e = 500 corresponding to an index based on minimum males counted at leks of 200 or less)*

indentifies populations or SMZs at long-term risk for extinction (Franklin 1980, Soulé 1980). Most populations and SMZs, based on our comparison of AIC_c values, had >one model that could be considered a competing best model by scoring within the 95% set. This generally meant AIC_c <3. We projected future population abundances using each of the 26 models and used model averaging to incorporate model selection uncertainty into forecasts of population viability (Burnham and Anderson 2002) to generate an overall, based on all fitted models,"

Minimum viable population size is a frequently used term in the conservation biology literature. The basic idea behind the concept and population viability analysis is that there must be some "minimum conditions for the long term persistence and adaptation of a species or population" (Soule' 1987). Despite the disclaimer by Soule' (1987) that there *"is no single value or 'magic number' that has universal validity"* in the estimation of population viability, two numbers are cited frequently and without question in the conservation biology literature (like Garton et al.) and in management plans. An effective population size (N_e) of 500 has been used to describe the minimum number of individuals necessary to maintain the long term adaptive or survival potential of a closed population. And a N_e of 50 has been suggested as the minimum population to prevent the effects of inbreeding depression that would lead to a high risk of extinction.

16.30) Background on the N_e <500 rule of thumb

The suggestion that a minimum effective population size of 500 individuals is necessary to maintain the adaptive potential of a population is based on Franklin's (1980) quantitative genetic model. Franklin reasoned that most important adaptive changes are the result of selection on continuously varying characters and therefore a quantitative genetic approach, rather than a population genetic approach, was needed for the long-term conservation of genetic variation. The model that Franklin presented described the conditions under which an equilibrium could be maintained in a finite population between the loss of additive genetic variance through genetic drift (no selection operating) and the amount gained via mutation.

Phenotypic variance in a population can be apportioned into three components: environmental variance, genotypic variance, and the genotype-environment interactive variance (Franklin 1980, Falconer 1981). The proportion of genotypic variance can be further broken down into additive, dominance, and epistatic variance components. Of these, the additive genetic variance is the most important to the genetically determined characteristics of a population that will respond to natural selection. The ratio of additive genetic variance to phenotypic variance is referred to as the narrow sense heritability of character (h^2).

In very small populations, the loss of genetic variability through genetic drift will be greater than that gained through mutation. According to Franklin (1980) and Falconer (1981), if all of the genotypic variance in a population is additive (no dominance or epistatic variance) then the rate of loss of additive genetic variance will be equal to the rate of loss of heterozygosity or $1/2N_e$ per generation. To determine the rate of gain for additive genetic variance from mutation, Franklin (1980) relied upon estimates based on

a handful of studies of mice, maize and *bristle hair number* in Drosophila that had been summarized by Lande (1976). In these studies of highly inbred lines, the proportion of additive genetic variance from mutation was found to be approximately 10^{-3} that of the environmental variance. From this information, Franklin concluded that if the loss and gain of additive genetic variance is to be equal in a population, or $1/2N_e = 10^{-3}$, then N_e must equal 500. This is the extent of Franklin's derivation. The empirical evidence used to derive this was minimal and gathered over thirty years ago,

Franklin's (1980) model dealt with the maintenance of neutral variation and did not formally consider the effects of stabilizing or directional selection on heritable variation. Although the influence of selection on additive genetic variance was treated qualitatively, Franklin (1980) nevertheless concluded on the basis of artificial selection experiments that *"the major detriment of the level of genetic variance in natural populations is the balance between genetic drift and mutation."* Lande and Barrowclough (1987) subsequently considered the effects of stabilizing selection on additive genetic variance in a quantitative genetic model and tentatively concluded "that an $N_e > 500$ can maintain as much genetic variance in typical quantitative characters as an indefinetly large population" although they cautioned that *"this figure cannot be regarded as being very precise."*

16.31) Background on the $N_e < 50$ rule of thumb

I has been generally assumed that populations with an N_e of less than about 50 is vulnerable to the effects of inbreeding depression and are at high risk of extinction. An N_e of 50 is thought to be a minimum number for short-term survival of a population to minimize inbreeding depression (to less than 1% per generation). However, field data and theory show that even smaller N_e s are not necessarily deleterious nor a good predictor of extinction unless the duration of the bottleneck is both severe and prolonged (Luikhart and Cornuet 1997; Ramey et al. 2000). Empirical support for the N_e 50 rule of thumb came in 1990 from a widely cited study by Berger (1990) who found that this rule predicted the disappearance within 50 years of all mountain sheep populations in California estimated to number 50 or fewer. The applicability of this rule of thumb to bighorn sheep was subsequently questioned and falsified by Krauseman et al. (1993, 1996), Goodson (1994) and Wehausen (1999). Krausman et al. (1993, 1996) conducted an independent test of Berger's predictions using data from Arizona and found that 6 of 20 populations had increased from below 50 to over 100 and that extinctions were found across all population size classes. Goodson (1994) reported similar results contrary to Berger's predictions for Colorado. And finally, Wehausen (1999) reported that: *"I tested Berger's (1990) model using the complete data set from California and found-contrary to his results-that, for all size classes of population estimates, at least 61% of the populations persisted for 50 years. Also, two predictions from Berger's model were not consistent with the data from California: (1) 10 populations have increased from estimates of 50 or fewer animals to over 100, whereas the Berger model predicted that these populations would only decline to extinction; and (2) of 27 extant populations with long enough records, 85% were estimated at least 50 years ago to be 50 individuals or fewer and should therefore be extinct by now. Berger's model has now failed tests in three states and therefore does not support the strong population size effect on extinction*

probability that it first appeared to provide, and it may serve conservation poorly through misdirected effort if it is used as the basis for setting policies or taking actions."

16.32) The 50/500 rule of thumb: recent critiques and empirical data

Boyce (1997) summarized on the supposed universal applicability of the 50/500 rule, *"Likewise, there is no solid basis for the often-cited rule of thumb that five hundred individuals may be sufficient to maintain long-term viability of a species. Unfortunately, the 50/500 rule does not have a sound genetic or demographic basis (Lande and Barrowclough 1987, Ewens 1990). And there is no theoretical or empirical justification for basing MVP [minimum viable population size] on an estimate of Ne."* And, *"Further empirical evidence is needed to justify the use of rule of thumb for MVP. But until such evidence becomes available, reliance on rules of thumb, such as the 50/500 rule is arbitrary and capricious."*

More recently, Frankham (2005) underscored the absence of empirical data to support the 50/500 rule of thumb: *"The second deleterious genetic effect of small population size is expected to be the loss of evolutionary potential, the ability to evolve especially in response to environmental change. I am not aware of any field data that make a scientifically supportable connection between loss of genetic diversity and extinction risk."* In that study, Frankham (2005) had only found a measurable effect by using an experimental population of *Drosophila* and putting them through extremely small population bottlenecks of two individuals as founders for several generations and subjecting offspring to different levels of salinity . They reported: "*However, in the laboratory we have tested whether population size restrictions affect extinction risk under condition of increasing levels of a stressful environment viz. increasing levels of NaCl. Single pair population size bottlenecks for one or three generations resulted in extinctions at lower NaCl concentrations than in nonbottlenecked base population control populations (Frankham et al., 1999)."* Frankham (2005) also noted the poor correlation between estimates of genetic diversity and quantitative genetic variation: *"Correlations between molecular and quantitative genetic variation across populations are typically low, averaging 0.2, and they do not differ significantly from zero for life-history characters (Reed & Frankham, 2001). The low correlations could be due to different patterns of change in genetic variation for the molecular and quantitative characters, or could simply be a reflection of large sampling errors around estimates of genetic diversity, especially those for quantitative traits."* These experiments underscore the fact that there is no universal population genetic number that can predict extinction probability. And while the loss of genetic variation in populations can reduce adaptive potential to changing environments, the specific adaptive traits affected, and magnitude of those responses, are rarely quantifiable.

From a functional perspective, it is not the effective population size *per se* that leads to an accumulation of deleterious mutations, it is genomic processes involving errors in replication. These include: point mutations, insertions, and deletions, endogenous retroviruses, a suite of mobile elements in the genome (long interspersed elements, short interspersed elements, and transposons), gene duplication and subfunctionalisation, exon shuffling, and intron splicing. Each of these mutational processes are going to act

differently upon lineages and how the act depends upon their unique evolutionary history. Without detailed knowledge of a species genome or its evolutionary history, the fitness "burden" imposed by these mutational processes, or how that might be purged or diluted, will be highly uncertain. For this reason, empirical data has been lacking from the much touted concept of "mutational meltdown" (Lynch and Gabriel 1990), (i.e. the accumulation of slightly deleterious mutations in closed populations) as a contributing factor in extinctions. As a result, there is no universally applicable magic number that can be applied to extinction probabilities. We know more about the genomics of *Drosophila* than other eukaryotes, yet we consistently fail to make reliable predictions regarding extinction probabilities. Other serious correspondence problems between the real world and the 50/500 rule of thumb include: ignoring the influence of migration, population structure, mating system, natural selection, genetic drift, recombination, and over dominance, as well as environmental factors influencing demography.

Significance: Application of the 50/500 rule of thumb to predicting extinction probabilities is speculative.

16.33) Garton et al. grossly underestimate the importance of current sage grouse migration rates among populations and SMZs to maintaining genetic variation and potential for recolonization. In the section titled "Metapopulation Analysis", Garton et al. reported that: *"Estimated dispersal rates among SMZs were generally low, never exceeding 5% of the SMZ's abundance dispersing to any other SMZ (Table 71)."* However, these rates are actually high from a population genetic perspective. Even the lowest reported rate of 0.1% migration between the Snake River Plain and the Southern Great Basin, is more than adequate to prevent divergence in allele frequencies, local inbreeding, and thus extinction under the 50/500 rule of thumb. For example, Garton et al report that in 2007 there were an estimated 15,761 males attending leks in the Snake River Plain and 12,165 in the Southern Great Basin. When their estimate of 2.5 adult females per adult male at leks are added to these numbers, it yields a total population of 55,163 in the Snake River Plain and 42,577 in the Southern Great Basin, or 97,740 total adult grouse. An annual migration rate of 0.001 (0.1%) between these populations would result in a net exchange of approximately 97 individuals annually or nearly 291 sage grouse per generation among populations (assuming a 3 year generation time). This exceeds, by a factor of nearly 300, the rate of migration necessary to prevent genetic divergence and avoid deleterious effects of inbreeding (Wright 1931; Tallmon et al. 2004).

Theoretical population genetic and empirical studies have consistently shown that low levels of immigration are sufficient to maintain genetic variation and increase fitness in populations. The influence of migration and genetic exchange can also be seen in sage grouse genetic data. For example, a recent study by Bush (2009) produced the following conclusions, contrary to the extinction predictions of Garton et al.'s erroneous application of the 50/500 rule of thumb: *"Using historic (1895 – 1991) and contemporary samples, I documented that sage-grouse in Canada have not experienced reduced genetic diversity, increased population structure, or genetic bottlenecks despite significant demographic declines in the last 40 years. Both effective population size and effective number of breeders decreased with time, but the effective number of breeders was high given the*

estimated population size. This is likely due to lower than expected variance in reproductive success and gene flow from the rest of the northern Montana population. Presently, it appears that genetic variability in Canada is being maintained through migration from southern parts of the northern Montana sage-grouse population and the low expected decline in genetic diversity based on simulations using historic genotypes."

Significance: Garton et al. grossly overestimate the impact of population number on extinction probabilities. Current estimated rates of migration among populations is sufficient to render Garton et al.'s extinction predictions invalid.

16.34) Garton et al. propose that their extinction predictions guide policy decisions on sage grouse, even though these are based on: 1) flawed data, 2) invalid assumptions, 3) population forecasts that are untestable, and 4) the false premise that there are magic numbers that can predict extinction in sage grouse. *"We have attempted to improve upon the classic approaches by including models which are based upon estimates of both long-term changes (time or year effects) in carrying capacity (our terminology for the quasi-equilibrium), recent changes in rates of change in the last 20 yr (period effects) and a variety of forms of density dependence (linear vs. log-linear and 0–2 yr time lags) that have increased the coefficients of determination of the models dramatically, thereby improving our confidence that these forecasts will be useful in guiding decisions concerning the future of sage-grouse and the sagebrush communities upon which they depend."*

Review of:
GREATER SAGE-GROUSE POPULATION DYNAMICS AND PROBABILITY OF PERSISTENCE

Review by: Dr. John D. Wehausen

This review compares Garton et al. with a recent report on the same subject issued by WAFWA.

16.35) A. WAFWA Report

In 2008 WAFWA put out a report on a commissioned analysis of lek counts of greater sagegrouse for the period 1965-2007. Those analyses partitioned the data along two dimensions: three time frames (1965-2007, 1965-1985, 1986-2007); and four geographic scales (range-wide, management zone, population, and state) and estimated trends in maximum male counts at leks using a set of linear mixed-effects models to test whether there was no trend, a linear trend (increasing or decreasing), or a quadratic trend in an information theoretic (AIC) context.

Those analyses had laudable and questionable aspects. The laudable aspects were:

1. Authors had a potential biological basis for the time periods used in the analyses.

2. A definition of a lek was generated in a way that might eliminate some confounding variation in lek count data.

3. Authors were forthcoming in presenting what they considered shortcomings of their analyses, which included:

> **(a)** Admission that insufficient time was available to do the analyses optimally.
>
> **(b)** Recognition that the relationship between lek counts and population size is unknown with the result that there is potentially substantial bias in any trend analysis with lek count data, regardless of analysis method, and that area based data would be preferable to lek based data. Walsh et al. (2004) stated: "Until lek counts are calibrated to actual population parameters by estimating detection probability, managers must realize the limitations of lek-count data and should be cautious when reporting trend data based on them"
>
> **(c)** Acknowledgment of the high variance in male attendance at leks, that bias could enter into their results because their ultimate measure, highest lek count, is a function of number and timing of lek counts, that methods for lek counts have not been consistent over time and space, and that they were not able to standardize the data entirely.
>
> **(d)** Recognition of inconsistency in the reporting of zeros (new leks vs inactive leks) that could lead to negatively biased trends.

(e) Acknowledgment that their assumption that the many missing data are random and bring no bias to the analyses is likely not always valid, and that they lacked any way to test this.

4. The authors discussed reasonable ways that data collection on sage grouse could be improved in the future to resolve questions on the usefulness of lek counts.

Some key questionable aspects were:

1. The tables at the end of this report list for every sampling unit and time period only one best model. It is hard to believe that there was always only one best model in terms of AIC. One of the values of AIC is that it rates models relative to each other and often ends up with multiple models that cannot be distinguished from each other in terms of explanatory power, i.e. are statistically equivalent. As such, on the surface it seems that the presentation of results in that report effectively ignored the AIC results and the basic underlying concept of that method. Further, there were many situations in which the confidence intervals around the coefficient for the quadratic term included zero, which casts considerable question as to whether the quadratic model was really supported statistically. It is likely that in those situations one or more models with fewer parameters were equivalent to the quadratic one in terms of AIC, but it appears that the reader was not provided that information.

2. In this regard, the graphs of linear mixed effects model results seemed questionable and appeared to be an artifact of using a quadratic model for relationships that are not parabolic and would be more accurately modeled with a different function. There were a number of sampling units for which the plots of means and medians showed clearly no trend over the total time period, but for which the quadratic mixed effects models presented consistently showed a clear curvilinear declining trend, despite the sometimes wide initial confidence intervals (e.g. MZ I, MZ III, MZ V, Montana, Oregon). What this suggested was that the quadratic model used had an inherent bias to produce a declining trend for most data sets. Perhaps this was somehow driven in part by the steep increase in leks counted over time for most sampling units. Given such an apparent declining tendency of the mixed effects models, it was hard to consider any of those results credible. This left only the plots of means and medians as potentially useful. The finding of no clear change between 1965 and 2007 for the combined data appears acceptable given the limitations of the data used. The declining, then increasing, pattern in means between 1965 and 2007 for the combined data (Figure 2) may be a real pattern in the data. However, given that these results are derived from a mixture of different data sets, most of which changed considerably over that time frame, and all the potential biases associated with those changes, there is no way of knowing whether that pattern represents a biologically meaningful pattern or is an artifact of the data set.

3. The presentation overstated the interpretation of results, beginning with the title, in suggesting that the reputed trends in their analyses of lek counts implied population trends. This was disappointing given the discussions of the limitations of the data.

Whether their results translated to actual dynamics of the sagegrouse populations awaits the development of data that will allow an analysis of the linkage between those two variables.

B. Garton et al.

Garton et al. in a manuscript titled "Greater Sage-grouse Population Dynamics and Probability of Persistence" provide a new analysis of the same data used in the WAFWA analyses. Here I compare and contrast those two analyses to ask what new insights Garton et al. offer relative to this question. Garton et al. add considerable criticisms of the WAFWA analyses.

16.36) Population units analyzed. The WAFWA report presented data at 3 geographic scales: state, management zone, and range wide. They list in Appendix C 38 different "breeding" populations they used for the analyses that were one or more leks separated geographically by >20 km from other breeding populations in accordance with a definition of breeding populations provided by Connelly et al. (2003). Garton et al. increased that threshold distance to >30 km or other significant barriers, and used only 30 breeding populations having what they considered sufficient data, of which 23 offered sufficient data to model annual rates of population change. In arriving at their population definitions Garton et al. "carefully examined each state's and province's data base and removed questionable data, e.g., leks for which no count data could be provided, and replicate locations (>two separate but nearby locations that represented the same lek)". Two large populations (Great Basin core and Wyoming Basin) were split by Sage-Grouse Management Zone (SMZ) boundaries and each was split into three and two respective smaller populations to allow more meaningful analysis. Thus, population definition in Garton et al. was somewhat different from the WAFWA report, but they used the same larger management zones.

16.37) Time periods considered in analyses. Because previous analyses found apparent differences in lek count dynamics before and after 1987, Garton et al. also used 1987 to define 2 time periods. Additionally, Garton et al. grouped the data in 5 year blocks, using averages and associated statistics for each block.

16.38) Data limitations. One of the laudable aspects of the WAFWA report was the open recognition that the relationship between lek counts and population sizes is unknown and the recommendation that a better understanding of this is needed to interpret the results of lek counts. Garton et al. wrote the following:

"The same leks, or leks within the same area, have been counted by agency biologists for many years (Connelly et al. 2004). These leks were likely selected because they held many males, their accessibility, or for both reason. Although some states and provinces attempt to monitor all known leks, leks surveyed in most states and provinces are not a random sample of those available, yet when analyzed in a repeated measures framework, may provide unbiased and precise measures of the rate of change of populations".

Their approach was to treat the data as minimum counts, and to use the available data in a way that accounted for what might appear as data limitations, which the following quotes clarify:

> *"We assessed monitoring effort within individual SMZs and populations by examining the average number of leks and number of active leks censused over 5-yr periods. This allowed evaluation of overall monitoring effort—the number of leks counted. We calculated the change in number of leks censused to describe the manner in which monitoring effort grew exponentially over time. Methods were developed to estimate trend and annual rates of change … that would not be biased by this increasing monitoring effort."*

> *"We developed an approach to analyzing this index which treats lek counts as a cluster sample of males within leks and applies ratio estimators to paired counts of males at leks in succeeding years to obtain unbiased estimators of $\lambda(t)$ the finite rate of change from the previous year to the present year and $\theta(t)$ its reciprocal. Population reconstruction using these unbiased estimators provides remarkably precise estimates of the rates of change for reconstructing the index in previous years and is not biased by changes in the number of leks counted in different years. These rates of change are the basis for our modeling efforts. Unfortunately the final year count of males attending leks is not based on a probability sample and cannot be used to infer the true number of males attending leks within the spatial region sampled, nor the true number of males present within the region, nor the breeding population of both males and females present within the spatial region sampled. Methods to replace this weak foundation of lek counts representing an unknown proportion of leks in a spatial region by a true probability sample of leks and breeding males and females in defined spatial areas have been proposed but not widely adopted at this time (Garton et al. 2007)."*

Thus, WAFWA and Garton et al. laid out clearly the potential limitations of the data used. The difference is that Garton et al. identified a sampling approach that the data appeared to fit and applied a statistical approach seemingly appropriate to this type of sampling.

16.38) Analytical approaches. As the above discussions indicate, Garton et al. and the WAFWA report used somewhat different data bases, but quite different analytical methods. The apparent problems with the WAFWA approach are listed above. The analytical approach of Garton et al. had multiple procedures:

> **(a)** careful use the lek count data to develop yearly (unbiased) estimates of $\lambda(t)$ for each lek with successive counts, which were then averaged for each population with precision of estimates.

> **(b)** use of the reciprocal of those $\lambda(t)$ estimates to back calculate (reconstruct) breeding population sizes beginning with a recent year in which the most leks

were counted. This effectively estimated how many male sage-grouse would have been counted in earlier years if the maximum number of leks counted had been counted every year. Garton et al. present a formula for estimating the compounding error of such a procedure and apply it to their reconstructed population data.

(c) use of those reconstructed populations to find best fit stochastic models. They considered 26 exponential and density-dependence growth models of varying numbers of parameters, including year, the 2 time periods, and time lags, employing AIC to evaluate models relative each other.

(d) use the models developed in (c) to project each population and management zone into the future for 30 and 100 years as population viability analyses (PVA). Pseudo-extinction levels considered were 500 and 50, based on concepts of levels at which genetic drift will cause high rates of loss of heterozygosity.

(e) Garton et al. also performed a metapopulation analysis which allowed migration of sage-grouse between populations up to 27 km distance.

16.39) Shortcomings of Garton et al. results.

16.39(a) Apparent low resolution of *λ(t)*. Inspection of the many tables of data by 5 year intervals indicates a high variance of *λ(t)* values within those time intervals such that among all the populations it appears that in all but a few 5 year periods the 95% confidence intervals (CI) will include 1.0, i.e. the data appear to lack resolution to detect if the population is increasing or decreasing with any confidence.

16.39(b) Low resolution of population reconstructions. Figures 2-8 are plots of the reconstructed populations with 90% confidence limits. For most plots those asymmetric CIs are so wide that no trend can be supported at that confidence level. At 95% the CIs would be yet much wider. Nowhere in the text was there any discussion of why 90% might be more appropriate. My guess is that at 95% the CIs were all outrageously wide and would have resulted in nothing to discuss about a data base with no resolution.

16.39(c) Lack of accounting for error. The large error around the reconstructed population data apparently did not enter in the attempt to model that population history. That modeling itself had seemingly poor resolution without consideration of the resolution of the population history. In Appendix 1, Garton et al. list data for best AIC models of their reconstructed population data. In that table the 26 r^2 values range from 0 to 0.682, the highest of which is for a population with data only for 1996-2007, and the next closest value was 0.498. Average r^2 was only 0.257. What this indicates is that the models on average did not explain 75% of the variation of data sets that themselves had low resolution. That large unexplained variation would have been used as stochastic variation in the PVA

projections based on those models, the results of which would have been substantially driven by that high stochastic variation. Garton et al. discuss the poor resolution of their growth models, but seem to accept the idea of a highly stochastic system: "the inherently stochastic nature of population changes of sage-grouse will require use of stochastic growth models to forecast future potential for persistence of the species". In actuality, the unexplained variation in their population growth models is probably a combination of a variety of sources of variation, including relatively crude mathematical constructs to model a complex system. As such, stochastic variation used in the PVAs is likely exaggerated, perhaps considerably. Adding to that the low statistical resolution of the reconstructed populations for which the models were developed suggests that a great deal of error accompanies the PVA forward projections. Similar to the population reconstruction, that error will compound and grow exponentially. Garton et al. discuss this potential, but ultimately emphasize the literature that better supports their analyses. In reality, given the poor resolution of the reconstructed population data base and the growth models based on it, the PVA projections probably incorporate a great deal of compounding error that likely renders projections at even 30 years as meaningless.

16.39(d) This leaves almost no clearly useful analytical results in what Garton et al. produced. What may be useful results are a couple of the reconstructed population histories (Summit-Morgan Counties, UT; Snake River Plain Management Zone) which had narrow enough 90% CIs to indicate a statistically supported negative trend over time. Even those trends are probably not supported at the 95% level. As with the WAFWA report, probably the most useful aspect of Garton et al. is the discussion of how population data collection on sage-grouse should be improved to develop statistically more useful data.

Review of:
GREATER SAGE-GROUSE POPULATION DYNAMICS AND PROBABILITY OF PERSISTENCE

Review by: Dr. Vernon C. Bleich

In this paper, the authors accumulated and analyzed counts of male Greater Sage-Grouse (*Centrocercus urophasianus*) at 9,780 leks identified since 1965, and totaling 75,598 individual counts. Data streams for many leks were substantial, with some counts having occurred over more than 40 years; the final year for which data were included in the analyses was 2007. The authors grouped leks into 30 populations, which were distributed among 7 previously identified sage-grouse management zones. The authors stated that this approach allowed grouping of leks into "biological meaningful populations", and 23 of the 30 populations were sufficiently data rich to model annual rates of population change. The authors then developed models of annual rates of population change, and used information-theoretic criteria to select the best model for each population for which sufficient time series of data were available. Overall, models predicted declining carry capacity through time ranging from -1.8% to -11.6%, and 18% of the models incorporated lower carrying capacity from 1987 – 2007 when compared to 1967 – 1987.

The authors established quasi-extinction thresholds (effective populations sizes) of 50 birds ($N_e = 50$) per population and 500 birds ($N_e = 500$) per sage grouse management zone (SMZ), and then used model forecasts to suggest that 13% of the populations, but none of the SMZs, may decline below 50 birds within 30 years, while 75% of the populations and 29% of the SMZs were likely to decline below 500 birds within 100 years if current conditions persisted. They then concluded that *"preventing high probabilities of extinction … will require concerted efforts to decrease continuing loss and degradation of habitat as well addressing other [potentially limiting] factors … at local scales."*

Specific Comments

16.40) This entire paper represents a retrospective analysis of data collected by dozens of individuals, over > 40 years, at hundreds of locations, using sometimes unconfirmed or unsubstantiated methodologies that may or may not have been consistent with accepted criteria for counting male sage grouse on leks. The authors state that they examined all such data prior to analysis to ensure that they were obtained following appropriate procedures, *"… but in some cases … had to assume that they were collected properly."* This begs the question of why the authors did not discard those questionable data but, rather, included them in the analyses.

16.41) The authors acknowledge that counts of male sage grouse on leks represent only an index to the minimum number of breeding males in a local area; there has been, however, no verification of the relationship between lek count data and population sizes, a major weakness in this index. Based on results reported by others (Connelly et al. 2004), they concluded that use of lek counts to assess change over a relatively large scale

was a sound technique, and they made no attempt to assess population dynamics at relatively small scales (e.g., harvest units) or estimate true population abundance using lek count data. I conclude that the models presented really represent relative changes over time, and at broad scales.

16.42) The authors established analysis periods of 5-year blocks of time over which data were averaged, and that they state correspond with "typical planning and assessment periods for management agencies), but included 8 years (2000-2007) of data into the final analysis period. They also divided the assessment period into two approximately equal time frames (1967- 1987 and 1987 – 2007) because previous analyses of similar data (Connelly et al. 2004) indicated that populations declined more steeply during the first period than during the latter. As such, there appears to have been some biological reason for establishing those two periods. Nevertheless, there appears to be no biological reason for combining data into 5-year blocks, and I suggest that results may have differed had they, say, used a different length of time to cut the data. In most cases, they also did not use the initial 2 years of data, which is understandable because it allowed models to be built with 1 and 2 year delays that reflected potential density dependent effects.

16.43) In an attempt to minimize problems, the authors did not include aerial lek count data, information from leks with only a single count per year, or data from "leks" that could not be confirmed as leks, but continued to assume that other data were collected following established procedures, which seems like a leap. Again, it is unclear why they would not have eliminated data that were *assumed* to be OK, and worked with a smaller, yet more robust, data set.

16.44) The authors acknowledged that information on genetic structure, movements, habitat boundaries, and demographic correlations are necessary to delineate local breeding concentrations, or demes, as pointed out by Garton (2002). For the purposes of their analyses, however, the authors assumed that breeding populations could be defined as a group of sage grouse using one or more occupied leks in the "same geographic area" but separated from other such leks by > 20 km (Connelly et al. 2003). In some situations, delineations of demes or metapopulations based on spatial criteria (e.g., Bleich et al. 1996) ultimately have been demonstrated to be correct (Epps et al. 2007), but such has not, to the best of my knowledge, been the case with sage grouse. Hence, what truly represents a breeding population remains subject to question.

16.55) Despite employing the definition of Connelly et al. (2003) for a breeding population, the authors further defined breeding populations if they consisted of concentrated areas of leks separated from the "nearest adjacent concentration of leks by at least 30 km" or were separated from other such concentrations by unsuitable habitat (Connelly et al. 2004). Thus, it is unclear to this reviewer just what the authors ultimately considered to be breeding populations, which were then grouped into 7 SMZs defined by previous investigators (Miller and Eddleman 2001, Connelly et al. 2004, Stiver et al. 2006).

16.56) The authors elected to treat each SMZ as a subpopulation of a metapopulation (that apparently consisted of the entire range of sage grouse) because of high correlations in demographic parameters (growth rates), "little genetic differentiation amongst populations", and the enhanced value of large sample sizes of leks to enhance precision of estimates of abundance. The decision to do so raises the following issues.

16.57) Subpopulations comprising metapopulations are expected to have the potential to be independently dynamic, but it does not necessarily mean that dynamics must be independent, as would be the case if environmental influences were affecting subpopulations across a large geographic area. Moreover, genetic similarities among subpopulations would be expected if interchange among those subpopulations were occurring, and such movement would meet the assumption that the potential for colonization of areas from which birds had been extirpated (e.g., leks or populations within limited geographic areas). Finally, enhancing sample size to generate more precise estimates of abundance seems to be a contrived rationale for defining the SGMs as metapopulations. As such, I question the merit of combining all leks within each SMZ into a single subpopulation of the metapopulation, and then defining the metapopulation as combinations of the 7 SMZs. I question the appropriateness of defining the SMZs as a subpopulation of a "metapopulation" of sage grouse that includes the entire range of the species, and suggest that the authors should not have attempted an analysis based on their definition of the metapopulation.

16.58) The authors divided two large populations (Great Basin and Wyoming Basin), which were split by SMZ boundaries into three and two smaller "populations", respectively, to allow more "meaningful" analysis. It is unclear why those populations were included in multiple SMZs in the first place, and doing so presents the appearance that the authors modified their original definition of populations provided earlier in the text.

16.59) There is an inconsistency between the statement that combing all lek counts within an SMZ allowed them to use all lek counts meeting standards for quality within each SMZ, and the previous acknowledgment that the authors were forced to assume in some cases that data were gathered correctly. Either lek counts were conducted properly, or they were not. The authors need to clarify that "meeting standards for quality" includes some data that are assumed to have met those standards.

16.60) Methods used to reconstruct populations back through time are complex, but seem reasonable if the limitations of the data are acknowledged. The authors also considered the potential influence of varying sampling effort and attempted to control for that bias by applying a ratio estimator to estimate the finite rate of population change between leks counted in consecutive years, and considered the ratio of males counted in a pair of successive years to be estimates of the finite rate of population in that interval. They then combined ratios across leks within a population to generate finite growth rate for the population, and across all leks within an SMZ to estimate the finite growth rate between successive years. These data were used to reconstruct the estimated numbers of male

sage grouse back through time, allowing the investigators to generate information about relative changes that occurred over time.

16.61) Population modeling was a complex process, and the authors fit a total of 26 models, evaluating their relative merit using an information theoretic approach. Models included a surrogate for density-dependent effects in the form of time delays ranging from 0 to 2 years, a period effect (first 20 years vs. second 20 years), and time trend in population carrying capacity, as represented by year. Ricker and Gompertz models both were evaluated and the authors argue that both provide an objective approach to estimate carrying capacity, defined as the population size at which the finite rate of growth is zero, and represents a threshold in abundance below which population size tends to increase, and above which population size tends to decrease.

Population projections were derived using parametric bootstraps on minimum population size in 2007 and projecting 100,000 replicate abundance trajectories for 30 and 100 years into the future for each qualifying population, and for SMZs. The authors estimated the probability of "quasi-extinction" (see below) by determining the proportion of replications in which population abundance declined below 20 or 100 males at some point during the 30 or 100 year time horizon for populations or SMZs, respectively.

16.62) The authors selected population sizes of 50 and 500 birds to represent quasi-extinction levels for sage grouse representing local populations (50) or SMZs (500) in the short term and long term, respectively. These values were derived from previously published estimates that an effective population size ≥ 50 and an effective population size ≥ 500 are necessary for short and long-term population persistence (Franklin 1980, Soule 1980), respectively, because they would minimize the negative influences of inbreeding depression and subsequent impacts to individual fitness. Nevertheless, the appropriateness of selecting values of 50 and 500 is questionable, given the uncertainties of just what constitutes an effective population, and whether or not those values really have any biological meaning in a conservation context given the importance of factors affecting demography when compared to genetic issues in small populations.

16.63) Based on the work of others (Patterson 1952, Schroeder et al. 1999, Aldridge 2001, Bush 2009), the authors concluded that a population containing 20 breeding males would represent an effective population size (N_e) of 50 birds (necessary for short-term population persistence), and that 200 breeding males would represent an effective population size of 500 birds (necessary for long-term population persistence). From the information provided, it was not possible for me to ascertain if these values (50, 500) were in reference to birds on leks (unlikely, given the range in counts of males provided in the tables), comprising populations (that is what I assumed), or SGMs (also what I assumed); nevertheless, the authors indicate that a local population or SMZ declining below effective population size of < 50 or < 500 breeding adults are at short and long-term risks of extinction. This seems to be nothing more than clarifying the obvious, and I again question the appropriateness of the selection of those values.

16.64) The authors use projected population levels to estimate the probability that the number of sage grouse occurring in a population or an SMZ will fall below 50 adults or 500 adults in both short term (30 years) and long term (100 years) projections. This fails to recognize that, although N_e can be based on current population levels, it is affected by the past history of the population. If a population has undergone one or more bottlenecks in its history, N_e may already have been reduced relative to what it might have been had those bottlenecks not occurred. Again, the authors have assumed that there is something magical about the values of 50 and 500, and did not adequately explore the derivation of those values, and how N_e can be interpreted in differing contexts (e.g., bottlenecks on effective breeding population size).

16.65) Although the authors elected to use values of 50 and 500 birds as thresholds for quasi-extinction, I am not sure those values are appropriate or their use justifiable; the numbers originated in the concept of the deleterious effects of inbreeding depression. Impacts to demographic processes are of much greater concern than are genetic issues when populations are small (Lande 1988), and the use of population sizes of 50 and 500 individuals to determine probabilities of persistence seems questionable. Nevertheless, the authors present data suggesting a high probability of populations (and even SGMs) declining below those thresholds both in short term (30 years) and long term (100 years) projections. I suppose they had to establish some threshold below which populations were expected to become endangered with extinction, but the arbitrary selection of those values, across such a large area, remains questionable.

16.66) The authors also examined the potential for metapopulation persistence, but relied on estimated dispersal rates among the SMZs that composed the metapopulation and determined the probability of dispersal between every pair of leks using graph theory, based on distance between known leks, the difference in size between adjacent leks, with dispersal distances limited to 27 km between any pair of leks. The methodology used is inadequately explained to be meaningful to this reviewer, but it appears that it involves the inclusion of parameters that are largely speculative in nature (or based on models of what would be anticipated to occur) and a number of assumptions that seem to be not fully justified. The best Gompertz models and Ricker models appeared to provide conflicting results. The Gompertz models suggested a low probability that sage grouse in the metapopulation would fall to < 30,000 males within the next 30 years, or to < 5,000 males within 100 years, and the mean final abundance was 45,870 and 39,817 males after 30 and 100 years, respectively; the mean minimum abundance was 6,965 and 5,998 males after the same lengths of time. In contrast, mean projections based on the best Ricker models suggested a low probability that sage grouse would fall below 3,000 males within 30 years, but a 100% chance of extinction within 100 years. Mean final abundance was 5,652 and 0 males after 30 and 100 years, and the mean minimum abundance was 5,577 and 0 males after 30 and 100 years, respectively, according to the Ricker models. These projections assume that current levels of risk to sage grouse remain unchanged, and whether or not that is a reasonable assumption is questionable.

16.67) The authors have included tables that provide detailed summaries of the results of lek counts across 7 SMZs, and for 30 populations, and were able to reconstruct

populations back to 1967 for 23 populations and 6 SMZs. Moreover, the results of their calculations are presented in detail for each of the 30 populations and 7 SGMs, with the exception of those that lacked sufficient data to allow populations to be reconstructed. These tables are potentially useful summaries of the history of each population from roughly 1967 to 2007, and allow the reader to quickly compare through time the mean number of leks counted, mean males/lek, mean active leks, mean percent active leks, mean males/active lek, mean finite rate of population growth (λ), and the SE of λ by five-year periods. They also provide graphics depicting population reconstructions and associated confidence intervals for the same time period. These tables provide an easy means by which interested parties can review historical information, and the graphics readily convey population trends based on population reconstructions. As such, they will be useful to individuals concerned with the dynamics, management history, and relative population dynamics of sage grouse comprising specific populations or occurring in SMZs, and really represent the most useful part of this paper.

16.68) The authors state that their analyses are based only on attempted censuses of males that met their standard for quality, but (as noted earlier), include data based on the assumption that their standards were met.

16.69) The absence of a probability based sampling scheme for the data analyzed precluded an unbiased estimate of the proportion of leks that disappeared during the sampling period (1965 – 2007), as well as an estimate of newly established (or discovered?) leks, and precluded the modeling of impacts of habitat changes or other factors that could affect sage grouse abundance, distribution, or population dynamics. Recognizing the shortcomings in the data used in their analyses and, to their credit, the authors readily advocated for establishment of range-wide, standardized methodologies based on probability sampling of leks and breeding males and females that would allow more meaningful analyses in the future, as pointed out by Garton et al. (2007). This is probably the second most useful part of this paper, but only if such methods are adopted range wide, and implemented in a manner that will yield meaningful results in the future, as advocated by the Sage- and Columbian Sharp-tailed Grouse Technical Committee (2008).

16.70) The results presented in this paper are consistent with results of other less sophisticated analyses (e.g., Connelly et al. 2004, Sage- and Columbian Sharp-tailed Grouse Technical Committee 2007) that inferred a long-term downward trend in sage grouse numbers in western North America. Neither of those previous analyses offered a means of assessing the true magnitude of population change, nor does the current analysis, although the precisions of recent population indices are markedly tighter than those based on earlier counts involving smaller samples. That the pattern repeats itself suggests that there is something to the conclusions reached by these authors; nevertheless, this is a retrospective analysis that incorporates sophisticated models of population dynamics, and the results are subject to the limitations of the data used to develop the models.

16.71) Where it was available, data, including those on population structure at harvest, chicks per hen, relative abundance during summer, chicks per adult, and mean brood size, hunting opportunity, and harvest rates from appropriate periods as evidence seem to corroborate conclusions that populations of sage grouse were high in the 1960s and early 1970s, consistent with the population reconstructions presented in this paper.

16.72) The statement that the multi-model predictions of the likelihood of individuals populations of sage grouse declining below 50 and 500 within 30 years are underestimates because they are based solely on the 23 populations for which sufficient data existed to build stochastic population models seems suspect. In the absence of data adequate to build those models, it does not appear to be appropriate to reach that conclusion. Indeed, absence of evidence does not equate to evidence of absence.

16.73) The authors readily acknowledge that not even their best models explained 50% of the variation in annual rates of change, and emphasize that decreasing error in lek counts using probability sampling approaches and incorporating meaningful predictive factors (i.e., environmental characteristics of lek sites or populations) into growth models will reduce the unexplained variation associated with growth models. Again, this is a plea for establishment of a probability based sampling approach to monitoring sage grouse populations.

16.74) The authors acknowledge the problematic nature of population indices exceeding the projected carrying capacities of specific populations, and offer three potential explanations for this phenomenon: (1) estimated carrying capacity represents a quasi-equilibrium rather than an upper limit, and that growth rates tend to be negative above that equilibrium point, and positive below it; (2) carrying capacity, as calculated, characterizes the median abundance rather than mean abundance; and (3) the cyclic nature of populations as indicated by the significance of delayed density dependence in models. I concur that each of these seems like a plausible explanation, and it is appropriate for them to have attempted to explain why population indices might exceed projected carrying capacities.

16.75) The authors acknowledge the shortcomings associated with attempting to project population viability for conditions outside of the range of the variables used to develop the model(s), but acknowledge that some of the dominant influences on sage grouse populations can change in the future, thereby altering future trajectories to the benefit of sage grouse populations. In emphasizing this shortcoming, they appear to be cognizant of the potential for their predictions, as written, to be utilized to justify “writing off” certain populations, because extinction is preordained or predicted to occur (this is my interpretation of their cautionary note). A similar concern was voiced a few years ago, when advocates of bighorn sheep conservation voiced concern that minimum viable populations (as defined by the Bureau of Land Management) could lead managers to make decisions contrary to the best interest of the conservation of those ungulates, because populations were not deemed to be viable.

16.76) Future trajectories of sage grouse populations will be affected by already well established processes, including the continued invasion of exotic species, particularly cheatgrass (*Bromus tectorum*), expansion of coniferous species into upper elevations, altered fire regimes and, potentially, the influences of global climate change that will further modify existing sagebrush rangelands. Additionally, uncertainties exist with respect to the influences of West Nile Virus and expanded modification of habitat resulting from energy development, and these uncertainties will influence future population trajectories, but the authors acknowledge that the ultimate influence of these unprecedented landscape changes are not well understood for sage grouse. Nevertheless, 44% of models presented in this paper indicate continued declines in carry capacities for sage grouse through time, and 18% incorporated a lower carrying capacity during 1987 – 2007 when compared to 1967 – 1987. The authors interpret these results as consistent with those of other investigators that have concluded a continuing decline in the quality and quantity of habitat for sage grouse. I concur that this conclusion is reasonable, but again subject to the limitations of the data used to reach those conclusions. The overall relative trend is downward, but trying to associate absolute numbers with declining populations is a reach.

16.77) In summary, models can be useful when making predictions regarding the future, but the accuracy of such models is questionable because the predictions are based on incomplete information obtained in the past. In the analyses presented in this paper, the authors incorporated time lags, estimates of carrying capacity, recent changes in rates of change, and surrogates for density dependence in an effort to increase the coefficients of determination of the models, with a resultant increase in confidence that the forecasts will be useful to land mangers making decisions that affect sage grouse or sage brush habitat.

Identification of 50 and 500 individuals as thresholds of quasi-extinction does not seem to be well founded, and likely are not very meaningful in the overall interpretation of the probability of population persistence. However, if projections are taken to be relative estimates of the probability of populations remaining viable into the future, larger populations will persist longer than smaller ones, and extirpations will take place over a longer period of time, assuming that factors currently affecting sage grouse and their habitat remain unchanged.

The authors used retrospective analyses of long-term data streams that they felt met their expectations in terms of data quality to synthesize population trends of 23 populations of sage grouse and 6 sage grouse management zones into the future. They likely used an inappropriate metric (N_e) as a measure of quasi-extinction, with the assumption that grouse populations declining below thresholds of 50 in the short term and 500 in the long term were destined for extinction. Nevertheless, the models generated are more robust than, and are consistent with, previous reports that concluded there has been an overall decline in sage grouse abundance over the past 4 decades.

Chapter 17 (2009), Chapter 17 (2011):
INFLUENCES OF ENVIRONMENTAL AND ANTHROPOGENIC FEATURES ON GREATER SAGE-GROUSE POPULATIONS, 1997–2007

Authors: Douglas H. Johnson, Matthew J. Holloran, John W. Connelly, Steven E. Hanser, Courtney L. Amundson, and Steven T. Knick

Abstract from Johnson et al.
"The Greater Sage-Grouse (Centrocercus urophasianus) is endemic to western North America and of great conservation interest. Its populations are tracked by spring counts of males at lek sites. We explored the relations between trends of Greater Sage-Grouse lek counts during 1997–2007 and a variety of natural and anthropogenic features. We found that trends were correlated with several habitat features, but not always similarly throughout the range. Lek trends were positively associated with proportion of sagebrush (Artemisia spp.) cover, within 5 km and 18 km. Lek trends had negative associations with the coverage of agriculture and exotic plant species. Trends also tended to be lower for leks where a greater proportion of their surrounding landscape had been burned. Few leks were located within 5 km of developed land and trends were lower for those leks with more developed land within 5 km or 18 km. Lek trends were reduced where communication towers were nearby, whereas no effect of power lines was detected. Active oil or natural gas wells and highways, but not secondary roads, were associated with lower trends. Effects of some anthropogenic features may have already been manifested before our study period and thus not have been detected in this analysis. Results of this range- wide analysis complement those from more intensive studies on smaller areas. Our findings are important for identifying features that could threaten Greater Sage-Grouse populations."

Review of:
INFLUENCES OF ENVIRONMENTAL AND ANTHROPOGENIC FEATURES ON GREATER SAGE-GROUSE POPULATIONS, 1997–2007

Review by: Dr. Rob Roy Ramey II and Dr. Laura M. Brown

This paper seeks to determine whether specific activities are correlated with population level declines in sage grouse, as determined from lek count trend data. The idea is to identify quantifiable threats to sage grouse populations.

17.1) The authors examined 62 different variables (Table 1) using only 11 years of lek count data for the response variable in seven different management zones. This study is an example of an extremely weak approach to statistical inference and a poorly planned data-fishing expedition. There are simply not enough years of data to support inferences with single variables, much less several variables. By chance alone, several variables should show correlations with lek count trends. The problem is compounded by the fact that many of the lek counts had *only four years of data* associated with them.

17.2) From the "Conservation Implications" section at the end of this paper you would not know that lek counts have generally increased over the 10-year period that this study looked at (Figure 2), although the authors have several convenient caveats to explain this away.

17.3) Basically, the figures tell the story, that there are no significant correlations between predictor and response variables. These are essentially random clouds of points. The authors resort to loess smoothing to search for patterns in the data that do not have obvious statistical significance. Despite this, the authors report on "trends" and discuss the potential importance of these in the paper.

Consequently, the resolution of the data and the methods applied to them is extremely limited. The authors admission of limitations and caveats is not enough to salvage the results or redeem weak inferences based on them. Had this paper undergone a rigorous and independent peer-review, it would have almost certainly been rejected. It is doubtful that this paper would be considered publishable in most reputable scientific journals.

17.4) The authors used data from 9,844 leks but *"only the 3,679 leks with at least four annual counts during the 11-yr period were included* [in analyses]." In comparison, Garton et al. (Chapter 16 used data from 9,780 leks. The reason for the difference between two studies using the same data, in the same monograph, with many of the same coauthors is not explained.

17.5) In the last lines of the paper, the authors voice a number platitudes that are consistent with the message of other papers in this monograph: *"No single factor is responsible for declining sage-grouse populations, and no single action may be sufficient to restore them. Conservation of the species will initially require a recognition of the intrinsic value of sagebrush-dominated landscapes, followed by the development of a*

comprehensive approach to sagebrush habitat conservation that involves commitments and partnerships among state and federal agencies, academia, industry, private organizations, and landowners; Knick et al. (2003:627) affirm that only through this concerted effort and commitment can we afford to be optimistic about the future of sagebrush ecosystems and their avifauna."

Chapter 18 (2009), Chapter 16 (2011):
CONNECTING PATTERN AND PROCESS IN GREATER SAGE-GROUSE POPULATIONS AND SAGEBRUSH LANDSCAPES

Authors: Steven T. Knick and Steven E. Hanser

Abstract from Knick and Hanser:
"Spatial patterns influence the processes that maintain Greater Sage-Grouse (Centrocercus urophasianus) populations and sagebrush (Artemisia spp.) landscapes on which they depend. We used connectivity analyses to: (1) delineate the dominant pattern of sagebrush landscapes, (2) identify regions of the current range-wide distribution of Greater Sage-Grouse important for conservation, (3) estimate distance thresholds that potentially isolate populations, and (4) understand how landscape pattern, environmental disturbance, or location within the spatial network influenced lek persistence during a population decline. Long-term viability of sagebrush, assessed from its dominance in relatively unfragmented landscapes, likely is greatest in south central Oregon and northwest Nevada; the Owyhee region of southeast Oregon, southwest Idaho, and northern Nevada; southwest Wyoming; and south central Wyoming. The most important leks (breeding locations) for maintaining connectivity, characterized by higher counts of sage-grouse and connections with other leks, were within the core regions of the sagegrouse range. Sage-grouse populations presently have the highest levels of connectivity in the Wyoming Basin and lowest in the Columbian Basin management zones. Leks separated by distances >13–18 km could be isolated due to decreased probability of dispersals from neighboring leks. The range-wide distribution of sage-grouse was clustered into 209 separate components (units in which leks were interconnected within but not among) when dispersal was limited to distances <18 km. The most important components for maintaining connectivity were distributed across the central and eastern regions of the range-wide distribution. Connectivity among sage-grouse populations was lost during population declines from 1965–1979 to 1998- 2007, most dramatically in the Columbia Basin management zone. Leks that persisted during this period were larger in size, more highly connected, and had lower levels of broad-scale fire and human disturbance. Protecting core regions and maintaining connectivity with more isolated sage-grouse populations may help reverse or stabilize the processes of range contraction and isolation that have resulted in long-term population declines."

Review of:
CONNECTING PATTERN AND PROCESS IN GREATER SAGE-GROUSE POPULATIONS AND SAGEBRUSH LANDSCAPES

Review by: Dr. Rob Roy Ramey II and Dr. Laura M. Brown

This was a modeling and data fishing project looking at different factors (lek connectivity, sagebrush presence, fire, edge, and human footprint at four different spatial scales) leading to the disappearance of leks. Basically, the results were as expected: leks on the periphery, without connectivity, in areas that had been burned, or were closest to human development, were extirpated first: *"In our study, fire within a 54-km radius and human activity within 5 km of a lek influenced the probability of persistence over 40 years."*

This analysis relies on the same lek count data as other chapters in this monograph, except that they are used a subset of the data and only the examined factors are correlated with the loss of leks. The authors used a subset of known lek locations , ones *"that had been surveyed at least once within each interval from 1965–1974, 1980–1989, and 1998–2007 to avoid confounding analyses caused by increases in sampling effort that added new lek locations."* This produced a limited data set (Table 2).

18.1) A fundamental problem with this analysis is that lek persistence data are used in lieu of actual population data, and the analysis rests on the critical assumption that population persistence and lek persistence are strongly correlated. For example, if leks had simply moved because of disturbance (e.g. fire) then the analysis would treat the lek as extirpated when the subpopulation birds that comprise it were not extirpated.

18.2) Although the data were originally at a 30m resolution, the authors resampled at a 540m resolution, claiming that they *"were able to detect relatively fine-scale patterns at this resolution when considered at the spatial extent of the SGCA."* The authors do not acknowledge that this rescaling could be expected to inflate the effects of disturbance.

18.3) The stated objectives were to: *"(1) characterize the hierarchical pattern of sagebrush landscapes that results from natural and human disturbance, and (2) identify spatial scales perceived by greater sage grouse and other wildlife."* The second objective is unusual in that it suggests a belief that sage grouse have a spatial awareness, a property that is only found in animals of higher intelligence. The authors also describe populations and landscapes in terms of their being hierarchically structured. What is not clear, is whether the authors believe that the structure they describe is an emergent property or an artifact of their analysis.

18.4) The authors' belief that "little is known about the connectivity and ability for spatially structured populations to exchange individuals," is contrary to the abundant field and genetic data showing ongoing long distance dispersal (>18km). (This aspect is discussed extensively in the reviews of Chapter 16 of this monograph,

Garton et al.)

18.5) The authors were *"unable to identify a specific source of human disturbance because the score represented a summed influence of all anthropogenic features."* Thus, they concluded that *"the cumulative effect of human activities may have a greater influence on persistence of sage-grouse populations than single land uses."* This ignores the relative influence (effect size) of specific types of disturbance on sage grouse populations and assumes that they all contribute to sage grouse decline, when in fact some do not. This is not a sound epistemological basis for informed management decisions.

18.6) A more robust analysis would include a logistic regression approach to model population presence/absence. If lek presence/absence data were substituted, then the analysis could only refer to factors leading to the extirpation of leks, and that would best be done at a more limited, regional scale (e.g. sage grouse management zone). Results would be compared to a range wide analysis. Ideally, the variables selected for analysis should be winnowed down on the basis of plausible cause and effect mechanisms, and those likely to have the largest effect sizes. In that way, variables can be treated as testable hypotheses.

Chapter 19 (2009), Chapter 18 (2011):
FACTORS ASSOCIATED WITH EXTIRPATION OF SAGE-GROUSE

Authors: Michael J. Wisdom, Cara W. Meinke, Steven T. Knick, and Michael A. Schroeder

Abstract from Wisdom et al.:
"Geographic ranges of Greater Sage-Grouse (Centrocercus urophasianus) and Gunnison Sage-Grouse (Centrocercus minimus) have contracted across large areas in response to habitat loss and detrimental land uses. However, quantitative analyses of the environmental factors most closely associated with range contraction have been lacking, results of which could be highly relevant to conservation planning. Consequently, we analyzed differences in 22 environmental variables between areas of former range (extirpated range), and areas still occupied by the two species (occupied range). Fifteen of the 22 variables, representing a broad spectrum of biotic, abiotic, and anthropogenic conditions, had mean values that were significantly different between extirpated and occupied ranges. Best discrimination between extirpated and occupied ranges, using discriminant function analysis (DFA), was provided by 5 of these variables: sagebrush (Artemisia spp.) area; elevation; distance to transmission lines; distance to cellular towers; and land ownership. A DFA model containing these 5 variables correctly classified >80% of sage-grouse historical locations to extirpated and occupied ranges. We used this model to estimate the similarity between areas of occupied range with areas where extirpation has occurred. Areas currently occupied by sage-grouse, but with high similarity to extirpated range, may not support persistent populations. Model estimates showed that areas of highest similarity were concentrated in the smallest, disjunct portions of occupied range and along range peripheries. Large areas in the eastern portion of occupied range also had high similarity with extirpated range. By contrast, areas of lowest similarity with extirpated range were concentrated in the largest, most contiguous portions of occupied range that dominate Oregon, Idaho, Nevada, and western Wyoming. Our results have direct relevance to planning. We describe how results can be used to identify strongholds and spatial priorities for effective landscape management of sage-grouse."

Review of:
FACTORS ASSOCIATED WITH EXTIRPATION OF SAGE-GROUSE

Review by: Dr. Rob Roy Ramey II

This chapter uses discriminant function analysis (DFA) on 22 environmental variables to model the environmental variables that best predict extirpated vs. extant sage grouse populations. Discriminant analysis is used to select variables and develop models that discriminate between two or more groups. With bootstrap resampling procedures and posterior probabilities calculated for each observation, the model can be tested to see how well it performed with classifying the observations used to develop it.

There are a number of statistical issues with the analysis that are not addressed by the authors. Also, the definition of historic habitat (which is used for selecting locations of extirpated populations) is based on circular reasoning because historic locations outside of existing sagebrush habitat were excluded. Published analyses that are of higher quality address the similar questions, making this study superfluous.

19.1) A weak threshold was used for Discriminant Function Analysis classifications.
The authors developed a DFA model containing five variables that correctly classified >80% of sage-grouse historical locations in extirpated and occupied ranges. It is assumed, because it was not reported otherwise, that the authors used the default settings in the statistical program SAS for classifying locations as either "extirpated" or "occupied." The SAS subroutine PROC DISCRIM computes posterior probabilities for membership in each group. The default setting is 0.5 for posterior probabilities and by default, PROC DISCRIM classifies an observation into a group based on the larger of the two posterior probabilities for each observation. In other words, a value of 0.51 would result in a correct assignment while a value 0.49 would result in an incorrect classification. To use more discriminating posterior probabilities, ones that would result in more certain assignments (e.g. posterior probabilities of $\geq$0.95), additional steps are required. Specifically, the THRESHOLD= option must be specified. If the posterior probability for an observation fails to meet the specified threshold it is classified as "OTHER" (SAS Institute, pers. comm.) If the authors had applied a higher threshold for posterior probabilities such as 0.95, their percent of correct classifications would have been much lower (but would have been made with greater certainty).

Willingness of the authors to accept such poor discriminant analysis assignments (some differing little from flips of a coin in terms of discrimination ability such as a posterior probability of 0.51) as a basis for setting policy is highly questionable.

19.2) At least three of the variables found by the authors to provide the best discrimination between occupied and extirpated areas were not independent.
The authors did not acknowledge that transmission line towers and cell phone towers have a tendency to be placed on high points, and thus these two variables and the elevation variable are not independent. For example, transmission towers must be placed hilltops and ridges in order for transmission lines to make large spans. Even small

elevation gains make for longer spans, reducing the number of towers needed. Cell towers are typically placed at higher points where they can cover broader areas. They are frequently built on private land because of regulatory and leasing considerations.

It is unclear whether the authors distinguished between cell towers and *cell antenna arrays* that are placed on existing towers, including radio and transmission line towers, and buildings. Such an error would increase cell tower density in urban areas. The fact that transmission and distribution lines frequently follow roads was not acknowledged by the authors. Both of these contribute to the non-independence of variables.

19.3) The authors advance several far-fetched and pseudoscientific explanations regarding the potential effects of transmission lines and cell towers. For example: *"The strong association between distance to cellular towers and sage-grouse extirpation was an especially intriguing result, given that no previous studies of sage-grouse have evaluated this variable. Whether cellular towers function in a cause-effect manner or simply are aligned with other detrimental factors cannot be addressed without additional research. Recent studies, however, suggest possible cause-effect relationships between high levels of electromagnetic radiation within 500 m of cellular towers and reduced population or reproductive performance of a limited number of bird and amphibian species (Balmori 2005, 2006; Balmori and Hallberg 2007, Everaert and Bauwens 2007). These negative effects are similar to those documented for bird species exposed to electromagnetic radiation generated by power lines (Fernie and Reynolds 2005). Cellular towers also are likely to cause sage-grouse mortality via collisions with these structures or influence movements by visual obstruction, but no research has investigated these issues."* A problem with the studies cited is their speculative basis and lack of repeatability. This reviewer does not share the author's view that cell towers represent a significant collision hazard for sage grouse.

19.4) The authors did not distinguish between different types of electrical transmission lines even though these would be expected to have different effects on sage grouse. The failure of the authors to distinguish between different types of transmission lines confounds their effects and leads to erroneous conclusions. Electricity is transmitted at high voltages to reduce the energy lost in long distance transmission. Therefore, long-haul transmission line voltages are typically 230kV and higher, and placed on towers approximately 50m in height. This puts their cables above the usual flight height of sage grouse. Transmission sub-lines are typically in the 69 to 169kV range, and placed on towers ranging in height from 20m to 30m. Distribution lines, commonly referred to as "powerlines" are in the 12 to 34kV range and 10 to 20m in height. The greatest hazard to sage grouse is posed by older distribution lines that are low-lying. Beck et al. (2006) reported powerline collisions of this type as well as other sources of mortality: *"Of total mortalities avian predation was the cause of death for 36% of grouse, followed by mammal predation (27%), power-line collisions (18%), legal harvest (9%), and unknown cause (9%; Fig. 2)."* Because sage grouse rely on explosive bursts of speed, and short, ground-hugging flights to avoid predators, the maximum height of their flight is quite limited.

19.5) The assumption of independence among variables is not convincing. The most significant variables within each group of the 22 environmental variables are obviously correlated. For example, the significant "biotic variables" are all related to sagebrush coverage (*sagebrush area, patch size of sagebrush, proximity of sagebrush patches, size of sagebrush core areas, and distance to the boundary between occupied and extirpated ranges*); "abiotic variables" are all related to elevation (*elevation, soil water capacity, and soil salinity*), and "anthropogenic variables" to development and roads (*agriculture, human density, road density, distance to highways, distance to electric transmission lines, distance to cellular towers, and land ownership*). One must question why the authors did not recognize these interactions among variables and question whether they would violate statistical assumptions. Prior to embarking on discriminant analysis, many of these variables should have been eliminated. Instead the authors simply stated that: *"Correlation coefficients among all discriminatory variables were <0.35, positive or negative, indicating that stepwise procedures could be used."* The authors should have asked whether those correlations were statistically significant.

Many of the issues above could have been avoided if the authors had simply put effort into testing for correlations among variables (e.g. bivariate plots and regression procedures).

It is surprising that the authors did not present scatterplots of Mahalanobis distances from their discriminant analysis output. These are useful for visualizing the discriminating ability of the model and the certainty of individual classifications. Instead, the authors simply report the percent "correctly" classified without considering weak thresholds for discrimination (see comments above regarding posterior probabilities).

Because testing for multivariate normality is difficult, most researchers substitute univariate tests of normality. Instead, the authors relied on a qualitative approach: *"Examination of the frequency distributions of each variable showed that data were normally distributed for all variables within both classification groups, thus meeting this assumption."*

The authors did not utilize tests for detecting and eliminating outliers, such as the Grubb's and Dixon's tests (Sokal & Rohlf, 1981). Outliers can violate assumptions of significance tests of discriminant analysis, producing erroneous results. This is why univariate descriptive statistics and bivariate plots for outlier detection are important steps prior to undertaking discriminant analysis. This aspect of the paper is notably deficient which raises questions regarding the validity of results.

19.6) The authors rely on circular reasoning to claim *"these results support past studies that identified sage grouse as a sagebrush obligate, dependent upon sagebrush for persistence."* The author's analysis (as well as Schroeder et al. 2004) is based on the subjective exclusion of observations and specimens *outside* of sagebrush habitat. How can it be denied that these were *not* sage grouse habitat, if sage grouse were living in them? The presence of these observations and specimens falsifies the dogma that sage grouse are *sagebrush obligates*. Clearly sagebrush is the preferred habitat of sage grouse

and where the majority are currently found, however, historic observations show that it is *not* essential for their survival.

19.7) The hypothesis that human structures (e.g. transmission line towers, distribution line poles, and cell towers) serve as perches that facilitate raptor predation on sage grouse deserves further exploration. Raptors and ravens regularly perch on power poles, as any driver down a country road will attest. And the common feature shared by transmission line towers, power poles, cell towers, and drill rigs is their *height*. Therefore, it is important to ask 1) whether habitat near powerlines represents an increased predation risk compared to similar habitat farther removed, and 2) whether sage grouse avoidance of tall objects in the environment is an innate or learned behavior. Predation risk can be quantified experimentally or estimated from previously published studies. Separating innate from learned behavior is more problematic but could be approached experimentally.

While it is potentially straightforward to install anti-perch devices as a mitigation measure, the more difficult question is how to mitigate the effects if there is an innate tendency to avoid tall objects? Possible mitigation in core habitat includes: burying of transmission lines in sensitive areas, building cell towers away from high quality grouse habitat, and concentrating drill rigs (e.g. through the use of horizontal drilling technology).

Despite the obvious importance of these issues, the authors gave only a brief, half-sentence to the idea that transmission line towers might facilitate predation on sage grouse.

19.8) A suggestion of merit by the authors is the concept of sage grouse population "strongholds" as conservation priorities. However, such prioritization of effort could be based on information other than this paper. Not including the analyses from this paper in prioritization would be a prudent conservation strategy because the analyses have a questionable basis. In this regard, Aldridge et al. (2008), who used different data and a logistic regression approach, would be a more useful alternative. The primary limitation of the Aldridge et al. (2008) paper was its reliance on Schroeder et al.'s (2004) subjective pre-settlement map.

19.9) The discussion is of excessive length relative to reported results. It restates the obvious (e.g. that peripheral or disjunct populations are at greater risk of extirpation), and repeats policy and management suggestions presented elsewhere in this monograph.

Review of:
FACTORS ASSOCIATED WITH EXTIRPATION OF SAGE-GROUSE

Review by: Dr. Robert M. Zink

19.20) The authors of this interesting paper do not differentiate Greater Sage-grouse (*Centrocercus urophasianus*) and Gunnison Sage-Grouse (*C. minimus*), thus in this review they are both lumped as sage-grouse.

19.21) The authors claim that *"a myriad of widely distributed birds and mammals have experienced large contractions in their historical ranges…"* According to the Encarta Dictionary, "myriad" means "too numerous to count". This sort of hyperbole does not set the paper on a solid foundation. There is no doubt that many species have experienced range contractions, and it is likely that others are experiencing range expansions.

19.22) The paper aims to identify environmental factors that might have resulted in the regional extirpation of sage-grouse. There were 4 specific objectives: 1) identify environmental factors that might explain why sage-grouse are currently not found in some plots where they were historically presumed to be present, 2) use these factors to evaluate which currently occupied plots might be more likely to experience future extirpations of sage-grouse, 3) use the results for conservation planning, and 4) suggest future research needs.

19.23) The analysis is based on Schroeder et al.'s (2004) estimate of historical and current ranges. That paper, however, can only be interpreted as a very general guide to sage-grouse occurrence. For example, just because Schroeder et al. (2004) estimated that sage-grouse might occur in some area, there is no guarantee that it is an optimal area or one that would have self-sustaining populations. Also, it is not possible to know the historical density of sage-grouse in either plot category; i.e., some might have been suboptimal. However, it is the only such effort available, and was used by Wisdom et al. But there is an element of error in the estimates of Schroeder et al. (2004), of unknown proportion, which is carried forward in this paper.

19.24) The authors do not consider the fundamental point that over time, any species' range can change for purely natural reasons. Thus, the authors assume that areas where sage grouse were once estimated to be but are not detected on modern surveys is a result of human-caused extirpation. However, there is some non-zero expectation that an area once used by a species will no longer be used owing to habitat succession or other naturally occurring events. The potential magnitude of this effect is unknown, but affects both Schroeder et al. (2004) and Wisdom et al.

19.25) The basic idea of Wisdom et al. was to identify plots where sage-grouse occurred historically, and then to identify plots that today are either still occupied (N = 239) or no longer occupied (extirpated; 136). The circular plots were ca. 1020 km^2 in area. They then attempted to identify what environmental changes occurred in the extirpated plots,

relative to the still-occupied plots, to determine why the extirpated plots no longer supported sage-grouse.

The analysis involved 22 environmental variables, which were chosen *a priori* because they *"likely differed"* between occupied and extirpated plots. Thus, there was a potential bias in the features of the environment chosen for study. Nine variables were "biological measures" and included area of sagebrush, patch size and density, two measures of edge density (sagebrush adjacent to non-sagebrush), nearest neighbor (mean distance between sagebrush patches), proximity index (among patches), core area (sagebrush within 100 m of the edge of each patch), distance to occupied-extirpated boundary. Five represented abiotic variables: mean annual precipitation, elevation, soil water capacity, soil rock depth and soil salinity. Lastly, there were 8 variables related to human-land interactions (anthropogenic): agricultural area, human density, distance to roads, road density, distance to major highways, distance to nearest electrical transmission line, distance to nearest registered cell tower, and land ownership.

19.26) Several of the variables were not clearly explained. For instance, if a road went through one of the circular plots, what was the distance to the nearest road (presumably 0)? This is especially unclear as road density is the area of roadways (roads vs highways) "within" the 18-km radius plots. It is also not clear how some of the variables differed, such as the "edge" variables.

19.27) As the authors note, a problem with this sort of analysis is geographic variation in climate. Ideally, there would be a large area of relatively homogeneous climate so that the relationship between it and the other variables could be multiply tested. However, there are likely many interactions among the 22 variables, and these interactions likely differ across the sampled space, confounding interpretation. That is, in the extreme NW there might be a certain relationship between precipitation and sage grouse occurrence, but a different relationship might occur in the extreme SE. In effect, the analysis "averages" out these relationships, meaning that the average across the whole area might not apply to any particular area.

19.28) The authors chose discriminant function analysis, which seeks to find combinations of variables that best discriminate among *a priori* groups (occupied, extirpated). They note that this is an appropriate procedure when variables are quantitative and normally distributed – it is not clear that several of their variables meet this criterion (e.g. land ownership). Personally, I think that a better choice was to uses principal components analysis for each group separately to see whether different combinations of variables explained the maximum amount of variance. I think this would provide a better indication of the nature of differences between occupied and extirpated plots. Of course in a PCA one would have to do some standardization to account for the different scales of measurement.

19.29) It is also of concern that plots are classified as occupied or extirpated, which might be overly coarse-grained. A better approach might be to consider the relationship between the environmental variables and the density of the sage-grouse (as done

elsewhere in this volume (Hanser and Knick); the authors attempt (see below) to consider strongholds gets as this issue.

19.30) The authors state that there are low correlations between the variable measured, yet in several places they note that there are correlations between different variables. For example, plots with higher percentages of sagebrush would have fewer roads (at least within them). Larger expanses of sagebrush would necessarily have fewer roads and people. Thus, I am unconvinced that the correlations are as low as suggested by the authors (all < 0.3).

19.31) The paper engages in a distracting number of multiple analyses. It is generally acknowledged that testing the same data multiple ways does not constitute independent tests. Different combinations of the same variables are interpreted as though they were independent analyses (e.g., Table 3). This makes it difficult to ascertain exactly which analyses should be interpreted. Indeed, the authors pick and choose sets of variables to discuss (a PCA would have identified important variables without this bias). Furthermore, there is no statistical test of which models are better, only a comparison of how well they perform in discrimination.

19.32) The results of the many analyses did not discover any strikingly unexpected conclusions. Occupied plots contained ca. twice as much sagebrush, mean patch size was 9 times larger and mean core area was 11 times larger, then extirpated plots. In other words, sage-grouse are aptly named. Occupied patches were also substantially closer to each other, which is expected as dispersal via corridors can maintain populations in the event of local extirpation. Three of five abiotic variables were significant, and occupied plots tended to be higher in elevation and salinity, and lower in water capacity of the soil.

19.33) Several significant anthropogenic variables differed between occupied and extirpated plots. Occupied plots had less area in agriculture and lower human density. There were also fewer roads, greater distances to transmission and cell towers, and more public ownership. These are all obviously correlated. Sage-grouse occur in sagebrush, not on roads, agricultural plots, or cities. One could argue only somewhat tongue-in-cheek that early naturalists knew this 200 years ago.

19.34) Again, it is difficult to evaluate the discriminatory models owing to overlap in which variables were used. At best, an analysis with all biotic and anthropogenic variables classified 72% of occupied and 80% of extirpated plots. However, an analysis with only sagebrush area classified 76% of occupied and 65% of extirpated plots. Thus the 17 variables in the former analysis only did slightly better than the single variable, sagebrush area in the second analysis. Confounding this is likely the geographic interaction among many of the variables.

19.35) The sections on “individual variables and biotic, abiotic and anthropogenic groups” vs “best-performing combinations of variables”, were confusing. However, there were some post hoc reasons for choosing variables in the four additional models in the latter section. The best performing model contained sagebrush area, elevation,

distance to transmission lines, distance to cell towers and land ownership, and correctly classified 85% of occupied and 83% of extirpated plots. It seems likely that at least some of these variables are highly correlated (again despite statements to the contrary) such as elevation and land ownership (a non-quantitative variable that is not normally distributed). For example later in the paper the authors point out that "Elevation was a good discriminator, probably because most sagebrush loss has occurred disproportionately at lower elevations where human activities and developments have been concentrated…." This sounds like strong correlation to me. Some of the misclassifications involved Great Plains plots, were the birds are probably not well adapted or common – thus casting some doubt on whether the results are an "average" over a large area and not necessarily applicable to a local area. That is, an analysis excluding Great Plains populations might be informative, as it would not be factored in with other ecologically disparate areas.

19.36) It is also important to recognize that a variable's occurrence in a model does not mean that it alone explains all of the variation in occupied vs extirpated plots. In many places in the paper, the authors single out specific variables without acknowledging that they do not explain all of the variation, and have likely complex interactions with other variables. In other words, sage-grouse presence is likely a complex outcome of many variables, including some potentially not measured (hunting pressure?), and it is not clear that the variables can be interpreted independently. The role of exotic grasses seems especially important, as the authors note.

19.37) Other conclusions are interesting but it is not clear how generally applicable they are. For instance, the authors say that landscapes with sage-grouse with less than 27% sagebrush have a greater than 97.5% probability of matching an extirpated site. It is not clear if this is true throughout the large area they studied or only in some places. It is also troublesome that in the discussion, they continue to discuss the results of various models (combinations of the same variables) as if they were independent analyses.

19.38) The authors point out that species including sage-grouse are likely more susceptible to extirpation at the periphery of the range. However, they did not classify the historical range they used to establish occupied vs extirpated as to which areas might be peripheral – instead, all potentially occupied areas were considered as sage-grouse habitat, or not. Thus, the perception of historical range is inflated, because in all species, there are core areas, and then reduced densities (and increased vulnerability) as one moves towards the range boundary.

19.39) It is difficult to disagree with their statement that "sage-grouse extirpation is associated with a varied combination of biotic, abiotic, and anthropogenic influences, and that holistic consideration of these many environmental factors…appears important to maintain persistent populations…". However, this statement is true for all species.

19.40) I thought that the authors attempt to identify "strongholds" was very clever. They used model 2 to identify strongholds. In short, finding areas of occupied territory that nonetheless possess the characteristics of extirpated areas, the authors could hypothesize

where existing sage–grouse populations are at greatest risk. Conversely, those occupied areas that shared the least in common with extirpated areas could be considered places where sage-grouse had the highest likelihood of continued persistence, which they termed "strongholds". Of course, ironically, it is in these areas that populations might not be declining. The authors did not state whether there are Breeding Bird Surveys (http://www.pwrc.usgs.gov/BBS/results/), or other surveys, in the areas identified as strongholds, which might indicate population trends. It would be useful to know whether populations in these strongholds are increasing, decreasing or holding steady. Nonetheless, these areas could be future preserves for the species, or areas where breeding stock might be taken for translocation. In particular their suggestion of protecting strongholds is appropriate because this is likely cheaper in the long run than restoring degraded areas elsewhere.

19.41) The paper's main conclusion boils down to the observation that areas where sage-grouse occur today have larger uninterrupted expanses of sagebrush than those areas where they do not occur. This conclusion might be inferred without much analysis (I suspect it is common knowledge among hunters). Sage-grouse are obligate sagebrush birds, and being large-bodied, need relatively large areas to be successful. The other correlates of sage grouse occurrence are potentially correlates of large patch size – a larger contiguous patch of sagebrush will have fewer roads, and longer distances to towers (transmission, cell) and be less fragmented. Thus, their conclusion that extirpated range contained 27 times the human density, 3 times more area on agriculture, was 60% close to highways and had a higher density of roads, is not surprising.

19.42) If sage-grouse were listed, the strongholds might function as areas of critical habitat. However, this paper does not identify strongholds per se, but identifies which combinations of the 22 variables are associated with them. Where this analysis might be useful is in restoration of habitat for sage-grouse, if that route were taken by managers. Wisdom et al. have identified some conservation guidelines that might guide restoration away from current strongholds. Some of these are obvious, such as large expanses of sagebrush that are relatively close together and on publically owned lands, although proximity was not identified in their best model (yet the importance of corridors is supported by many other studies). The relatively novel suggestion that distance to cell towers (and transmission towers) merits further study. If for example, cell towers provide perches for raptors preying on young sage-grouse, there are steps to discourage such behaviors.

Chapter 20 (2009), Chapter 19 (2011):
GREATER SAGE-GROUSE AS AN UMBRELLA SPECIES FOR SHRUBLAND PASSERINE BIRDS: A MULTI-SCALE ASSESSMENT

Authors: Steven E. Hanser and Steven T. Knick

Abstract from Hanser and Knick:
"Working groups and government agencies are planning and conducting land actions in sagebrush (Artemisia spp.) habitats to benefit Greater Sage-Grouse (Centrocercus urophasianus) populations. Managers have adopted an umbrella concept, by creating habitat characteristics specific to sage-grouse requirements, in the belief that other wildlife species dependent on sagebrush will benefit. We tested the efficacy of this approach by first identifying the primary environmental gradients underlying sagebrush steppe bird communities (including Greater Sage-Grouse). We integrated field sampling for birds and vegetation with geographic information system (GIS) data to characterize 305 sites sampled throughout the current range of Greater Sage-Grouse in the Intermountain West, US. The primary environmental axis defining the bird community represented a gradient from local-scale Wyoming and basin big sagebrush (Artemisia tridentata ssp. wyomingensis and A. t. ssp. tridentata), and bare ground cover to local and regional grassland cover; the second axis represented a transition from low elevation Wyoming and basin big sagebrush and bare ground to mountain big sagebrush (A. t. ssp. vaseyana) and habitat edge. We identified the relative overlap of sage-grouse with 13 species of passerine birds along the multi-scale gradients and estimated the width of the umbrella when applying management guidelines specific to sage-grouse. Passerine birds associated with sagebrush steppe habitats had high levels of overlap with Greater Sage-Grouse along the multi-scale environmental gradients. However, the overlap of the umbrella was primarily a function of the broad range of sagebrush habitats used by sage-grouse. Management that focuses on creating a narrow set of plot-scale conditions will likely be less effective than restoration efforts that recognize landscape scale heterogeneity and multi-scale organization of habitats. These multi-scale efforts may improve some sage-grouse habitats and strengthen the management umbrella for shrub-steppe passerine birds."

Review of:
GREATER SAGE-GROUSE AS AN UMBRELLA SPECIES FOR SHRUBLAND PASSERINE BIRDS: A MULTI-SCALE ASSESSMENT

Review by: Dr. Robert M. Zink

Overview
The chapter by Hanser and Knick (hereafter HK) evaluates the potential benefit of managing sagebrush habitat for Greater Sage-Grouse (GRSG; *Centrocercus urophasianus*) to 13 species of birds that use sagebrush habitat to varying degrees. The conceptual basis is that of the "umbrella species", which has been defined (Groom et al. 2006) as: "A wide-ranging species whose requirements include those of many other species". Hence, such species act as an "umbrella." Thus, if one preserves as much habitat as possible for populations of an umbrella species, such as GRSG, it will have the ancillary or indirect effect of providing suitable habitat for many other species. Earlier assessments of GRSG as an umbrella species were not supportive. HK criticized these studies as having too coarse a resolution, and suggested that their analysis of multiple habitat levels showed that management of sagebrush for GRSG will have beneficial effects on 13 species of passerine birds, ranging from obligate sagebrush species (Brewer's Sparrow [*Spizella breweri*], Sage Sparrow [*Amphispiza belli*], and Sage Thrasher [*Oreoscoptes montanus*]) to ten other species that depend to lesser extents on sagebrush communities. Most of these 13 species have been listed in one or more states or regions, thus efforts to increase their populations would be helpful.

Critique
20.1) The idea, although logical in theory, is nonetheless hypothetical in practice. No one has as yet determined if there are higher populations of the other 13 species in areas with optimally managed habitat for GRSG. That is, do these 13 species have peak population performance in microhabitats that promote maximum GRSG population viability? Perhaps more appropriately, do these 13 species do better in restored GRSG habitat than in the current sagebrush communities? This information is presumably available and could be used to test this hypothesis. At a broader scale, HK point out that over 350 species (other animals and plants) are dependent to some degree on sagebrush habitats, not just the 13 birds they considered. They did not estimate whether the GRSG would be an effective umbrella for the other 95% of the species that use sagebrush environments.

20.2) HK studied a large number of plots (305) in five states in which they gathered data on the following habitat variables: % Low-black sagebrush, % Mountain big sagebrush, % Wyoming-basin big sagebrush, % Total sagebrush, Sagebrush height, %Grass, % Forb, % Total native grass and forb, % Exotic grass, % Bare ground, % Litter. Each of these was analyzed at the plot scale (180 x 180 m), 1 km and 5 km scales. They also recorded presence of birds, and the presence of GRSG droppings (pellets). These data sets are intensive, although it is not clear how valid an index of GRSG presence can be obtained from counts of pellets. Although HK say that they can remain for up to 3 years on a site, it is not clear how long one can obtain a valid estimate of the presence of GRSG after the pellets were deposited, nor what time of the year the pellets were cast. Densities

of the 13 species were not considered from the census data because it was not possible to convert GRSG pellet counts to density; hence, all birds were compared as either present or absent from a plot. It is not apparent whether the habitat or bird census data are publically available; it appears they are not.

20.3) Various analyses were performed on the habitat data at the different spatial scales. Computations were made that quantify similarity among habitat patches Shannon's diversity index was used to estimate landscape diversity. For the core of their analysis, HK performed a multivariate analysis of the habitat variables. This analysis, a canonical correspondence analysis (CCA), yields a linear combination of habitat variables that maximize the dispersion of species in multivariate space. The analysis identifies the relative contributions (or quantitative weights) of each of the variables to a set of axes (each of which is a linear combination of the variables). A high weight means that the variable contributes highly to the spread of points on the axes. Usually, only some variables contribute significant to explaining variation on a given axis, and that is interpreted in terms of those variables (e.g., plant species x height axis).

Of the 12 habitat variables, CCA I was most highly correlated with % grass cover, % of bare ground, and % Wyoming-basin big sagebrush; the remaining 9 variables were not deemed significant to explaining habitat variation among species. The coefficients for % of bare ground, and % Wyoming-basin big sagebrush were negative, meaning that less bare ground and Wyoming-basin big sagebrush, and more grass cover, were correlated with positive species' occurrences. It is possible to estimate both the amount of the total variance each axis explains. HK found that the first axis only "explained" 27% of the species-habitat relationship. In other words, 73% is explained by some unmeasured set of variables. The second axis was similar in explaining 24.8% of the species-habitat relationship, but was interpreted at the plot scale as a function of only the % Mountain big sagebrush, with no other variable being important. Although these are by no means atypical results, it indicates a high level of uncertainty in exactly what environmental factors limit distribution of GRSG, and the other species as well.

20.4) A CCA is only as good as the choice of included variables and their measurement. Although this is a standard type of analysis, it is a heuristic view of habitat associations, owing to the difficultly of including all of the habitat and environmental variables that describe where a species lives (and it ignores the wintering areas). Furthermore, the results are not discrete, but continuous. That is, they do not identify a discrete combination of characters that explain where a species lives (in ecological/environmental space), but identify a range of habitat characteristics that are correlated with species' occurrences. In this study, the species is represented as a centroid mean and a measure of dispersion equal to two standard deviations. Thus, there is a range of combinations of variables where species tend to occur, with lower densities likely at the ends of the species' environmental distributions. Looking at the figure (2) that summarizes this analysis, one sees that a continuous distribution of species on the axes. One needs to know how much the species overlap with GRSG on the habitat characteristics most important to them. A way to assess this is to determine, for the habitat variables measured, how much the species overlap in "habitat space."

20.5) From these data, the authors calculate overlap of each species habitat characteristics with the GRSG. These overlaps are judged subjectively as low (< 0.3), moderate (0.3 – 0.7) and high (0.7). They found that many of the 13 species overlapped in the multidimensional niche-space diagram. However, even a high value of overlap doesn't insure that GRSG is a good umbrella as it might exclude an important niche dimension for a particular species (e.g., nest sites), and does not indicate the species success during the migratory period or wintering grounds. Thus, it is unknown whether an increase in GRSG populations of say 10% or 20% would have a similar impact on the other species. It is very possible that many species listed as special concern suffer more from habitat degradation or other problems in migration or during winter. Also, at least three species do not share very high similarities with GRSG, suggesting that almost 25% of the species would not benefit from managing sagebrush habitats for GRSG.
Choice of 13 passerine species.

20.6) Two concerns relate to the species chosen. First, it is not clear why only species already in some peril were chosen. By suggesting that GRSG is an umbrella for these 13 species (actually only 10), one runs the risk of managing GRSG as an umbrella for these species while at the same time putting other, currently non-threatened species, in subsequent risk. Importantly, this could be not only birds, but mammals, plants, insects, or in short, any other organism. As HK note, there are up to 350 species that are associated with sagebrush environments. That is, what if focusing attention on the species chosen by HK brings populations of currently common species down to a point where they would be considered for listing. Hence, it does not make sense to limit the analysis to this set of species.

20.7) Secondly, it is unclear how "threatened" these species are. Are they only listed in states at the periphery of the species' range? If so, it is misleading to treat them all as "at risk". In Table 1, I used the same Breeding Bird Survey (BBS) data as those used by HK to determine the range-wide status of the species they studied. For every species listed as declining in the western U.S., the species is also declining range-wide. For example, Loggerhead Shrike is declining in the western U.S., as HK noted, but it is recognized to be in serious decline throughout its range. Thus, it is not just populations in sagebrush habitat that are experiencing declines, but all habitats. Of course, it might be that declining populations in sagebrush habitats drive the overall declining trends.

This suggestion is probably not the case. When one studies Table 1, it is apparent that 6 of the 13 species (or 14 if GRSG is counted) are not declining in the area surveyed by the Breeding Bird Survey (BBS; available free online). Of the obligate sagebrush species, those most likely to be positively influenced by managing sagebrush for GRSG, only 1 of 3 is declining significantly (Brewer's Sparrow). Also, there are three species that are not significantly declining in the western U.S. (Vesper Sparrow, Lark Sparrow, Savannah Sparrow) but they are declining range-wide; hence, they are apparently "doing worse" elsewhere than in sagebrush habitats.

A different approach?

20.8) The authors did not use GARP models to predict the distribution of GRSG, and then subsequently to predict the occurrence of the other species (Peterson 2001). That is, there is a large body of literature in which one uses environmental data, and then predicts the geographic distribution of the species by testing the predicted range with museum and sight records. If this can be done with efficiency, then one could use the GRSG information to predict the occurrence of other species. If GRSG is a good predictor of the other species, one would agree that it's a potentially valuable umbrella species. The correlative analysis done by HK suggests that this would probably not be the case.

Conclusions

1. This is an interesting analysis of the degree of habitat overlap, as measured by 13 variables, between GRSG and 13 other bird species.
2. There is little doubt that managing sagebrush habitat for GRSG will increase populations of GRSG.
3. It is not clear that GRSG can be an effective umbrella species for more than the three obligate sagebrush passerine birds studied. Even then, two of these are not in decline. It might be that habitat fragmentation is of a scale that is not detrimental to these other species, whereas it might be for GRSG.
4. Over 300 species use sagebrush habitats. Clearly it is unreasonable to ask HK to analyze all of these. Still, it is possible that using GRSG as an umbrella might cause unanticipated declines in other species, such as Green-tailed Towhee, Grasshopper Sparrow and Savannah Sparrow.
5. This analysis does not justify designation of GRSG as an umbrella species.

Table 1. Species studied in HK and their population status in breeding bird surveys range wide. BBS trends for Western NA and Status (an "X" indicates that the species is listed in at least one state or province) from HK. All columns are the same as in HK except the last column is added here for comparison of western NA and the entire ranged covered by the BBS.

Common	name	Scientific name		BBS Trend in Western NA	Status	BBS Trend Range-wide
Gray	Flycatcher	*Empidonax*	*wrightii*	4.61*	X	Positive*
Loggerhead	Shrike	*Lanius*	*ludovicianus*	-2.70***	X	Negative*
Horned	Lark	*Eremophila*	*alpestris*	-2.39***		Negative*
Sage	Thrasher	*Oreoscoptes*	*montanus*	ns	X	ns
Green-tailed	Towhee	*Pipilo*	*chlorurus*	ns	X	ns
Brewer's	Sparrow	*Spizella*	*breweri*	-2.01**	X	Negative*
Vesper	Sparrow	*Pooecetes*	*gramineus*	ns	X	Negative*
Lark	Sparrow	*Chondestes*	*grammacus*	ns		Negative*
Black-throated	Sparrow	*Amphispiza*	*bilineata*	-1.73***	X	Negative*
Sage	Sparrow	*Amphispiza*	*belli*	ns	X	ns
Savannah	Sparrow	*Passerculus*	*sandwichensis*	ns		Negative*
Grasshopper	Sparrow	*Ammodramus*	*savannarum*	-5.31***	X	Negative*
Western	Meadowlark	*Sturnella*	*neglecta*	-1.23***		Negative*

Chapter 21 (2009), Chapter 20 (2011):
ENERGY DEVELOPMENT AND GREATER SAGE-GROUSE

Authors: David E. Naugle, Kevin E. Doherty, Brett L. Walker, Matthew J. Holloran, and Holly E. Copeland

Abstract from Naugle et al.
"Rapidly expanding energy development in western North America poses a major new challenge for conservation of Greater Sage-Grouse (Centrocercus urophasianus). We reviewed the scientific literature documenting biological responses of sage-grouse to development, quantified changes in landscape features detrimental to sage-grouse that result from development, examined the potential for landscape-level expansion of energy development within sage-grouse range, and outlined recommended landscape-scale conservation strategies. Shrublands developed for energy production contained twice as many roads and power lines, and where ranching, energy development, and tillage agriculture coincided, human features were so dense that every 1 km^2 could be bounded by a road and bisected by a power line. Sage-grouse respond negatively to three different types of development and conventional densities of oil and gas wells far exceed the species' threshold of tolerance. These patterns were consistent among studies regardless of whether they examined lek dynamics or demographic rates of specific cohorts within populations. Severity of current and projected impacts indicates the need to shift from local to landscape conservation. The immediate need is for planning tools that overlay the best remaining areas for sage-grouse with the extent of current and anticipated development. This will allow stakeholders to consider a hierarchy of set-aside areas, lease consolidations, and more effective best-management practices as creative solutions to reduce losses. Multiple stressors including energy development must be managed collectively to maintain sage-grouse populations over time in priority landscapes.

Review of:
ENERGY DEVELOPMENT AND GREATER SAGE-GROUSE

Review by: Dr. Rob Roy Ramey II

This paper purports to provide:
1) *"the scientific literature documenting biological responses of sage-grouse to development,"*
2) *"quantified changes in landscape features detrimental to sage-grouse that result from development,"*
3) *"examined the potential for landscape-level expansion of energy development within sage-grouse range, and"*
4) *"outlined recommended landscape-scale conservation strategies"*

21.1) This is not an impartial review of the scientific literature. The authors examined 32 published papers, reports, management plans, and theses regarding biological responses of sage-grouse to energy development. The authors dismissed all but four peer-reviewed publications, one unpublished dissertation, one unpublished M.S. thesis, and a USGS report in their summary. This *"critical review"* is not impartial because the authors of Naugle et al. are also authors on four of the seven pieces of the literature reviewed. Studies not written by the authors of Naugle et al. were reinterpreted.

21.2) Notable, is one of the studies *not* written by Naugle et al. That study, (Aldridge and Boyce 2007) used empirical data to model both "sources" and "sinks" for nesting and brood-rearing habitat in southern Alberta, including an area of energy development. Aldridge and Boyce (2007) then produced a high-resolution map (with a 30 m pixel resolution and a 1km shifting frame) to identify non-habitat, nesting and brood-rearing habitats (priorities for protection), and key sink habitats *"which provide managers with the ideal opportunity to evaluate management alternatives aimed at increasing productivity through habitat management following an adaptive management framework."* Aldridge and Boyce (2007) also provided several key departures from the standard paradigm on sage grouse conservation: 1) the traditional focus on habitat protection around lek sites *"may not be suitable to ensure the viability of Sage-Grouse populations"*, 2) nest success was independent of anthropogenic features, and although birds tended to avoided human development, chick mortalities tended to occur in proximity to oil and gas developments and along riparian habitats, and 3) approximately 60% of the study area was low occurrence/noncritical habitat. All three are in contrast to the coarse mapping efforts of other authors used to recommend conservation priorities and policy: Doherty et al. (this issue), Copeland et al. (2009), and Naugle et al. (this issue).

Naugle et al.'s summary of Aldridge and Boyce (2007) did not mention these aspects but focused instead on sage grouse mortalities and avoidance/abandonment of habitat near oil and gas fields:

"In an endangered population in Alberta, Canada, where low chick survival (12%

to 56 days) limits population growth, risk of chick mortality in the Manyberries Oil Field was 1.5 times higher for each additional well site visible within 1 km of a brood location (Aldridge and Boyce 2007).

Negative responses of sage-grouse to energy development were consistent among studies regardless of whether they examined lek dynamics or demographic rates of specific cohorts within populations. Recent research demonstrated that sage-grouse populations declined when birds behaviorally avoid infrastructure in one or more seasons (Doherty et al. 2008), when cumulative impacts of development negatively affect reproduction or survival (Aldridge and Boyce 2007)

Avoidance of energy development reduces the distribution of sage-grouse and may result in population declines if density dependence, competition or displacement into poor-quality habitats lowers survival or reproduction among displaced birds (Holloran and Anderson 2005, Aldridge and Boyce 2007)."

21.3) Naugle et al. inaccurately represented results of the other peer review paper that they were not authors on (Lyon and Anderson 2003), in support of a statement that males and female grouse abandon leks due to *"noise and human activity associated with energy development."* While this seems like a logical finding of such a study, in fact Lyon and Anderson (2003) never mentioned abandonment. Instead, Lyon and Anderson (2003) reported that: *"Hens we captured on disturbed leks demonstrated greater movements from capture lek to nest than hens from undisturbed leks. Hens from disturbed leks nested approximately twice as far from capture leks as did hens from undisturbed leks."* Lyon and Anderson (2003) also reported that females tended to nest farther from roads *"due to light road traffic (1-12 vehicles per day) during breeding."* The primary impact of energy development was thought to be related to traffic and that additional traffic restrictions might be considered.

21.4) Four of the seven studies reviewed by Naugle et al. focused on impacts to sage grouse in Pinedale/Jonah Field area and two in Powder River Basin. Thus, these represent studies of *intensive* energy development and are not necessarily representative of less intensive energy development, development based on newer environmental regulations, or newer technologies.

21.5) The authors briefly mention mechanisms that *may* result in some of the avoidance behavior by sage grouse, however the primary focus is on "impacts". The paper is therefore lacking in analysis of understanding *why* grouse may avoid energy development or have lower survivorship adjacent to it, which is key to mitigating its effects.

21.6) Naugle et al. repeatedly refer to the need for "landscape level" or "landscape-scale" effects to sage grouse. However, the authors do not provide a definition of "landscape level" impacts and the need for "landscape-scale" conservation strategies. Although they use the term "landscape" 21 times in this paper, Naugle et al. never provide a definition for "landscape" in this context.

Examples are provided below:
"Severity of current and projected impacts [of energy development] *indicates the need to shift from local to landscape conservation."*

"Finally, we recommend a paradigm shift from local to landscape conservation and discuss the implications of this change."

"We quantified changes in landscape features detrimental to sage grouse that result from energy development."

21.7) Naugle et al.'s assertion that sage grouse are "landscape specialists," is both unsupported and left undefined, and appears to be a unique invention of the term by these authors. It could be argued that most species have a "landscape" requirement and thus, the term is meaningless.

Naugle et al. used the term as follows: *"sage-grouse are landscape specialists that require large and intact sagebrush habitats to maintain populations."*

Webster's dictionary defines "landscape specialist" quite differently from the author's apparent intended use: *a human grounds keeper*.

21.8) Much of Naugle et al.'s lengthy discussion is devoted to quantifying impacts or potential impacts of development on sage grouse based on correlative studies, and recommending policies based on those. What is lacking are testable hypotheses regarding *why* sage grouse may be impacted by various types and intensities of development. By focusing only on the pattern and not the process, Naugle et al. emphasize a research and regulatory approach that only focuses on large scale or "landscape level" conservation strategies. This ignores mitigation and enhancement opportunities at a local level that can be based on an understanding of *why* sage grouse avoid or do poorly in response to particular situations. In this regard, the paradigm offered by Aldridge and Boyce (2003), provides an attractive alternative.

Review of:
ENERGY DEVELOPMENT AND GREATER SAGE-GROUSE

Review by: Dr. Matthew A. Cronin

In this chapter the potential for energy (oil and gas) development to affect sage grouse is assessed. Relationships of sage grouse to energy development, tillage agriculture, and livestock ranching were also assessed. It is stressed that energy development in sage grouse range in the western states is increasing rapidly and this could impact sage grouse. It is noted that sage grouse have been extirpated from almost half of the original range. The authors used coal bed methane development in the Powder River Basin in northeast Wyoming as a case study to assess habitat changes detrimental to sage grouse. A case is made for a paradigm shift from local management to implementing "landscape conservation".

The primary impact of oil and gas development as described is disturbance of leks (i.e., breeding grounds). Disturbance can be from raptors perching on power lines, vehicle traffic, and noise and human activity. There also can be mortality from collisions with power lines and vehicles and predation by raptors. Man-made ponds may also support mosquitoes with West Nile virus.

First the authors assessed development in the Powder River basin. The authors used satellite imagery from 2003 to classify land cover for a 9,081 km^2area. Land uses were:

1. Ranch lands,
2. ranch lands with energy development,
3. ranch lands with tillage agriculture, and
4. ranch lands with energy development and tillage agriculture.

Gas wells, power lines, roads, ponds, and tilled agricultural land were identified on grids, and the density of these was considered as potentially affecting sage grouse. They found ranching was the most environmentally benign land use with fewer human features than the other land uses. The highest density of human features was where ranching, tillage agriculture and energy development co-occur and in these areas 70% of the land was within 100 meters of human features.

Next, the authors assessed the response of sage grouse to energy development by reviewing the literature, primarily seven scientific studies.
- These studies reported negative impacts of energy development on sage grouse.
- There were no reports of positive impacts.
- Development in excess of one pad/2.6 km^2 impacted breeding populations.
- Conventional pad densities of eight pads/2.6 km^2 exceeded sage grouse threshold of tolerance (presumably meaning abandonment of the area).
- Numbers of grouse in leks in gas fields declined by 82% from 2001-2005 and numbers outside the gas fields declined by 12%.

- By 2004-2005, 38% of the leks inside gas fields remained active and 84% of the leks outside gas fields remained active.

The BLM stipulation of no surface infrastructure within 0.4 km of a lek was assessed. Impacts to leks were discernable out to > 6 km and have led to "extirpation of leks within gas fields". This probably means abandonment of an area for breeding, that is, the birds probably moved to another location so extirpation may not be the appropriate term.
- Development "influenced" numbers of displaying males to 4.7 to 6.2 km from infrastructure.
- Models indicated a strong negative effect of energy development on lek persistence within 0.8 km or 3.2 km of a lek and showed negative impacts out to 6.4 km.
- These results were used to show that the BLM stipulation of 0.4 km distance of development from leks was insufficient to conserve breeding sage grouse populations in fully developed gas fields. A 0.4 km stipulation results in 98% of the landscape with infrastructure within 3.2 km of leks and would reduce the probability of lek persistence from 87% to 5%.

21.9) Negative impacts were found for leks and demographics of populations. Populations declined with avoidance of infrastructure or when cumulative impacts affect reproduction or survival. However, the authors note that avoidance of energy development reduces the distribution of sage grouse and **may** result in population declines if density, competition, or displacement to poor habitats reduces survival or reproduction.

It is not clear if the cited research documented population declines or simply speculated it could occur. It appears that displacement from leks has been shown, but its not clear if there are good data on population numbers (including simple relocation to other areas, as opposed to mortality and total failure to reproduce).

21.10) Areas other than leks were briefly discussed.
- Avoidance of winter habitats with energy development was cited.
- Nest sites were further from disturbed than undisturbed leks and nest initiation was lower for birds breeding on disturbed leks. In contrast, and perhaps in contradiction to these points, adult females remained in traditional nesting areas with development, but yearling females nested farther from haul roads and avoided infrastructure.

21.11) The authors note that sage grouse declines are partly explained by lower annual survival of females and this resulted in a population level decline. It is not clear if this is documented or suspected.

There is high site fidelity but low survival of adult sage grouse, and lek avoidance of young birds resulted in a lag of 3-4 years between the onset of development and lek loss.

21.12) The literature cited in this chapter needs thorough review and reanalysis. The authors contend that the scientific evidence shows that energy development is impacting sage grouse populations, though the exact mechanisms are not certain. However, the

disturbance from leks is presented as definitive so the uncertainty needs to be better explained.

21.13) The authors note that the efficacy of mitigation methods need testing. Mitigation methods such as burying power lines, minimizing roads and pads, minimizing vehicle traffic and noise, and managing produced water were mentioned. It was stated that rigorous testing is needed to know if these or other methods will allow sage grouse to persist in developed areas. This seems like the critical point, and other issues are secondary to simple development of low impact development scenarios.

21.14) It is noted that translocations and reintroductions of sage grouse are rarely successful so population level impacts are a major concern. This seems to be a problem for the wildlife biologists to solve, not accept.

21.15) The authors then describe current and future energy development in sage grouse ranges and state there is increased risk of further decline of sage grouse distribution and abundance and call for a "fundamental shift from local to landscape conservation". In doing so they ignore their call for research on mitigation measures which is the obvious need for effective multiple use management. There is no definition of "landscape" but it seems to indicate range-wide planning.

21.16) The authors discuss "Conservation Implications. This actually refers to management implications. Conservation (of sage grouse in this case) is but one management objective.

21.17) There was considerable uncertainty of the overall impacts of energy development on sage grouse, particularly with regard to the potential for enhanced mitigation measures to minimize displacement from leks and impacts on nesting and survival. However, the authors state: *"Severity of impacts and continued leasing… dictate the need to shift from local to landscape conservation."* This is not particularly meaningful. Local management is clearly needed to ensure effective mitigation and can allow local populations to be maintained. "Landscape" seems to refer to the status of the species over large ranges. This should be part of the basic state management and cooperation among states for common species.

21.18) It is stated that federal and state government and industries need to implement solutions at a large scale. They suggest that one approach is to forego development in priority landscapes until new best management practices are implemented. This is reasonable. However, Connelly et al. (2000) note that mining and oil and gas development can have negative impacts on sage grouse but that populations can recover after the development ceased. This critical point is that both temporal and spatial management are needed. Development with subsequent restoration of areas with oil and gas resources can occur over time to maintain populations over the range of the species. Coupled with development of effective mitigation to minimize impacts close to development, this approach would allow achieving multiple objectives without excluding development from large areas.

21.19) Additional factors (climate change, habitat loss, range management, disease) are mentioned that may affect sage grouse. The potential impact of sport hunting and predation are not discussed in this chapter. Hunting will incur mortality and disturbance and fear of humans. This may contribute significantly to disturbance from energy developments if the birds are afraid of humans with whom they associate danger.

21.20) The treatment of "conservation implications" implies the entire species is somehow at risk, when the review so far has only documented some (potentially manageable) local impacts. It is an effort to coordinate management of sage grouse across the western U.S., which in itself is not a bad idea. The problem is this has created the impression the species is at risk of large scale declines and endangerment. There is no supporting evidence of this in this chapter. The numbers of sage grouse in various states and local areas needs tabulation before this landscape perspective is practicable. I would assume each state already has knowledge of their sage grouse populations.

21.21) The authors note that restoration programs in areas already developed could re-establish populations. This is a good idea and related to the development of effective mitigation methods.

21.22) It's not clear how much of the sage grouse habitat is likely to be anywhere near development. The maps are very large scale, with dots representing gas wells. Dots are not to scale so it's not clear what the actual distribution of wells and sage grouse habitat looks like. A detailed atlas of sage grouse populations and oil and gas development is needed to properly assess these issues.

21.23) The issue is very similar to that with caribou in the North Slope Alaska oilfields. Some local disturbance/displacement impacts were suspected. Then they are assumed to be definitive, and speculated to have population level impacts. These perceptions persist despite evidence the local disturbances on caribou can be effectively mitigated and the population has grown dramatically (from 5000 to 67000) since the oil fields were developed. It is important to note that there is no hunting in the oil fields, which may contribute to their habituation to human activity. Comparative assessments with other species and other energy developments can provide insights to help plan sage grouse management.

Chapter 22 (2009), Chapter 21 (2011):
ENERGY DEVELOPMENT AND CONSERVATION TRADEOFFS: SYSTEMATIC PLANNING FOR GREATER SAGE-GROUSE IN THEIR EASTERN RANGE

Authors: Kevin E. Doherty, David E. Naugle, Holly Copeland, Amy Pocewicz, and Joseph Kiesecker

Abstract from Doherty et al.
" We developed a framework for conservation planning to evaluate options for reducing development impacts on Greater Sage-Grouse (Centrocercus urophasianus) in Wyoming, Montana, Colorado, Utah, and North and South Dakota that contained some of the largest populations and highest risk of energy development. We used lek-count data (N = 2,336 leks) to delineate high abundance population centers which we termed core regions, that contained 25, 50, 75, and 100% of the known breeding population. We assessed vulnerability of these areas by examining risk of future land transforming uses from energy development. Sagegrouse abundance varies by state, core regions contain a disproportionately large segment of the breeding population, and cores regions vary dramatically by risk of future energy development. Wyoming contains 64% of the known sage-grouse population and more active leks than all the other states combined within our study area. Conservation success in Wyoming will depend on leasing and permitting policy decisions because this state has the highest risk of development. Montana contains fewer sage-grouse (24%) than Wyoming, but actions that that reduce sagebrush (Artemisia spp.) tillage by providing private landowners incentives to maintain sagebrush-dominated landscapes would provide lasting benefits because core regions in Montana are at comparatively low development risk. Habitat restoration in areas with low risk of development but containing fewer sage-grouse fit into the overall conservation strategy by targeting populations that promote connectivity of core regions. This vulnerability assessment illustrates the tradeoffs between conservation and energy development, and provides a framework for maintaining populations across the species' eastern range."

Review of:
ENERGY DEVELOPMENT AND CONSERVATION TRADEOFFS: SYSTEMATIC PLANNING FOR GREATER SAGE-GROUSE IN THEIR EASTERN RANGE

Review by: Dr. Rob Roy Ramey II

22.1) Doherty et al. combined data on projected oil and gas development with potential wind development to produce a new category, "energy development," for sage grouse vulnerability assessment and conservation planning. While projected oil and gas development were based on *actual* well data or lease sales that overlap sage grouse core areas, wind development was based on undeveloped and unleased commercial wind *potential*. While the basic approach of mapping areas of key conservation importance and development to avoid conflict was first introduced in the 1960's by McHarg (1969) and widely applied since, there are serious issues with this methodological approach presented here.

> **First, by combining two very different types of data into a single category of "energy development", the authors confound the effects of the two different types of development on sage grouse. This ignores differences in their level and type(s) of impact, and negates the authors' intention of using this information for planning purposes.**
>
> **Second, the effect of combining two different types of data, one that is based on current and known future development (oil and gas well and leases) with speculative information based only on wind potential, introduces unnecessary and unmeasurable error into their analysis. Thus, their results, based in large measure on speculation, are unreliable, especially as a basis for informed policy decisions.**
>
> **Third, the 1km^2 grid size used is very crude and over estimates the scale of impacts. Data at much finer resolution are readily available and are the industry standard for habitat analyses.**

22.2) An unbiased approach would involve analysis the two types of development separately, then overlay their projected impacts to sage grouse in a common unit that reflects each development's impact(s) to sage grouse. If the common unit was expressed in terms of habitat quality or probability of sage grouse use, then mapping would show degree of effect: from 100% habitat loss, to zones where avoidance is expected, and where restoration efforts have *increased* useable habitat. Instead, the authors equate "risk" with permanent loss of areas surrounding potential development.

22.3) The authors present an approach that assumes all impacts are created equal, regardless of whether they are from oil and gas, or wind development. This one-size-

fits-all approach grossly overestimates loss of sage grouse within areas of potential development. Furthermore, while some impacts from oil and gas to sage grouse have been quantified, there are no studies documenting impact of wind energy development to sage grouse.

22.4) The authors ranked all 1km grid cells within 6.4km of leks to delineate their importance without consideration of whether the entire area was of equal importance. These delineations were made without regard for the fact that the errors (standard deviations) associated with estimates of average distance to nearest lek and the lek counts were nearly as large as the estimates themselves (Table 1). (Under this approach, the area around each lek encompasses approximately156km^2 (depending upon where a lek was in a cell) because all cells within 6.4km of a lek receive the same ranking. By comparison, the area of a circle drawn around a lek would be128.7km^2 or ~28km^2 less). The approach used in this paper has the effect of overestimating impacts in some areas while underestimating impacts in other areas.

22.5) A measured approach that makes use of best available information would incorporate current development, physiographic features, and vegetation into an analysis to more accurately portray landscape potential for sage grouse. Failure to incorporate readily available information on essential sage grouse habitat elements as well as areas that are permanently unavailable, limits its accuracy and utility of this "risk assessment" and its use for policy decisions.

22.6) A 1km^2 grid size for land use does not constitute best available information. A 1km^2 grid is a crude spatial resolution for planning assessments and overestimates areas of potential conflict, a shortcoming not acknowledged by the authors. A 1km^2 resolution does not constitute best available information and is over 33 times larger than the 30m grid size used by the 2001 National Land Cover Data (NLCD 2001, http://www.epa.gov/mrlc/nlcd-2001.html). The 30m grid size has long been in use to develop qualitative models for endangered species critical habitat because it is the resolution of many digital elevation models (e.g. Turner et al. 2004). Some conservation GAP analyses use data with a resolution of 10m. While data resolution may limit analyses in some regions, a more focused evaluation of sage grouse core areas that utilizes a more informative grid size (e.g. industry standards of 90, 30, or 10 m) would be a more appropriate basis for policy decisions and conservation measures than that offered in this paper.

22.7) There is a need for a measured approach to mapping the different types of energy development along with sage grouse, a key issue in sage-grouse conservation. However, the author's implicit assumption that oil and gas development always results in sage grouse population declines appears to be based on an evaluation of the effects of past practices and does not reflect current realities (e.g. new BLM requirements, a slow down of leasing) or future technologies (e.g. lower impact extraction methods).

22.8) As with other papers in this monograph, the authors did not consider hunting

to be a factor controlling sage grouse populations.

22.9) The discussion section of this paper includes an extensive set of policy recommendations for decision makers that are based less on the results of the study than on a political point of view and self-importance. This detracts from the results of the study and gives the appearance of advocacy dressed up as science. Examples are presented below:

> *"The unprecedented leasing of the public mineral estate dictate the need for a shift from piecemeal to landscape-scale conservation."*
>
> *"Successful planning must embrace the social and political realities of the region. Our analysis is both sufficiently broad in scale to allow a relevant examination of the necessary tradeoffs and, by assessing the potential impacts of energy development, we bring recognition of the political reality of energy development in the West."*
>
> *"Analyses reported here provide a framework for planning across political boundaries and a currency for measuring the success of its implementation."*
>
> *"Our analyses will enable policy makers to consider a portfolio of set-aside areas, priority conservation areas, lease consolidations, and more stringent spatially-based best management practices as creative solutions to balance energy development with sage-grouse conservation."*

22.10) Audubon's retiring CEO recently declared this pre-publication paper as the basis of new policy and successfully headed off an ESA listing. The lead author of this article is employed by Audubon.
http://www.audubonmagazine.org/audubonview/audubonview1001.html

22.11) The term "mitigation" does not appear anywhere in this paper although it would seem to be of some importance to sage grouse conservation.

Review of:
ENERGY DEVELOPMENT AND CONSERVATION TRADEOFFS: SYSTEMATIC PLANNING FOR GREATER SAGE-GROUSE IN THEIR EASTERN RANGE

Review by: Dr. Matthew A. Cronin

In this chapter the potential for energy (oil, gas, and wind power) development to affect sage grouse is assessed. Relationships of sage grouse and energy development were assessed by mapping sage grouse lek distributions and potential energy development across the eastern part of the sage grouse range (Wyoming, Montana, Colorado, Utah, North Dakota, South Dakota, and Idaho). The goal was to address three questions:

1. Where are landscapes with the highest biological value for sage grouse?
2. How do these landscapes differ with respect to risk from future energy development?
3. How does variation and juxtaposition in risk and biological values of areas affect the potential to develop a successful conservation strategy for sage grouse?

The types of energy development considered included oil, gas, and wind power. Areas with sage grouse populations (some were designated "core areas") and areas of potential energy development were mapped, and risk of impacts assumed where there was overlap. These analyses addressed the first two questions, although it was not a thorough analysis and at such a large scale it was of limited utility. The third question was not clearly addressed other than the apparent assumption that development would lead to loss of populations and the need to plan energy development considering this.

The results were described by state. Wyoming has the most sage grouse and most energy development, followed by Montana, and Colorado. It was stated that "Risk of energy development to sage grouse core regions" increase with biological value across the entire species' eastern range. This is especially the case for oil and gas, and less for wind power. Oil and gas pose the greatest risk in Colorado and Utah, and wind power poses the greatest risk in Montana and the Dakotas. Both oil and gas and wind power pose the highest risk in Wyoming.

22.12) Three strategies are suggested to ensure persistence of sage grouse.

1. Policy changes in areas of high biological value and high risk of energy development to manage leasing and permitting of oil and gas development on federal lands and to proactively site wind developments.
2. Rapid implementation of conservation to enhance populations in high value biological areas that don't have energy potential.
3. Restoration of fringe habitats and low density areas with limited risk from energy to promote connectivity.

The second and third strategies make sense and are general, but self evident. Regarding the first strategy (high value areas with high risk of development), several ideas are presented. It is claimed that:

"The future of sage grouse conservation is in question in the eastern range in part because 44% of the lands that the federal government has authority to control for oil and gas development (7 million of 16 million ha) has been authorized for exploration and development."

It's not clear how this questions the future of sage grouse (the proposed development is less than half of the range and it does not seem reasonable to assume that development will cause complete loss of local sage grouse populations where it occurs).

22.13) The authors also note that lease sales are continuing despite concerns (without citation) that no policy is in place for risk assessments at the scale at which impacts occur. However, they don't describe current policies or what scale they are talking about. Impacts can occur from the individual bird to subpopulations of a larger population.

22.14) Doherty et al. also say that the severity of impacts and unprecedented leasing dictate the need for a *"shift from piecemeal to landscape scale conservation"*. This is questionable and vague. All practical management will be at the local level, and can be applied over geography to achieve a large scale objective. Instead of shifting from local to landscape scales, they really want to add a large geographic scale to complement and integrate with local management. This is ok, but one scale won't replace the other.

22.15) With regard to wind energy, the authors suggest there is an urgent need for policies that promote landscape scale considerations. They note that much of the wind energy will be developed on private lands, particularly in Montana and the Dakotas. They suggest that private lands with "high value sage grouse habitat" could be considered for conservation easements to limit surface development. They note the high cost of easements and profitability of wind energy (without citations) require broader strategies to minimize wind development footprints. They do not describe what such strategies would be.

22.16) The authors note that 17% of the eastern sage grouse range has high biological value and low risk of energy development and these should be maintained, especially where they are next to areas of development. They say this is critical to ensure genetic connectivity and re-colonization after development is completed (apparently assuming development results in complete loss of sage grouse).

22.17) They note other potential "stressors" in these habitats such as tillage (farming), residential development, and invasive plants. They note the large amounts of private property in Montana and Utah as potential areas of ranching and rural residences (as with wind development) and suggest they are good places for incentives such as the Conservation Reserve Program (CRP). It is encouraging to see recognition of incentives

for private property owners as a good way to proceed. The same rationale should be extended to private energy lease holders on public lands.

22.18) Areas of low biological value and low energy potential (19% of the eastern range) are identified as important for connectivity of populations to core areas in Montana and fringe areas in the Dakotas, Montana, and Canada are in need of aggressive habitat restoration programs. They suggest restoring currently farmed lands to sagebrush dominated grasslands. Assuming farmed land is private, this is a questionable assumption without consideration of land owners' preferences and economic impacts from such changes.

22.19) The authors conclude by saying that *"Conservation concerns related to sage grouse will remain at the forefront until collaborative landscape planning and conservation are demonstrated."* This seems to ignore existing cooperative management groups (e.g. the Montana sage grouse work group).

22.20) They also state that their analyses provide a framework for planning and a currency for measuring success. It's not clear what their "currency" is, other than identifying good habitat and trying to protect it.

22.21) The basic premise of this chapter is that management planning is needed across Wyoming, Montana, Colorado, Utah, North Dakota, and South Dakota. It's not clear that it is needed, but seems to be the authors' personal preference. I think there's an unwritten assumption that the species is endangered with extinction (it is being considered for Endangered Species Act listing) so planning at the species level is needed. This may be so (although with more than 50% of the native habitat intact it seems unlikely), but it is not adequately justified or documented.

22.22) The title and text suggest the chapter is going to assess "tradeoffs" between conservation and energy development. However, there is no real description of tradeoffs. To deal with this issue one would assess economics, property rights, employment, and the states' and country's energy needs in light of managing sage grouse. The chapter simply claims unavoidable impacts of energy development and that a "landscape" approach is needed. An effective assessment of tradeoffs would include co-authorship by representatives of the energy industries and landowners.

22.23) The chapter does not acknowledge that mitigation and local management is the key to managing sage grouse and energy development. Instead it calls for landscape policy for sage grouse, coupled with the tacit assumption of loss of populations with development. In my opinion, this probably indicates the authors' (unstated) goals of excluding development from large areas.

22.24) The paper also doesn't acknowledge that the States have management authority for wildlife. The call for regional "landscape" policies need to be tempered with this foundational Constitutional tenet.

22.25) With regard to the mapping analysis of the chapter, it's not clear how much of the sage grouse habitat is likely to be near development. The maps are very large scale, covering several states, with dots representing gas wells. Dots are not to scale so it's not clear what the actual distribution of wells and sage grouse habitat looks like. A detailed atlas of sage grouse populations and oil and gas development is needed to properly assess these issues.

22.26) A very important issue is the current state of sage grouse populations and energy development. The authors of this chapter made no effort to determine if current development coincided with populations and if they were compatible. The issue of hunting is also important in this regard. It is possible that un-hunted sage grouse populations would habituate to human activity and noise better than hunted populations.

22.27) The use of the term "conservation" in this chapter and others indicates the mentality that the sage grouse needs to be conserved. It actually needs to be managed, and in my opinion "management" should replace the term "conservation".

22.28) This chapter lacks acknowledgment that sage grouse and energy development could be compatible with proper mitigation and restoration. Connelly et al. (2000) note that mining and oil and gas development can have negative impacts on sage grouse but that populations can recover after the development ceased. This critical point suggests that the authors are calling for only half of the proper management equation. Doherty et al. are calling for *spatial* "landscape management". Both *temporal* and *spatial* management are needed. Development with subsequent restoration of areas with oil and gas resources can occur over time to maintain populations over the range of the species. Coupled with development of effective mitigation to minimize impacts close to development, this approach would allow achieving multiple objectives without excluding development from large areas.

Chapter 23 (2009), Chapter 22 (2011):
RESPONSE OF GREATER SAGE-GROUSE TO THE CONSERVATION RESERVE PROGRAM IN WASHINGTON STATE

Authors: Michael A. Schroeder and W. Matthew Vander Haegen

Abstract from Schroeder and Vander-Haegen:
"We examined the relationship between the Conservation Reserve Program (CRP) lands and Greater Sage-Grouse (Centrocercus urophasianus) in Washington state including an assessment of population change, nest-site selection, and general habitat use. We monitored nest site selection of 89 female sage-grouse between 1992 and 1997 with the aid of radiotelemetry. The proportion of nests in CRP lands significantly increased from 31% in 1992–1994 to 50% in 1995–1997, although more nests were detected in shrubsteppe (59 vs. 41% of 202 nests). The increase appeared to be associated with maturation of CRP fields, which were characterized by increased cover of perennial grass and big sagebrush (Artemisia tridentata). Nest success was similar (P = 0.38) for nests placed in the two cover types (45% in CRP and 39% in shrubsteppe). Counts of fecal pellets indicated that sage-grouse selected areas with greater sagebrush cover, especially in relatively new CRP in a shrubsteppe landscape. Analysis of male lek attendance, prior to implementation of CRP (1970-1988) illustrated similar rates of declines in two separate populations of sage-grouse in north-central and south-central Washington. Data from 1992–2007 following establishment of the CRP revealed a slight reversal of the population decline in northcentral Washington while the south-central population continued a long-term decline (~ 17% vs. 2% of the occupied areas were in the CRP, respectively). These results indicate that lands enrolled in the CRP can have a positive impact on Greater Sage-Grouse, especially if they include big sagebrush and are focused in landscapes with substantial extant shrubsteppe. The CRP for sage-grouse and other sage-dependent species should be considered a long-term investment because of the time required for sagebrush plants to develop."

Review of:
RESPONSE OF GREATER SAGE-GROUSE TO THE CONSERVATION RESERVE PROGRAM IN WASHINGTON STATE

Review by: Dr. Rob Roy Ramey II

This paper analyzes sage grouse populations prior to converting cropland to sagebrush, and after conversion of cropland to sagebrush, through the Conservation Reserve Program in Washington State. There was not an obvious direct increase in grouse populations following conversion - one population increased 19% while the other population decreased 56% - however the gist is that if cropland near existing sage steppe is converted back to sagebrush, sage grouse will nest there. Former cropland that is not near existing sage steppe may not attract sage grouse because there is not enough existing natural habitat nearby.

Logistic regression was used to quantify differences in occupied vs. unoccupied land used by sage grouse in the Conservation Reserve Program. The maturation of shrubs on CRP lands was important factor in sage grouse utilization, which indicates the need for a long-tern investment in this conservation strategy.

Chapter 24 (2009), Chapter 23 (2011):
RESTORING AND REHABILITATING SAGEBRUSH HABITATS

Author: David A. Pyke

Abstract by Pyke:
"Less than half of the original habitat of the Greater Sage-Grouse (Centrocercus urophasianus) currently exists. Some has been permanently lost to farms and urban areas, but the remaining varies in condition from high quality to no longer adequate. Restoration of sagebrush (Artemisia spp.) grassland ecosystems may be possible for resilient lands. However, Greater Sage-Grouse require a wide variety of habitats over large areas to complete their life cycle. Effective restoration will require a regional approach for prioritizing and identifying appropriate options across the landscape. A landscape triage method is recommended for prioritizing lands for restoration. Spatial models can indicate where to protect and connect intact quality habitat with other similar habitat via restoration. The ecological site concept of land classification is recommended for characterizing potential habitat across the region along with their accompanying state and transition models of plant community dynamics. These models assist in identifying if passive, management-based or active, vegetation manipulation-based restoration might accomplish the goals of improved Greater Sage-Grouse habitat. A series of guidelines help formulate questions that managers might consider when developing restoration plans: (1) site prioritization through a landscape triage, (2) soil verification and the implications of soil features on plant establishment success, (3) a comparison of the existing plant community to the potential for the site using ecological site descriptions, (4) a determination of the current successional status of the site using state and transition models to aid in predicting if passive or active restoration is necessary, and (5) implementation of a post-treatment monitoring to evaluate restoration effectiveness and post-treatment management implications to restoration success."

Review by: Dr. Rob Roy Ramey II

This paper provides a useful review of information on sagebrush restoration and is a practical "how to" guide for restoration strategies. It is the most immediately useful paper in the monograph to sage grouse conservation and mitigation.

Chapter 25 (2009), Chapter 24 (2011):
CONSERVATION OF GREATER SAGE-GROUSE: A SYNTHESIS OF CURRENT TRENDS AND FUTURE MANAGEMENT

Authors: J. W. Connelly, S. T. Knick, C. E. Braun, W. L. Baker, E. A. Beever, T. Christiansen, K. E. Doherty, E. O. Garton, C. A. Hagen, S. E. Hanser, D. H. Johnson, M. Leu, R. F. Miller, D. E. Naugle, S. J. Oyler-McCance, D. A. Pyke, K. P. Reese, M. A. Schroeder, S. J. Stiver, B. L. Walker, and M. J. Wisdom

Abstract from Connelly et al.:
"Recent analyses of Greater Sage-Grouse (Centrocercus urophasianus) populations indicate substantial declines in many areas but with relatively stable populations in other portions of the species' range. Sagebrush (Artemisia spp.) habitats necessary to support sage-grouse are being burned by large wildfires, invaded by nonnative plants, and developed for energy resources (gas, oil, and wind). Management on public lands, which contain 70% of sagebrush habitats, has changed over the last 30 yr from large sagebrush control projects directed at enhancing livestock grazing to a greater emphasis on projects that often attempt to improve or restore ecological integrity. Nevertheless, the mandate to manage public lands to provide traditional consumptive uses as well as recreation and wilderness values is not likely to change in the near future. Consequently, demand and use of resources contained in sagebrush landscapes plus the associated infrastructure to support increasing human populations in the western United States will continue to challenge efforts to conserve Greater Sage-Grouse. The continued widespread distribution of sage-grouse, albeit at very low densities in some areas, coupled with large areas of important sagebrush habitat that are relatively unaffected by the human footprint, suggest that Greater Sage-Grouse populations may be able to persist into the future. We summarize the status of sage-grouse populations and habitats, provide a synthesis of major threats and challenges to conservation of sage-grouse, and suggest a roadmap to attaining conservation goals."

Review of:
CONSERVATION OF GREATER SAGE-GROUSE: A SYNTHESIS OF CURRENT TRENDS AND FUTURE MANAGEMENT

Review by: Dr. Rob Roy Ramey II

This chapter provides a convenient summary of the results, discussion, and recommendations of previous chapters, as well as other cited studies. As a result, it is one of the most important chapters to read in its entirety. The authors also lay out a *"Roadmap To Conservation"* that is likely to become the basis of a recovery plan, critical habitat designation, and biological opinions.

Fifteen major threats to sage grouse identified by the authors and other studies are identified in Table 1. There are obvious differences in opinion regarding the primary threats, although energy development, drought, and wildfire were most frequently cited. The problem with the categories used is that they are too coarse and combine effects from multiple factors (i.e. energy includes oil and gas as well as wind; urbanization includes roads, powerlines, and traditional development).

25.1) The authors make a number of strong statements that are clearly aimed at influencing policy:

"Severity of impacts (Holloran 2005, Aldridge and Boyce 2007, Walker et al. 2007) and extensive leasing of the public mineral estate suggest a need for landscape-scale conservation. Lease sales continue despite concerns because no policy is in place that would permit an environmental assessment of risk at the scale at which impacts occur."

"Aggressive habitat protection and restoration programs may be necessary to maintain the biological integrity of fringe populations in North Dakota, South Dakota, northern Montana, and Canada."

The following suggestion appears to make sense until one realizes that *"immediately implemented"* can mean severe restrictions on other productive land uses (e.g. agriculture) *"Areas of high biological value combined with low energy potential represent regions where conservation actions can be immediately implemented (Doherty et al., this volume)."*

25.2) Lacking from this and other chapters in this monograph is a comprehensive treatment of how individual states or the private sector have contributed to sage grouse conservation. The only mention is the study of sage grouse response to the Conservation Reserve Program in Washington State in Chapter 23.

25.3) The authors believe that direct predation management is ineffective and recommend that habitat manipulations be used instead. Additional research on predator dynamics is also proposed. There is no discussion of research into how to

make predator management (lethal and non-lethal) *more effective* in populations of sage grouse that are in decline or at risk of extirpation. For example, testing and refinement of mitigation measures designed to actually reduce predation (e.g. installing anti-perch devices on towers, power poles, and fence posts) would be relatively straightforward and easy to achieve as compared to large-scale habitat manipulations.

The authors' stated views on predator management:

> *"Because of these considerations, predator management for sage-grouse has generally been accomplished most efficiently by manipulating habitat rather than by predator removal to enhance populations (Schroeder and Baydack 2001). For future sage grouse conservation efforts we recommend quantifying predator communities as they relate to demographic rates and habitat variables so the predator-cover complex as it pertains to sage-grouse life history can be better understood on how species that prey on sage-grouse respond to anthropogenic changes."*

25.4) The authors propose using a "before-after control-impact design" for proposed projects in sage grouse range. This will spawn a cash cow for researchers and consultants.

> *"For proposed projects that occupy spatially discrete as opposed to dispersed areas, a before-after control-impact design (BACI) may provide the most powerful statistical approach. To assess population effects, we recommend that BACI include marking sage grouse at each impact and control site(s). Required sample sizes of marked birds will vary depending on size and extent of the grouse population being considered questions being asked, and the marking technology employed. We recommend capturing and marking birds in a manner that allows sampling of the entire project area, focusing on leks most proximate to the proposed impact site(s). We also recommend marking additional female grouse in an 18-km buffer zone to characterize the migratory status of the population, but this sample will not allow evaluation of avoidance behavior. Because of the effect of lag periods on population response, at least 3 yr pre- and 4 yr postconstruction may be required at a minimum, as well as the year of construction to fully assess project effects on grouse populations. Given the lifespan of sage-grouse, strong fidelity to breeding areas, and lag-effects in population dynamics some longer term (8–12 yr) less intensive monitoring will be necessary to fully assess impacts."*

It is important to realize the costs associated with such a monitoring effort. The cost of such a monitoring study for a monitoring project could easily exceed $150,000 per year, per project. This makes the proposed monitoring a cash cow for researchers and consultants (especially those who have contributed to this monograph) with little in return for sage grouse conservation or the project proponent.

25.5) The authors explain away hunting as a cause for concern and do not suggest any additional study, regardless of the fact that the level of hunting in 2007 removed approximately 9% of the adult population, and this level of harvest occurs annually:

> *"Hunting has also been identified as a management concern for sage-grouse populations (Connelly et al. 2003; Reese and Connelly, this volume). Nine of 11 states with sage grouse presently have hunting seasons for this species. Sage grouse normally experience high survival over winter (Wik 2002, Hausleitner 2003, Beck et al. 2006, Battazo 2007), thus mortality from hunter harvest in September and October may not be totally compensatory. Nevertheless, harvest mortality is low on most populations of sage grouse, and no studies have demonstrated that hunting is a primary cause reducing populations (Reese and Connelly, this volume)."*

As noted in the review of Chapter 16:
Garton et al. estimated 88,816* male grouse in 2007 or a total population size of 310,856 (using their assumption of 2.5 adult females per male to obtain total population). That was the count in the spring while leks were active. However, in the fall of 2007, a total of 28,180 sage grouse were harvested, or 9 percent of the estimated population number of this species. And in four of the six pervious years, the take was even higher (up to 37,607 in 2006). To date, there has not been a field-verified study of maximum sustainable yield applied to this species and this intensity of harvest. The state of the science does not provide an empirical basis that is solid enough to forecast the future of sage grouse with any degree of accuracy, especially when known sources of mortality are not included.

25.6) The authors' proposed monitoring and mitigation strategy does not explicitly provide for thresholds to be set in advance, and therefore cannot provide an objective assessment of results. Simply put, the approach advocated by the authors leaves results open to subjective interpretation and bias. The authors suggest here, and elsewhere in this monograph, that monitoring and planning be "*carefully*" conducted and implemented. However, the authors never describe what *"careful"* means in this context. Nor do they describe how monitoring or management prescriptions would be deemed successful or not:

> *"Well planned and carefully implemented monitoring and assessment will allow an objective evaluation of conservation measures over varying temporal and spatial frames. It will also provide an unbiased assessment of impacts that can be used to guide appropriate mitigation efforts."*

> *"Energy development and other anthropogenic change represent substantial challenges to protecting existing habitat, and will require development and implementation of broad-scale and long-term conservation plans (Stiver et al. 2006; Stiver, this volume) that are carefully developed using the best available data."*

Similarly, the authors recommend, *"statistically sound sampling designs"* but say nothing about how those will be used in any sort of objective problem analysis or hypothesis testing framework. Because other papers in this monograph had relied on interpretation of results and inductive reasoning, it is reasonable to conclude that the same can be

expected from these authors in the future. The absence of hypothesis testing in this chapter, as well as other chapters in this monograph, indicates a lack of basic epistemology.

25.7) In contrast to the approach recommended by the authors of this monograph, the most effective means to ensure an unbiased analysis of results is to utilize an adaptive management approach. A scientific approach to adaptive management requires that threats and management actions be treated as potentially falsifiable hypotheses (Popper 1963), rather than certain knowledge. If the presumed threats to a population are ranked in order of importance (based on plausible cause and effect mechanisms, or available data on mortalities and recruitment), then even hypothetical threats can be prioritized and subsequently investigated in a scientific manner. Priorities may be revised as some hypotheses are rejected when new information becomes available.
Alternative management actions that have been designed to address a specific threat may be treated as alternative hypotheses and their effectiveness tested against quantitative thresholds. These can be laid out in a series of “if - then” statements in the adaptive management plan. This same strategy can be used to set “triggers” for additional or alternative management actions.

In all cases, if the thresholds for rejecting hypotheses or triggering management actions are set in advance of data collection, then an objective and scientifically defensible evaluation of the evidence is possible. Such a scientific approach to adaptive management increases the likelihood that the allocation of conservation effort will go towards providing the greatest benefit; in this case, contributing to the recovery of the sage grouse populations at multiple locations. A list of adaptive management actions, their priority, and the value to the sage grouse populations could be quickly developed based on available information.

In order to prioritize Adaptive Management actions and the areas where they will be conducted, the evaluation of sage grouse habitat is needed. While the studies presented in this monograph could be used, they could also be substantially improved upon to develop a composite ranking of sage grouse habitat, including identification of areas of non-habitat. It could be used to identify specific areas where habitat enhancements could have the greatest benefit to sage grouse. The habitat evaluation would also identify areas where physical and/or biological constraints impose limitations on the potential for sage grouse occupancy.

Other key components of an adaptive management approach include expected outcomes from implementation, measures of success, and an operational management plan.
It is more than an oversight that adaptive management is not mentioned anywhere in the 25 chapters of the sage grouse monograph.

Review of:
CONSERVATION OF GREATER SAGE-GROUSE: A SYNTHESIS OF CURRENT TRENDS AND FUTURE MANAGEMENT

Review by: (This reviewer wishes to remain anonymous.)

25.8) This chapter summarizes data indicating a continuing decline in the sage grouse over much of its range. It also lists a great variety of known and suspected threats causing this decline. However, the analyses of which threats are most important in the sage grouse declines are mostly unquantitative, and leave something to be desired. In effect the authors attempt to come to conclusions about the relative importance of various threats by taking a vote of the opinions of people who have been on various panels (dominated by themselves) who have been asked to evaluate the decline of the species. This may be good politics, but it is not necessarily good science. There appears to be a general absence of data allowing rigorous evaluation of the relative importance of various threats for any particular area. Especially questionable is the fact that the authors present data on a number of panels of opinions (Table 1) as if they might be independent judgements, when in fact the authors themselves were involved in the operation of all four panels, with the senior author a conspicuous co-author on three of the panels. Membership on three additional panels (Table 2) is not specified, but one wonders whether the authors of this chapter may have been involved with these panels as well. My own experience with bureaucratic panels on other species is that they are often misguided concerning the reality of limiting factors, depending on the field experience and biases of personnel involved and the quality of data available on the species in question.

25.9) The authors seem to have accepted an underlying assumption that the primary stresses on the species must be habitat related, hence the emphasis on maintenance and improvement of sagebrush habitats. However, while correlation of population declines with habitat degradation may well exist, this does not prove causality between these factors as many other stresses tend to go along with habitat degradation and may be more important, but relatively unacknowleged, causes of difficulty. Rigorous experimental tests of the importance of various factors appear to be largely missing.

25.10) I am especially puzzled by the way the authors treat the potential stresses of hunting and grazing – two threats that might reasonably be very important but often pose political problems in correcting. With both of these threats, the authors claim that data do not exist to show the clear detrimental effects of these practices. Yet with respect to hunting, they acknowledge that where populations are continuing to decline, there could be a need to adjust levels of hunting, implying a recognition of detrimental effects. They do not say there could be a need to cease hunting of such populations. However, a failure to cease hunting of declining populations places the burden of reversing declines on improving other potential stress factors which may be of lesser importance and may be much more difficult to identify and correct.

I would argue that for continuously declining populations there is no persuasive justification for hunting activities, as any additional mortality over natural mortality should be conservatively assumed to exacerbate difficulties. Hunting activities should cease in order to determine whether elimination of such pressure might be enough to reverse the declines. If a cessation of hunting results in populations increasing, then limited low levels of hunting could be reinstituted, depending on how close populations might be to a healthy level. If not, hunting should remain in abeyance until population recoveries are achieved by whatever means may be appropriate.

25.11) It is also surprising that, with the exception of one study on the impacts of horses on sage grouse habitat, no studies are presented that compare various sage grouse populations under grazing pressure from domestic livestock with those that are not. It would be especially interesting to compare sage grouse populations that are associated with native herbivores, such as bison and pronghorn, with those associated with cattle or sheep. No discussion of such comparisons or the values of such comparisons is presented, yet such studies could have profound importance in achieving optimal management of the species.

25.12) The authors' use of the term “carrying capacity” seems unclear on page 15 of the paper. Quite reasonably, many sage grouse populations may be far below carrying capacity because of stress factors unrelated to resources such as food, cover, nest sites, etc. How carrying capacity is defined and established is not explained in this summary although it may be clearer in Garton et al., which I have not seen. Carrying capacity is usually very difficult to pin down in any rigorous way, because of a lack of critical information on limiting factors.

25.13) As a general review, this summary does not take us much beyond a catalogue of known and potential threats to sage grouse populations, and a presentation of a number of actions that might help declining populations to some largely unspecified extent. There is no urgent call for the sort of research that could establish the true impacts of stresses such as grazing, or studies that could establish clearly whether the species is a true specialist on sagebrush incapable of persisting in any other habitat types. The distribution of early records of the species in many regions east of the sagebrush dominated zone in early times (see Schroeder et al. paper) leaves this question unresolved.

Mapping Oil and Gas Development Potential in the US Intermountain West and Estimating Impacts to Species

Citation:
Copeland, H.E., K.E. Doherty, D.E. Naugle, A. Pocewicz, J.M. Kiesecker (2009) Mapping Oil and Gas Development Potential in the US Intermountain West and Estimating Impacts to Species. *PLoS ONE* 4(10).

Abstract from Copeland et al.:
"Background: Many studies have quantified the indirect effect of hydrocarbon-based economies on climate change and biodiversity, concluding that a significant proportion of species will be threatened with extinction. However, few studies have measured the direct effect of new energy production infrastructure on species persistence."

"Methodology/Principal Findings: We propose a systematic way to forecast patterns of future energy development and calculate impacts to species using spatially-explicit predictive modeling techniques to estimate oil and gas potential and create development build-out scenarios by seeding the landscape with oil and gas wells based on underlying potential. We illustrate our approach for the greater sage-grouse (Centrocercus urophasianus) in the western US and translate the buildout scenarios into estimated impacts on sage-grouse. We project that future oil and gas development will cause a 7–19 percent decline from 2007 sage-grouse lek population counts and impact 3.7 million ha of sagebrush shrublands and 1.1 million ha of grasslands in the study area."

"Conclusions/Significance: Maps of where oil and gas development is anticipated in the US Intermountain West can be used by decision-makers intent on minimizing impacts to sage-grouse. This analysis also provides a general framework for using predictive models and build-out scenarios to anticipate impacts to species. These predictive models and build-out scenarios allow tradeoffs to be considered between species conservation and energy development prior to implementation."

Review of Copeland et al. (2009):
Mapping Oil and Gas Development Potential in the US Intermountain West and Estimating Impacts to Species

Review by: Dr. Rob Roy Ramey II

This paper used predictive modeling to map potential impact of oil and gas development on existing sage grouse core areas. When magnified, a perusal of Figure 1 suggests that there is far less certainty with its predictive powers that the authors acknowledge. The reasons are identified below.

Methods

C09.1) "Random forests" is a classification method that uses decision tree algorithms for sorting observations into categories, as well as predictive modeling and data mining. Widespread application of this approach is relatively new, although some of the algorithms have been around for decades. It differs from classic vector-based statistical methods such as discriminant analysis and (nonparametric) multivariate adaptive regression splines, and reportedly performs better in many cases. The "random forests" method has seen use in medical and ecological fields although several authors have recently pointed out limitations. The most serious involve cases when the predictor variables differ widely in scale or classification, and when there are an excessive number of variables being used (Strobl et al. 2007; Siroky 2009). As a relatively new technique, the potential and limitations of "random forests" are still being explored, as well as its implementation by various software packages. The authors do not present any examples of "random forests" having been previously applied to predicting subsurface geology or oil and gas deposits. It is a method who's performance is unknown and untested for this application.

C09.2) The authors claim that: *"We measured the impacts of the build-out scenarios on populations of greater sage-grouse (Centrocercus urophasianus)"* however, what they actually did was estimate *potential* impact to sage grouse habitat.

C09.3) The authors make the following assumption without supporting data: *"Where reasonable foreseeable development projections were unavailable, we calculated resource area estimates by doubling the number of wells permitted from 1996–2007 within a resource area."*

C09.4) It is questionable whether the analytical method of *"seeding the landscape with oil and gas wells according to the underlying development potential"* is an accurate approximation of how oil and gas fields have been developed. No supporting information are provided by the authors. Under a random placement scenario, estimated impacts to the landscape using this method would be greater because development would not build on existing infrastructure (e.g. roads) and leasing tracts, resulting in a higher level of habitat fragmentation.

C09.5) While the analysis methods appear novel, there is a lack of detail in describing how the parameters for each variable were quantified or categorized (e.g. the variable "geology"). It is also unexplained what amount of error was introduced into the analysis by using 1:5,000,000 scale bedrock geology maps to define the author's 1km^2 cell surface model. Application of such a crude map to such a small pixel size could be expected to result in overestimates of oil and gas potential, and therefore impacts.

C09.6) The authors predict *"a 7 percent population decline in the anticipated scenario and 19 percent population decline in the unrestrained scenario compared to 2007 lek population counts."* It is important to remember that this is a hypothetical build-out scenario based on the "random forests" method to predict underlying oil and gas potential (rather than actual oil and gas deposits). The model could be improved is actual data on oil and gas deposits were incorporated. This may be difficult because of the propriety nature of some data on oil and gas deposits.

It is not stated how the authors arrived at the population decline numbers or what the range of uncertainty is with these estimates. Readers are referred to Tables 1 and 2 in Doherty's unpublished dissertation (Doherty 2008). Greater detail on how these population level impacts were calculated is needed, as well as a review of Doherty's (2008) methods.

Doherty (2008) reported, *"Potential impacts were indiscernible at 1-12 wells within 32.2 km2 of a lek (~1 well / 1 mi2), a threshold of development compatible with conservation. Above this threshold land managers can expect to see rate of lek inactivity double at 13-39 wells and jump to > 5 times (40-100 wells) that outside of widespread development in northeast Wyoming."* Clearly, intense development has a measurable impact on sage grouse but the question remains: *Do the yearling grouse that are displaced from developed areas move into unaffected habitat and successfully reproduce?* If so, then the population-level impact would be less than predicted by Doherty (2008). If not and if grouse from unaffected areas disperse into developed areas, the population impact could be greater (a population sink).

Another unanswered question is the extent to which on-site or off site mitigation could benefit sage grouse populations. For example, Doherty (2008) made the following suggestion: *"Post-hoc analyses of 17 leks showed that clustering wells to provide open areas for nesting may increase opportunities for restoration by keeping a few small but active leks inside intensely developed landscapes."* The effects of this and other mitigation needs to be accounted for in a measured analysis of predicted impacts.

C09.7) The authors assert: *"These declines* [of sage grouse] *are in addition to the estimated range-wide population declines of 45–80 percent that have already occurred."* While it is well known that sagebrush was persecuted by a wide variety of methods up until the mid-1980s , there has always been a great deal of uncertainty regarding population number and extent of decline. All of the papers dealing with that topic have relied on the same flawed methodology: male lek count data. Consequently, there is greater uncertainty with the estimates of decline than acknowledged by the authors. A

more comprehensive treatment of the limitations of this technique and issues surrounding data collection and analysis are included in the review of Chapter 16.

C09.8) Despite assurances that the methods and results are sound, patterns emerge that suggest otherwise. Most notably, the locations of oil and gas wells in Figure 1 do not correspond well with the predicted oil and gas potential.

A) The supposed accuracy of the model is misrepresented by the following statement of the authors because it only describes the percentage of producing wells within the total predicted oil and gas deposits, rather than the area of their predicted oil and gas deposits that has producing wells or leases. *"We found that 81 percent of wells producing during 1986–2007 were in areas the validation model predicted for development, which suggests that our model accurately predicts where new wells would be placed up to 20 years into the future (Fig. 1C)."* The problem with the prediction accuracy of the model can clearly be seen by zooming on in Figure 1. First, there are large areas that the authors' model classified as having medium to high potential for oil and gas but those areas do not have any wells currently. And second, there are numerous areas with dense collections of wells that appear to be classified as having low (zero) potential. A closer approximation would be about 50% accurate. (One would assume that the oil and gas companies would have already identified and placed wells on most areas of high potential.)

B) Figure 2 shows the overlap in the authors' predicted oil and gas reserves to sage grouse leks. The locations of existing wells are not included on this map. In order to quantify the correspondence between the model and the actual oil and gas resources that have been identified to date, it would have made sense to have included existing wells on the map in Figure 2.

C09.9) There are numerous simplifying assumptions used to develop the model and these are not specified.
The analysis presented in the paper falls short in that it does not fully explore the benefits of advancements in extraction technology. While the authors acknowledge that predictions *"could be inaccurate if there are significant new advancements in extraction technology,"* the authors make no allowances for it except to say: *"Forecasted impacts to sage-grouse populations could be revised lower if directional drilling to reduce well pad density at the surface became more commonplace."*

New technologies already include horizontal drilling and methods to increase production from existing wells. The constantly evolving nature of this technology can be expected to reduce the scale of landscape level impacts in the future. Therefore, both of the scenarios presented by the authors represent over estimates with respect to the density of wells and hence, the total area impacted. This oversight would be expected to have an effect on the market value of future proposed lease swaps and buy backs. It could also foreclose options for energy extraction.

C09.10) Recently released policies by the BLM on energy development in sage grouse core areas are intended to consolidate disturbances to sage grouse (BLM Memorandum No. WY-2010-012 and WY-2010-013 dated December 29, 2009). For example, one of these policies includes the proposal: *"to not exceed one energy production location and/or transmission structure per 640 acres* [one square mile]. *The one location and cumulative value of existing disturbances in the area will not exceed 5 percent of sagebrush habitat within those same 640 acres."* Such a spatial restriction would have the effect of reducing the overall acreage of potential impact, although the actual impact would depend upon how far potential disturbance to grouse extend beyond the developed area (due to avoidance, low survivorship, or increased predation). To further avoid disturbance, the BLM has also proposed seasonal restrictions intended to reduce impacts to sage grouse during the breeding season.

C09.11) The authors present the analysis with a build-out scenario of 20 years and an unrestrained buildout scenario. From a practical point of view, the latter scenario could take over one hundred years. A prolonged build-out might reduce the extent of impacts because some wells would have gone out of production in that time period and opening up habitat to sage grouse occupation. It is unrealistic to expect that a build-out scenario would be achieved in a short time frame such as that proposed by the authors.

C09.12) The analyses used in this paper implicitly assume a permanent adverse impact, as if each 1km block would be withdrawn from sage grouse range in perpetuity. Any realistic build out scenario must account for the fact that production wells are not permanent. They all have a finite life span determined by the hydrocarbon resources they tap. The mean longevity of a typical producing individual oil and gas well in this region is likely in the 30-year range.

C09.13) The authors propose that implementation of their approach is a cost effective alternative to an Endangered Species Act listing of the sage grouse. Based on my 29 years of experience working with the Endangered Species Act, that assessment is not disputable. However, the methods proposed and results obtained should only be considered preliminary. The assumptions and models used in this paper could be refined to provide a more reliable prediction and could them be of greater utility to inform decision makers.

C09.14) Competing interests were not acknowledged by the authors.
The paper provides a rationale for promoting land conservation lease swaps and buy backs to benefit sage grouse populations in areas of overlap with potential oil and gas development. Three of the five authors list affiliations with The Nature Conservancy (TNC), including the lead author. The hallmark conservation strategies of TNC are land purchases and land swaps, so this is a natural extension of those strategies, as applied to lands of conservation interest with oil and gas resources. As part of its conservation program, TNC has recently implemented *"Energy by Design"* which is promoted on its website.* The webpage features the TNC authors of this paper, their "*complex modeling program",* its application to mitigation of a large gas field, and subsequent purchase a 1,000+ acre conservation offset. While this effort is certainly laudable, the authors should

have declared a *competing interest* as per the journal's competing interest policy. The author's declaration of *no competing interest* appears to be in conflict with the following facts: 1) TNC partnered with the fastest growing energy company in the region to implement *Energy by Design*, 2) one of the TNC Board of Directors is also a member of an executive committee for the partnering energy company, 3) the TNC listed that energy company as a donor in 2009, 4) as shown on the TNC website, there are abundant financial opportunities (employment and grants) using this model for application to sage grouse, and 5) a $100,000 contract was recently awarded by the BLM to the Audubon (Doherty's affiliation) to do additional mapping of sage grouse and energy development. It is unknown whether partnerships with TNC provide a competitive advantage to companies seeking regulatory approvals.
*http://www.nature.org/wherewework/northamerica/states/wyoming/misc/art26566.html

C09.15) The authors promote application of their analytical methods to other conservation issues, however, this would be premature given that this method is simply an inadequately tested prototype. For reasons detailed previously, this approach would need substantially more refinement, quantification of classification error, and field validation prior to its intended application. For the same reasons, extension of this method to other resources, and especially to 'cumulative effects analysis', would not be prudent at this time, despite the author's enthusiastic promotion: *"the framework we present could be modified to consider not just one type of energy development, in this case oil and gas, but also wind, solar, coal, oil shale and uranium, along with other stressors such as residential development, invasive species, and pathogens. Because many of these stressors do not correlate spatially, this approach would account for cumulative impacts. Models and maps of multiple future threats are needed to fully quantify the future risk to biodiversity."*

Despite the methodological shortcomings of this paper, the U.S. Fish and Wildlife Service has gone on record stating that *"It's a good report, and the information in it will definitely be considered in any final decision we make on the bird's status."* Please visit following links for more information:
http://www.eenews.net/public/Landletter/2009/10/22/1
http://www.audubon.org/newswire/Newswire_V7N11.html

Review of Copeland et al. (2009):
Mapping Oil and Gas Development Potential in the US Intermountain West and Estimating Impacts to Species

Review by: Dr. Vernon C. Bleich

Predictive modeling techniques have been used for many years to project changes in landcover resulting from urban development, predict habitat suitability for particular species, or examine effects of habitat alteration on habitat quality for various species. Similar techniques have not yet been used to make inferences about the impacts of anticipated energy development on wildlife. In this article, the authors took the approach of estimating the affects of future energy production infrastructure on species persistence, with an emphasis on impacts to Greater Sage-Grouse (*Centrocercus urophasianus*). They attempted to model future oil and gas build-out scenarios at two levels: (1) that which is reasonably anticipated to occur and based on Bureau of Land Management (BLM) projections for the next 20 years, and (2) an unconstrained scenario, in which the highest quintile of oil and gas potential would be expected to occur, in part because past BLM projections have been conservative. As appropriate, the authors excluded from those two scenarios those areas from which oil and gas development currently is prohibited (e.g., national parks, wilderness areas).

The authors used Random Forests (a non-parametric method with which I am not familiar) to develop a model that was used to predict potential oil and gas resources, and that was based on a series of six largely geological parameters known to be associated with those resources. Accuracy of the overall model was approximately 83%; the authors further tested the model's ability to predict future development using data from 1900-1986, and then tested the resulting model with well data from 1986-2007, reporting that 81% of wells producing during 1986-2007 were in areas their validation model predicted for development. The authors then concluded that the model would be useful in predicting locations of new wells over the next 20 years, given current extraction technologies.

Anticipated impacts to Greater Sage-Grouse were based on losses in abundance and occurrence of populations only in Wyoming, but extrapolated to other areas inhabited by sage-grouse. Timing of responses of leks to development were based on data collected over 11 years and compared to control leks not exposed to oil or gas development. Using these data, the authors predicted a decline of 7% in 2007 lek population counts in the anticipated build-out scenario, and up to 19% with unrestrained build-out. These declines are in addition to declines that already have occurred. Habitat impacts will be incurred over 2.3 million ha in the anticipated buildout, and 5.5 million ha in the unrestrained buildout, the majority of which will be sagebrush habitat in both scenarios.

C09.16) In predicting anticipated declines in sage grouse, a period of only 11 years was used to examine responses in altered versus control locations. While it is possible that other impacts to populations (e.g., harvest, predation, and grazing rates) remained constant during that short period, the potential impacts of weather did not appear to be

accounted for (and that short period likely lacked the variance in weather conditions necessary to examine the role of that variable in population persistence). Additionally, the assumptions of consistency in harvest, predation, and grazing did not appear to be substantiated. Further, proximity of impacted areas to non-impacted areas inhabited by sage-grouse could have been a meaningful consideration in assessing impacts, but there was no way of knowing if that variable played a role in population persistence. Moreover, range-wide impacts were extrapolated across a huge geographic area from responses developed only in Wyoming. Despite these shortcomings, the authors have produced a potentially useful predictive model that has implications for decreasing the severity of future impacts to sage-grouse and other sagebrush obligates.

C09.17) Application of the model (which appears to perform well) could be useful in avoiding the listing of Greater Sage-Grouse as an endangered taxon by the U.S. Fish and Wildlife Service. For example, a substantial portion (~15%) of the area included in this modeling exercise has high potential for oil or gas development, but development rights have not yet been sold. BLM could withdraw those areas from sale, or establish special mitigation measures within such areas. Another potential solution would be to establish constraints on land uses within such areas. Additionally, the model could be useful in creating a system analogous to the Natural Community Conservation Program, in which project proponents agree to set aside development rights on certain properties in order to ensure future access to others. Options for lease holders to sell back development rights could also be pursued, but I suspect the likelihood of such occurring is slight; there will be a continuing, and intensifying demand for oil and gas extraction well into the future. Application of the model could be useful in encouraging the energy extraction industry to develop or apply more advanced extraction techniques that result in less surface disturbance in certain areas. Finally, the model might be used to determine which areas inhabited by sage-grouse are most apt to be impacted and, if appropriate, grouse in some geographic areas might be listed as threatened or endangered population segments, rather than listing the taxon as a whole.

C09.18) In summary, the technique proposed by Copeland et al. (2009) appears useful in predicting anticipated oil and gas development under two scenarios, but could be further improved if additional predictive variables are incorporated to assess impacts to sage-grouse. Weaknesses of assessing impacts to sage grouse include the application of localized responses (i.e., Wyoming only), the assumption that other factors (e.g., hunting, grazing, and predation rates are constant across the range of the species), and the apparent absence of the potential of climatological effects to impact localized grouse populations. Additionally, caution should be used when extrapolating results obtained from one area to a vastly broader area. Nevertheless, the potential for decreasing some impacts to sage-grouse (and other sagebrush obligates) is enhanced if agency personnel, oil and gas companies, and other involved parties make use of this information when planning or implementing resource extraction activities. Further, similar models would appear to have application to other types of energy development, including solar and wind, that have the potential for landscape-level habitat alteration, but are less far along in planning and development on the public lands than are oil and gas extraction. Finally, application of this model, or similar models, could be useful in identifying localized geographic areas

in which sage-grouse or habitat occupied by sage-grouse may benefit from the constraints and additional project scrutiny associated with listing, while minimizing benefits (and constraints) that would be associated with listing the taxon in its entirety.

Schroeder et al. (2004):
DISTRIBUTION OF SAGE-GROUSE IN NORTH AMERICA

Citation:
Schroeder, M.A., Aldridge, C.L., Apa, A.D., Bohne, J.R., Braun, C.E., Bunnell, S.D., Connelly, J.W., Deibert, P.A., Gardner, S.C., Hilliard, M.A., Kobriger, G.D., McCarthy, C.W., McCarthy, J.J., Mitchell, D.L., Rickerson, E.V., Stiver, S.J. (2004) Distribution of sage-grouse in North America. *Condor* 106:363–373.

Abstract from Schroeder et al (2004):
"We revised distribution maps of potential presettlement habitat and current populations for Greater Sage-Grouse (Centrocercus urophasianus) and Gunnison Sage- Grouse (C. minimus) in North America. The revised map of potential presettlement habitat included some areas omitted from previously published maps such as the San Luis Valley of Colorado and Jackson area of Wyoming. Areas excluded from the revised maps were those dominated by barren, alpine, and forest habitats. The resulting presettlement distribution of potential habitat for Greater Sage-Grouse encompassed 1 200 483 km^2. with the species' current range 668 412 km^2. The distribution of potential Gunnison Sage-Grouse habitat encompassed 46 521 km^2, with the current range 4787 km^2. The dramatic differences between the potential presettlement and current distributions appear related to habitat alter- ation and degradation, including the adverse effects of cultivation, fragmentation, reduction of sagebrush and native herbaceous cover, development, introduction and expansion."

Review of Schroeder et al. (2004):
DISTRIBUTION OF SAGE-GROUSE IN NORTH AMERICA

Review by: Dr. Rob Roy Ramey II

This paper estimates the potential habitat of sage grouse from the time of pre-European settlement in North America to the present. The authors define their pre-settlement baseline as *"the period prior to1800"*. The authors utilize historic distribution maps, museum records, published accounts, Kuchler's potential natural vegetation maps, and other information to define potential pre-settlement habitat. The criteria by which this information was used in developing the pre-settlement potential habitat map was not well explained and was subjective. The definition of historic habitat is based on circular reasoning as locations outside of sagebrush habitat were excluded from consideration. Recent information (e.g. location data from states) and edits by state biologists were used to produce the map of current distribution. The authors report that the pre-settlement (pre-1800) potential habitat for greater sage-grouse encompassed 1,200,483 km^2, and that the current range is 668,412 km^2, a 56% reduction. The distribution of potential Gunnison sage grouse habitat was estimated to be 46,521 km^2, with a current range of 4,787 km^2, a 90% reduction. This paper is widely cited. While there are few issues with the current distribution map, the basis of the pre-settlement potential habitat map (and habitat loss estimates derived from it) is questionable.

S04.1) The authors use pre-1800 as their "pre-settlement potential habitat" baseline. However, there are several invalid assumptions not acknowledged by the authors that accompany use of this as a historic baseline.

First, the author's pre-settlement potential habitat (pre-1800) falls within a period extending from approximately 1400 to 1850 that was known as the *Little Ice Age*, a period of cold, arid climate (0.5-0.9°C lower then present). Thus, climatic conditions and vegetation at that time differed substantially from what would occur today even without human influences (i.e. Kuchler's potential vegetation). This problem is further exacerbated by the fact that the years surrounding 1800 correspond to one of the three temperature minimums during the Little Ice Age (Tausch et al. 1994; Peterson 2002; Yu et al. 2002). The pollen record, published in numerous studies, clearly shows that the distribution of sagebrush and other vegetation fluctuated with climate during the Holocene, and that rising temperatures and precipitation *since* the Little Ice Age (past 150 years) have resulted in changing conditions for sagebrush (e.g. upslope range expansion in some areas and invasion by juniper in others) (Miller and Wigland 1994). Therefore, a comparison between pre-1800 potential habitat and presently occupied habitat confounds the effects of natural climate change with changes that occurred as a result of post-1800 settlement.

Second, the author's simplistic application of Kuchler's potential natural vegetation (Kuchler 1966, 1985) to predict sagebrush habitat during a period of colder climate (the Little Ice Age) produces erroneous results. PNV classifications are based on

hypothetical ‘climax’ vegetation that could potentially occupy a site without disturbance or climatic change based on current conditions (Zerbe, 1998). According the Kuchler (1964) PNV is *"the vegetation that would exist today if human beings were removed from the scene and if the resulting plant succession were telescoped into a single moment."* Thus, Kuchler's PNV was never intended to extend to historic climate.

Third, Kuchler's (1964, 1985) PNV classifications are qualitative, generalized descriptions of vegetation communities. These do not take into account the mosaic nature of natural landscapes, including successional stages, nor do they accurately characterize physiographic features or soil type (Aminian et al. 1998). Any of these would alter predictions if incorporated into PNV models. The limitations with Kuchler's PNV have been known for decades (Harris 1965): *"From the geographer's point of view, however, the major weakness of this new map* [Kuchler 1964] *is that the vegetation units it portrays are theoretical entities of unequal validity: some established with near certainty, others dependent on informed guesswork. It is not a map of the vegetation of the United States as it existed in 1964, nor of the vegetation in pre-European times (as was Shantz and Zon's map by implication), nor yet of the pre-aboriginal 'natural' vegetation. Instead it is a summary of prevalent opinion as to the likely ecological status of many different types of American vegetation."* More recently, correspondence problems between PNV and actual vegetation have led some authors to rethink its application to real world problems (Wright et al. 1998; Zerbe 1998). Even when comparing actual vegetation with PNV over a limited area, the correspondence between the two is poor (Chen et al. 2008). Although Kuchler's PNV may be a useful heuristic tool for some applications, it is neither realistic in its assumptions nor a reliable predictive tool.

S04.2) The effect of Native Americans (prior to 1800) on sage grouse and their habitat is not acknowledged by the authors. New evidence reveals that North and South America were inhabited by an estimated 40 and 112 million people prior to European contact (Mann 2005). While the population density of Native Americans was concentrated in temperate regions, and had clearly declined as a result of introduced diseases prior to 1800, archeological evidence shows that these aboriginal people affected sage grouse in two ways. First, as noted by Schroeder et al. (2004) and others, sage grouse were hunted by Native Americans. And second, range fires were set by Native Americans to improve edible forage and game (Agee 1993), which also affected plant succession (Miller and Wigland 1994). Thus, the pre-1800 pre-settlement period selected by Schroeder et al. (2004) was not without human impacts to sage grouse.

S04.3) The are discrepancies between the published paper and the metadata description as to what "pre-settlement" means. For example, Schroeder et al. (2004) state: *"Consequently, we used the term "pre-settlement" to define the period prior to 1800, before rapid settlement by people of European descent."* However, the metadata associated with the GIS overlays for this paper defined pre-settlement as later than 1800**:** *"The 'pre-settlement' reference time generally refers to the early 1800's, when Europeans generally settled in western North America, even though settlement may have occurred*

much earlier in some locations." Metadata may be found here: *http://metadata.nbii.gov/clearinghouse/send/xsltText2;jsessionid=8337ED5924570D61F5840454B0C3FF79?fileURL=http%3A%2F%2Fmercury.ornl.gov%2Fmetadata%2Fnbii%2Fhtml%2Fwsgc%2Fwa-node.gis.washington.edu_waf_uw_dfw_na_sage_historic.html&full_datasource=Washington+State+Geospatial+Clearinghouse+Node&full_queryString=+(+title+%3A+Pre-settlement+distribution+of+potential+habitat+Greater+of+Sage-Grouse+and+Gunnison+Sage-Grouse+in+North+America+-+NA_Sage_Historic+)&ds_id=*

S04.4) The methods used by Schroeder et al. (2004) to define the pre-settlement distribution of potential habitat were poorly defined. It is unclear as to how historical accounts were quantified and incorporated into the mapping data, and use of some data appears to be subjective. Such issues raise the question of reproducibility. For example, the author's note that they *"considered 1,167 records of museum specimens"* and were *"cautious in our interpretations because of potential inaccuracies in recorded locations and the ability of individual sage grouse to travel long distances."* This led the authors to 166 records being rejected. The authors also considered *"138 published observations"* but do not explain how those were specifically used.

Additionally, observations outside the current sage grouse distribution were treated differently, from those within the current range: *"Because many published observations and museum specimens were poorly documented, we primarily considered these data in terms of their generalities."* The meaning of "generalities" is not explained by the authors.

The following excerpts are from the meta-data description accompanying data files associated with this paper. I have underlined relevant passages:

> *"The pre-settlement distribution is extremely difficult to document due to a paucity of information. Consequently sources like the journal of Meriwether Lewis and William Clark were used, which described the 1803-1806 expeditions from the Saint Louis, Missouri area to the west coast of Oregon and back (transcribed by Moulton (1986-1997; Volumes 2-11)). Swainson and Richardson (1831) was one of the few contempory publications that provided information about the early distribution of sage-grouse. Additional summaries on the historic distribution were also considered including McClanahan (1940) and Aldrich and Duvall (1955). The extent of the presettement ranges were also modified with the aid of maps of original habitats (Kuchler 1964). References on habitat distribution were evaluated relative to specific information on habitat use (Schroeder et al. 1999, Connelly et al. 2000). <u>The source information gathered on the historical range was reviewed, interpreted, synthesized, and then transcribed by Dr. Schroeder onto 1:2,000,000 scale U.S. Geological Survey Map</u>s. The polygonal data on the U.S. Geological Survey maps was then digitized and attributed, using ARCINFO software, to create a working draft coverage of*

sage-grouse distribution for North America.

"Use_Constraints:
This data was compiled at a scale of 1:2,000,000. Data should only be used for general display, mapping, and planning purposes at scales of 1:2,000,000 or smaller. Extreme care was taken during compilation of these boundaries to ensure accuracy. However, Washington State Department of Fish and Wildlife (WDFW) had to rely on outside sources of information when compiling these data, and therefore cannot accept any responsibility or liability for errors and/or omissions in the use of these data. WDFW provides no warranties to accompany this data".

"Completeness_Report:
Given the scale (1:2,000,000) the data is obviously highly generalized. For more specific information about an individual state or province it would be best to contact the natural resource managment agency responsible for managing the Sage-grouse in that jurisdiction. The accuracy varies from state to state depending on the knowledge of the biologists involved."

Distribution_Liability:
The Washington Department of Fish and Wildlife (WDFW) makes no guarantee concerning the data's content, accuracy, completeness, or the results obtained from the queries or use of these data. WDFW makes no warranty of fitness for a particular purpose, no representation as to the quality of any data, and assumes no liability for the data represented here. These data do not represent exhaustive inventories, but are compilations of existing knowledge from WDFW staff that are updated periodically as knowledge improves. These data should be used cautiously because they are not exhaustive, and are subject to change. When conducting projects or planning for fish or wildlife, please consider using additional information gathered from other spatial sources and consultations with WDFW staff."

Reproducibility is essential to scientific inquiry. However, the pre-settlement distribution map of Schroeder et al. is not reproducible because of poorly defined methodology and subjective use of information. If potential habitat maps are to be used as the basis of policy, it needs to be based on a repeatable methodology.

S04.5) The authors considered 1,167 museum specimen records and 138 published observations in compiling their pre-settlement potential habitat map, however it appears that all (or virtually all) records and observations occur *after* 1800. The earliest records cited were from the Lewis and Clark expedition that took place from 1803 to 1806. The next was Swainson and Richardson in 1831.

To determine of the oldest museum collections in the U.S. had sage grouse specimens, the online collections were accessed at the National Museum Of Natural History and the American Museum of Natural History. Of 144 museum records of *Centrocercus* in the

National Museum of Natural History, the earliest were from 1853 in Washington (records: A10019, A10021, and A10022). Of 14 records in the American Museum of Natural History, the earliest specimen was from 1887 in Montana (record: SKEL 60). These post-1800 museum and historical records were plotted on the pre-1800 pre-settlement potential habitat map.

S04.6) An alternative hypothesis that could explain the lack of early sage grouse sightings in northern Montana, Alberta, and Saskatchewan, was not considered by Schroeder et al. (2004). Schroder et al. (2004) included northern Montana east of the Continental Divide and areas north, including Alberta and Saskatchewan in pre-settlement habitat. However, the Lewis and Clark expedition did not report sage grouse along the Missouri River east of the Rocky Mountains in Montana. Rather than considering the possibility of a recent (post-1800) range expansion due to post Little Ice Age warming, Schroeder et al. chose to explain away the absence of sage grouse sightings: *"It is possible that Lewis (Moulton 1987) and others might not have observed sage-grouse because of low densities along their primary travel corridors. Periodic fluctuations in the abundance of sage-grouse (or cycles, Rich 1985) may also have had an impact."* The alternative hypothesis, that this was a range expansion that followed the Little Ice Age, was not considered by the authors.

Review of Schroeder et al. (2004):
DISTRIBUTION OF SAGE-GROUSE IN NORTH AMERICA

Review by: (This reviewer wishes to remain anonymous.)

S04.7) I'm fundamentally bothered in this paper by what appears to be a circular definition of the limits of historic range. On page 366, the authors state:

> *"Habitats without known use by sage-grouse were excluded from the presettlement distribution of potential habitat, even if there were scattered observations or recoveries of sage-grouse."*

Then on page 372 they state:

> *"The location of some observations and museum specimens were outside the perimeter we delineated for the presettlement distribution of potential habitat. There have been numerous (italics added) observations of sage-grouse in areas outside big-sagebrush dominated habitats, particularly in Colorado, Kansas, Nebraska, Oklahoma, and the Dakotas. Because of these observations and the large area (italics added) involved, our distribution of potential habitat may be a conservative estimate of the total amount of area occupied in the past."*

Evidently the authors are limiting potential habitat to big-sagebrush dominated areas despite an abundance of records in a large area that is not big-sagebrush dominated. Further, they evidently assume that these records did *not* represent "use" by sage-grouse – a bold conclusion difficult to justify. Range of any species presumably should be defined by regular presence of the birds, not by presence of habitat types that the authors deem to be essential to the species, because they just might be wrong about habitat dependencies of the species. Surely with all species one can expect to have occasional occurrences outside normal range, but when one obtains "numerous observations" of birds outside of designated range, it's time to redefine the range of the species. If this means that one also has to redefine "acceptable" habitat for the species, so be it. Perhaps sage-grouse do not really require big-sagebrush dominated habitat. This would be my conclusion from what is presented here, and it makes me suspicious that the authors have greatly underestimated the true size of presettlement range. Kansas and Oklahoma, which evidently hosted numerous early observations of the species, are not even close to the presettlement range identified by the authors. Something is evidently amiss here, and this seems to be recognized in a left-handed sort of way in the second quote above. This paper should present full data on records outside the presettlement range identified by the authors (not just museum specimens and published locations (Fig. 1)), but also the rough locations of the 830 observations that were not mapped in this figure.

S04.8) I'm surprised that the reviewers for this paper evidently did not give the authors a hard time on these matters prior to publication. It looks basically like a huge area east of the east boundary of "presettlement range", extending from Texas to the Dakotas might also have been true sage-grouse habitat, though not necessarily optimal habitat. How this

might have affected the conclusions of other authors who have relied on this paper should be examined closely. Judging simply from the information provided by the authors in this paper, their presettlement range is probably not reliable.

S04.9) By comparison, consider the case of Swainson's Warbler, a species that has been long famed for its association with cane thickets in the southeastern United States. Yet another population of this species was discovered in the 1930s in rhododendron-mountain laurel thickets of the Appalachians, and this demonstrated that the species was not a true cane specialist. The Appalachian population would have been ruled out by the sort of logic employed in this sage-grouse paper. Common habitat associations do not prove strict dependencies and we are well advised not to underestimate habitat tolerances of a species, especially when true limiting factors for populations are not thoroughly understood. Attempts to define habitat tolerances of a species based on small sample sizes are always risky, but "ranges" that *exclude* from consideration areas and habitat types where *numerous* records of a species exist, are surely unjustified.

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Appendix 1. Review team bios. (Note: The professional affiliations of reviewers are listed, however, the statements and opinions of reviewers are solely their own professional judgments.).

Dr. Rob Roy Ramey II, Wildlife Science International, Inc.
Dr. Ramey has 32 years of experience with research, management, and recovery of endangered species in the U.S. and abroad. He provides measured and impartial review of scientific information and counters misinformation with facts and sound arguments. Dr. Ramey has extensive experience working with threatened and endangered species, including fieldwork on the front lines of research and recovery of California condors, California and Peninsular Ranges bighorn sheep, argali, peregrine falcons, and African elephants. He has also conducted original research or provided scientific review on a wide variety of proposed and ESA-listed species, subspecies, and Distinct Vertebrate Population Segments, including: coastal California gnatcatcher, western snowy plover, northern spotted owl, California brown pelican, Gunnison sage grouse, greater sage grouse, Sierra Nevada bighorn sheep, desert bighorn sheep in the Peninsular Ranges of California, Mexican wolf, Canadian lynx, arroyo toad, California tiger salamander, Pacific pocket mouse, two subspecies of meadow jumping mouse, multiple subspecies of beach mice in Florida, and Delta smelt. Clients have included a wide variety of governmental agencies, companies, tribes, individuals, NGOs, and law firms.

Dr. Vernon C. Bleich, (Eastern Sierra Center for Applied Population Ecology) recently retired as a senior biologist from California Department of Fish and Game. He is recognized as an expert on four federally endangered taxa: Stephens kangaroo rat, Amargosa vole, Sierra Nevada bighorn sheep, and Peninsular bighorn sheep. He has served as a member of the Peninsular Bighorn Sheep Recovery Team and the Sierra Nevada Bighorn Sheep Science Team, and oversaw preparation of the Sierra Nevada Bighorn Sheep Recovery Plan. His research has included projects on sage grouse, as well as wildlife responses to mining and habitat fragmentation in the west. He recently participated in a critical review of sage grouse population trends derived from lek count data (organized by WSI).

Dr. Mathew Cronin, Research Assistant Professor, University of Alaska, Fairbanks.
Dr. Cronin has conducted research and published on numerous ESA-listed species and issues, including the coastal California gnatcatcher, polar bear, and beluga whale. His research and publication on the gnatcatcher revealed the arbitrary criteria used to describe this and other subspecies and DPS designations. The polar bear and beluga whale population genetic research did not support proposed DPS designations. In 2005 he reported that, contrary to expectations, the caribou population that utilizes Prudhoe Bay had more than doubled in size over the previous two decades. Dr. Cronin submitted extensive comments to the Fish and Wildlife Service on the proposed listing of polar bears as threatened.

Annonymous - (U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center - retired).

Annonymous is an extensively published research ornithologist, who's foresight as a recovery team leader led to two successful recovery programs, saving these species from extinction.

Dr. John D. Wehausen, Research Scientist, White Mountain Research Station, University of California, San Diego (retired).
Dr. Wehausen's expertise is in population estimation, demography, taxonomy, and epistemology. He has served as a member of the Peninsular Bighorn Sheep Recovery Team and the Sierra Nevada Bighorn Sheep Science Team. He worked on preparation of the Sierra Nevada Bighorn Sheep Recovery Plan, and consulted on the Coachella Valley Habitat Conservation Plan. He shares authorship on three papers synonymizing the so-called Preble's meadow jumping mouse with the nearby subspecies, Z. h. campestris (and two response papers defending that synonymy). He recently participated in a critical review of sage grouse population trends derived from lek count data (organized by WSI).

Dr. Robert Zink, Breckenridge Chair in Ornithology, Bell Museum; Professor, University of Minnesota.
Dr. Zink has published extensively for 25 years in the field of population genetics and phylogeography. Many of his papers have dealt with species of conservation concern, such as the California Gnatcatcher and the Black-Capped Vireo. He has also published a series of papers on the genetics of Hawaiian freshwater fishes. He was an invited instructor at a workshop sponsored by the USFWS on genetic studies in conservation. He has provided written comments on genetic work related to the Gunnison Sage Grouse, Snowy Plover (western) and Spotted Owl. Dr. Zink brings a critical and objective viewpoint to the discussion of the relevance and role of genetic studies in conservation.

Dr. Laura M. Brown, Wildlife Science International, Inc. (Editor)
Dr. Brown's expertise is in ornithology, habitat fragmentation, and making scientific writing accessible to the public and decision makers.

Peer Review and Information Quality Breakdown in an Endangered Species Act Decision: The Case of the Greater Sage Grouse

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16 October 2013

ABSTRACT
This paper discusses issues with the implementation of Information Quality Act guidelines in U.S. Endangered Species Act (ESA) listing decisions. These issues are illustrated by the key scientific paper and peer review processes that figured prominently in the decision to list the greater sage grouse (*Centrocercus urophasianus*) as "warranted" under the ESA as a threatened or endangered species in 13 states and provinces. We examine limitations of the data, errors and bias in the analyses and inferences based upon those analyses, and then explore why and how questionable data and analyses were used as the basis for such a far-reaching decision, even when independent peer review did not support the conclusions. We discuss policy implications and potential policy solutions, and how these checks and balances could reduce opportunities for various types of error and bias in the ESA decision-making process.

INTRODUCTION

The conservation of biodiversity is a worldwide concern, especially the conservation of threatened and endangered species and the habitats they depend upon. In the United States the protection of species threatened with potential extinction is provided by the Endangered Species Act (ESA) of 1973. The Act requires that the U.S. Fish and Wildlife Service (USFWS) make decisions to list species as threatened or endangered, *"solely on the basis of the best scientific and commercial data available"*. The USFWS must determine whether a species, subspecies, or distinct population is likely to become threatened or in danger of extinction (endangered) in the reasonably foreseeable future, throughout all or a significant portion of its range. In making such decisions (and those that follow to aid the recovery of species), the USFWS is afforded substantial judicial deference in interpreting what constitutes best available scientific and commercial data, sometimes refered to as *best available science* (Hickey 2009). Although the ESA refers to *data*, the USFWS actually relies on published and unpublished studies, and professional opinion, rather than the underlying *data*. The USFWS assures the quality of the information which is used for its decisions by relying on the Information Quality Act (IQA), the bulletin (OMB 1999, 2002) implenting IQA, and the Department of Interior's Scientific Integrity policies (DOI 2011).

For many rare or declining species, there are only limited data available, and those data may be incomplete or inadequate for the purposes of assessing population numbers and trends. The problem is particularly acute in species that are not of commercial value. For example, data may have been collected over many years for other purposes and now applied to answer questions that were not originally anticipated. Or, the agencies monitoring the species may have been reluctant to change and adopt superior methods of data collection. Therefore, listing decisions and recovery actions may be made on the basis of limited or sub-optimal data, which can hinder the types of discriminating analyses and the inferences that can be drawn from them.

In other cases, underlying data used in studies may not be made public because agencies or researchers have witheld access to them. This may be because agencies or researchers consider the data proprietary, or they may not want to reveal the locations of endangered species. In either case, when data are not made public, it prevents independent reanalysis and review (Fischman and Meretsky 2001).

In this paper we explore these issues by examining the highly influential scientific paper by Garton et al. (2011), that figured prominently in the decision to list the greater sage grouse as "warranted but precluded" for threatened or endangered status under the ESA (USFWS 2010). We examine limitations of the data used by Garton et al. (2011), the analyses, inferences based upon those analyses, and then explore why and how such an important decision as an ESA listing could have been based on such questionable analyses of questionable data. This is of particular concern given that there was considerable independent peer review that did not support the conclusions of that analysis. We also discuss potential policy solutions to these shortcomings, and how these

checks and balances could benefit the conservation of species by reducing opportunities for various types of error in the research and decision making process.

SHORTCOMINGS OF THE APPLIED METHODOLOGY

The species in question, the greater sage grouse, is a large ground-nesting bird dependent upon sagebrush habitat in western North America. Each spring, sage grouse congregate at traditional sites (leks) where the males display in order to attract and mate with females. Thirteen states and provinces began counting the number of adult male sage grouse at prominent leks in the 1940's and 1950's as a potentially useful index of population size. Initially, male counts were made at a few large and easily located leks. Then, from 1965 to 2001, the number of counted leks increased approximately ten-fold. The data collection, however, continued to be a non-random sample of leks, but included no information on the number of leks that were not included in these counts.
Concern and repeated litigation over the status of sage grouse, and a desire to quantitatively estimate population sizes and trends, has motivated three different research groups to conduct analyses of male lek count data (Connelly et al. 2004; WAFWA 2008; Garton et al. 2011). The most recent and most ambitious of these studies, Garton et al. (2011), used 42 years of male lek count data (from 1965-2007) to estimate population trends, reconstruct estimates of past population sizes, and forecast population sizes and probabilities of persistence 30 and 100 years into the future, to 2037 and 2107 respectively.

The male lek count data used by Garton et al. (2011) and previous authors were collected by different states and provinces - some of which used different methods - and by many different individuals at thousands of locations. Data from different states and provinces were combined for analysis in Sage Grouse Management Zones (SMZs) and metapopulations. The authors claim that they carefully examined all data prior to analysis to ensure that they were obtained following appropriate procedures, but the authors also acknowledged that they *"had to assume that the data were collected properly."* However, the number of cases where this assumption had to be made was not reported, nor did they report the number of leks that were deleted from the raw data.

After filtering the data, the analytical approach had multiple procedures:

(a) Male lek count data were used to develop annual estimates of the rate of change from the previous year to the present year for each lek with successive counts, and these were then averaged across each population.

(b) The reciprocal of those estimates was then used to back-calculate (reconstruct) breeding population sizes prior to 2007 (the terminal year in which the largest number of leks was counted). This effectively estimated how many male sage-grouse would have been counted in earlier years, if the maximum number of leks counted had been counted every year. A formula for estimating the compounding error of such a

procedure was applied to their reconstructed population data and 90 percent confidence intervals (CI) were reported.

(c) The reconstructed population sizes were then used to find "best fit" stochastic population models by considering 26 exponential and density-dependent growth models with varying numbers of parameters (including year, two time periods (1969-1987 and 1988-2007), and time lags). Model selection procedures were employed to evaluate models relative to each other. Additionally, the data were grouped in 5-year blocks, using averages and associated statistics for each block.

(d) The models developed in (c) were used for 30 and 100-year population forecasts as part of a population viability analysis (PVA). Extinction predictions were based on the proportion of replicate trajectories where the estimated effective population (N_e) sizes fell below 50 or 500, in which case populations were deemed "quasi-extinct."

Garton et al. (2011) reported that 44% of their models indicated declining carrying capacity through time, ranging from -1.8% to -11.6%. In other words, their results found that 56% of populations were stable, increasing, or had no significant trend. Also, 18% of the models incorporated lower carrying capacities from 1987 – 2007, compared to 1967-1987. Again, this could also be viewed as 72% of populations being stable, increasing, or having no significant trend. They also reported that 13% (3) of 24 populations for which they had sufficient data, had a high likelihood of declining below $N_e = 50$, and 54% (13) had a likelihood of declining below $N_e = 500$ within 30 years. On a 100-year time horizon, 75% of the populations and 29% of the SMZs were projected to decline below effective population sizes of 500. For 2007 they estimated a minimum of 88,816 male grouse. They assumed a ratio of 2.5 adult females per lekking male, yielding a minimum population estimate of 310,856 adult sage grouse. This number contrasts with an estimated population size of approximately 535,542 sage grouse, based on estimates provided by states and provinces (USFWS 2010).

The authors acknowledged the inherent inaccuracy of lek counts and several limitations of the data for inferring population abundance and trends, and conceded that they made no attempt to estimate true population abundance using leks counts. Yet, despite this caveat, Garton et al. (2011) subsequently used lek count data to create an index of historical abundance, population reconstructions, and probability of extinction forecasts for 30 and 100-year time horizons. They concluded by proposing that: *"these forecasts will be useful in guiding decisions concerning the future of sage-grouse and the sagebrush communities upon which they depend."*

Data limitations in the conservation of endangered species can lead to a policy dilemma analogous to the challenge of minimizing Type I and Type II statistical errors. Type I error occurs when conservation actions are based on an erroneous or exaggerated conclusion that a biologically meaningful and statistically valid risk threatens a species. Type II error may occur if conservation actions are *not* taken, based on the mistaken belief that little or no biologically meaningful and statistically valid risk threatens a species, when one actually does. Minimizing both types of error can be difficult, because

attempts to minimize one type of error can increase the probability of the other type of error.

In practice, the situation is more complex than this simple dichotomy for two reasons. First, Type I and II error scenarios assume that the basic data are sound, a condition that can be difficult to meet with endangered species. Because scientific uncertainty is anathema to government, scientists are encouraged to fill these information gaps as best they can with new analyses of existing data, or new data and analyses. Second, when one type of error is viewed as having more serious consequences than the other, the standard of proof becomes asymmetrical (MacCoun 1998). For the USFWS, one of the consequences of a decision that might result in a species decline (or extinction) is the threat of costly lawsuits brought by environmental groups. And once listed, the USFWS and other agencies have an additional consequence to consider: in 1978 the U.S. Supreme Court interpreted language of the ESA to conclude that *"the value of endangered species is incalculable"* and that a listed species must be protected *"whatever the cost."* Such interpretations naturally lead to a precautionary approach and to increased potential for Type I error in listing decisions. Other errors, including errors of omission, selective interpretation, or confirmation bias (Nickerson 1998; Robertson 2009), may also contribute to either Type I or II error.

Known issues with lek count data

Numerous published papers have pointed out *why* male lek count data are unreliable and inappropriate for inferring population abundance and trends. These include: Jenni and Hartzler (1978), Emmons and Braun (1984), Walsh et al. (2004), Connelly and Schroeder (2007), Garton (2007), and Western Association of Fish and Wildlife Agencies (2008). There were also six publicly available peer reviews commissioned by the Colorado Division of Wildlife that specifically pointed out methodological issues with Garton et al. (2011). These include Conroy (2009), Noon (2009), Runge (2009), and three anonymous peer reviews (CDOW 2009). (Note: The version of Garton et al. that was reviewed in 2009 by Conroy, Noon, and Runge was the peer reviewed and accepted version that the USFWS relied upon in making its ESA listing decision in 2010 (Garton et al. 2009). The 2011 version of Garton et al. that we discuss here is virtually identical to the 2009 version, with just minor edits to text.)

Briefly, the issues identified by the authors and reviewers listed above include:

1) No demonstrated correspondence between male lek counts and actual population number or trends.
2) Data collection procedures were not standardized among states and sometimes varied within states over time.
3) Personnel monitoring leks and individual differences in methods and detection ability change over time, leading to *observer bias*.
4) Data sets from multiple states and provinces (i.e. data from two to six states) were combined for analysis of SMZs. (This problem is exacerbated by the fact

that some states supplied data summaries while others provided raw lek count data.)

5) Data were not randomly collected by any state or province, and there are an unknown number of unsampled leks in each population. Therefore, it is impossible to know the extent to which sampling effort is representative of the distribution of sage grouse within populations or SMZs. This also affects the definition of dispersal distances which, in turn, are used to determine whether populations are isolated.
6) Only males were counted; there is no accounting for the number of females or juveniles in the populations sampled, their sightability, nor how these differ across different sagebrush habitats or decades.
7) The number of grouse counted at a lek depends upon the spatial definition of a lek: a more inclusive definition includes nearby satellite leks and results in a higher count, while a more restrictive definition results in more leks with fewer birds counted in each lek. Previous authors provided quantitative criteria for what constituted a lek. Connelly et al. (2004) considered all males within 2.5km of a lek to be part of that lek, while the Western Association of Fish and Wildlife Agencies (2008) used 0.5km as a cut-off. Garton et al. (2011) did not specify any cut-off distance.
8) A disregard for estimating the number of unknown leks makes it is impossible to use male lek count data to estimate population number or trends.
9) A lek is not reported in databases until two or more male grouse are found using it. Consequently, counts at a lek start with a positive number and any lek that has become inactive or merged with another lek is followed by zero counts. This leads to negatively-biased trends.
10) The assumption that lek-attendance rates of adult male greater sage-grouse are high and constant is not supported by the data.
11) The number of sage grouse leks being counted has increased over time, but the non-random sampling of leks has not yet changed.
12) Small sample sizes and variation in sample sizes across years at each lek increases the statistical unreliability of reconstructed population estimates.

The low resolution of population reconstructions

Plots of population reconstructions and their 90% confidence intervals in the study by Garton et al. (2011) are so wide that no trend can be supported at that confidence level for many populations. (At 95%, the confidence intervals would be so wide that there would be nothing to discuss about the results.) The following illustrates the magnitude of the problem: First, the 90% CI for the Dakotas (Figure 2 in Garton et al. 2011): about 950 male sage grouse were estimated for 2005, but the 90% CI for 1968 was 400 - 9,250, thus a trend ranging between a 90% decrease and a 150% increase over that time period. Second, the east-central Idaho population, with only two leks counted in 1965-1969 and four leks in 2000-2007, had 90% CIs between zero and no upper limit across all years. Yet despite the enormous uncertainty surrounding these and other population reconstructions, Garton et al. (2011) were willing to make several remarkably *precise*

predictions about the future of some populations. For example, they stated that the Powder River Basin, Wyoming population *"will fluctuate around carrying capacity which will decline from 3,042 males attending leks in 2007, to only 312 males attending leks in 2037, to going extinct with only two males attending leks in 2107 if this trend continues at the same rate in the future."* That population had a 90% CI of 0 - 180,000 in 1968, 5,000 - 40,000 in 1987, and an estimate of about 8,000 in 2007.

Lack of accounting for error in population growth models and negative trend bias

It is important to recognize that the population growth models in Garton et al. (2011) were not fitted to observed lek count data but instead to *reconstructed population estimates*. These were calculated in such a way that the input and output variables share data, and therefore cannot be considered independent (i.e. the population reconstruction method depends upon quantities that appear on both the "prediction" and "predictor" side of the equation). One reviewer (Conroy 2009) reported that this resulted in "built in patterns" in the reconstructed population estimates, which in turn affected the population growth models and led to erroneous inferences. Similarly, one of the anonymous CDOW reviewers reported a negative trend bias when Garton et al's (2011) method was applied to simulated input data that deliberately had *no* trend. That reviewer reported that 34-40% of the simulated populations produced a statistically significant negative trend using Garton et al.'s (2011) methods. These reviewers also pointed out that sampling variation and statistical uncertainty from reconstructed population estimates were not carried over by Garton et al. (2011) into subsequent models of population growth and persistence.

These assessments are supported by results in Appendix 1 of Garton et al. (2011) where they list results for best models of their reconstructed population data: the 26 adjusted r^2 values range from 0 to 0.682, the highest of which is for a population with data for only 1996-2007, and the next closest value was 0.498, and average r^2 was only 0.257. This indicates that the models, on average, did not explain 75% of the variation in the data sets (i.e. low resolution).

The low statistical resolution of the reconstructed populations for which the models were developed suggests that a great deal of error accompanies the PVA forward projections. Similar to the issues with estimating population reconstructions in reverse time, errors will compound and grow exponentially. Garton et al. (2011) discuss this potential, but ultimately emphasize the literature that better supports their analyses. In reality, given the poor resolution of the reconstructed population data base and the growth models based upon it, the PVA projections incorporate a great deal of compounded error that renders projections at even 30 years meaningless. This leaves almost no clearly useful analytical results in what Garton et al. (2011) produced.

Mathematical error(s)

Garton et al's (2011) use of 20 males and 2.5 times that number of females to achieve an N_e of 50, is in error and should result in an N_e of 57.14 (using Wright's 1938 equation). Instead, only 17.5 breeding males would be needed for an N_e of 50 (assuming a ratio of 2.5 females per lekking male). Likewise, 175 males rather than 200 would be required for an N_e of 500. In other words, extinction risk was overestimated across all populations by setting the minimum number of breeding males *higher* than necessary for maintaining an N_e of 50 or 500. Although these differences may seem slight, they do establish different thresholds for generating extinction probabilities across all populations. (This was not a result of the formula error noted below.)

Garton et al. (2011) presented an incorrect equation for estimating effective population size: $N_e=1/((1/Nm) + (1/Nf))$, where Nm is number of breeding males and Nf is the number of breeding females in a population. The correct equation, from Wright (1938) is: $N_e=4NmNf/(Nm+Nf)$. The two equations would have been mathematically equivalent if Garton et al. (2011) had used a four instead of a one in the numerator. It is unknown whether this mistake carried over into the population viability analysis (in which case it would have overestimated extinction risk), or whether it was a typographical error in their paper. This question cannot be answered because the code and data used to perform the analysis are not publicly available.

Reliance on the 50/500 rule of thumb: an obsolete concept

The basic concept underlying minimum viable population size (MVP) and population viability analysis is that there must be some "minimum conditions for the long term persistence and adaptation of a species or population" (Soule 1987). An effective population size (N_e) of 50 was suggested as the minimum in the short term to limit the loss of heterozygosity through genetic drift and potential resultant inbreeding depression that could lead to a risk of population extinction (Soule 1980). An N_e of 500 was proposed as the minimum necessary to maintain the long-term adaptive potential of a population (Franklin 1980) based on a handful of studies of quantitative genetic variation in highly inbred lines of mice, maize and *Drosophila* (summarized by Lande 1976). None of those studies actually compared extinction risk with genetic variation or N_e.

Although the 50/500 rule of thumb is widely cited, field data, laboratory studies, and theory show that this rule of thumb is not a reliable predictor of extinction. Successful populations have been founded by few individuals, and populations with a much lower N_e than 50 have persisted long past when they should have gone extinct under the 50/500 rule of thumb (Krausman et al. 1993, 1996; Goodson 1994; Luikhart and Cornuet 1997; Wehausen 1999; Ramey et al. 2000; Frankham 2005). Criticism of the 50/500 rule of thumb was succinctly summarized by Boyce (1997): *"Unfortunately, the 50/500 rule does not have a sound genetic or demographic basis. And there is no theoretical or empirical justification for basing MVP on an estimate of N_e… until such evidence becomes available, reliance on rules of thumb, such as the 50/500 rule is arbitrary and capricious."*

In practical terms, the predictions of future sage grouse population sizes by Garton et al. (2011) are not falsifiable because they are simply probability statements about what might happen if environmental conditions are unchanged. While long-range predictions based on models are potentially useful heuristic tools, they are also notoriously inaccurate and can be easily over-applied (Pielke, Jr. and Conant 2003). Their lack of potential falsifiability effectively places decisions based upon them outside the realm of science.

Hunting mortality: an error of omission in model development

Garton et al. (2011) ignored the effects of sport hunting in their models, although it is the largest documented source of sage grouse mortality: 207,433 sage grouse harvested in the U.S. during 2001-2007 (Reese and Connelly 2011). We find it curious that Garton et al. (2011) ignored hunting mortality, while suggesting that other human activities must have reduced carrying capacity, specifically: expansion of cheatgrass and conifer woodlands, increased fire frequency, energy development, and spread of West Nile Virus.

If one accepts population estimates (88,816 male grouse in 2007 or a total population size of 310,856), then hunters removed 28,180 sage grouse or approximately 9 percent of the species in 2007 alone. In four of the six pervious years, the take was even higher (up to 37,607 in 2006). These numbers do not include the number of grouse that were wounded and not recovered by hunters.

Regionally, the estimated percentage of sage grouse hunted may have been even higher in some years. For example, in 1992 an estimated 34,388 sage grouse were harvested by sport-hunters in Wyoming (Reese and Connelly 2011). Using the upper and lower 90% CI values of the estimated number of males in the Wyoming Basin SMZ and Powder River population in 2007 (and 2.5 adult females per male counted at leks), hunting loss would have amounted to 12 - 29% of the estimated adult population. This is the same SMZ where Garton et al. (2011) estimate a rate of decline between 3.4% and 10.5% annually. With this level of hunting mortality occurring annually, we question the assumption that there is no (additive) demographic effect (Gibson et al. 2011). The difficulty in establishing a link is in part due to the fact that sage grouse lek counts, the basis of hunting harvest, are not a reliable indicator of population number or trends (see discussion above). Clearly, more refined data and methods are needed to address this question.

DISCUSSION

Once a ESA listing is final, compliance is a costly endeavor. Compliance with regulations associated with listings usually involve a substantial allocation of conservation resources in order to be effective (Government Accountability Office 2006; Ferraro et al. 2007). Compliance can lead to secondary costs to local communities and regional economies (Wanger 2010), and is imposed with no regard to cost based on the

Supreme Court's admonishment that ESA listed species must be protected *"whatever the cost*" (*TVA v. HILL, 437 U.S. 153 (1978)).*

Independent and detail-oriented peer reviews are important for prudent decision makers. Equally important is the availability of data and methods used to ensure the replicability of results and allow identification of errors, methodological biases, and potential for falsification of hypothesized population trends (Fischman and Meretsky 2001). This is recognized and required by IQA Guidelines issued by federal agencies. However, in the case of the greater sage grouse, the failure was not of the guidelines themselves, but of the agencies' failure to apply them.

In the case of the sage grouse decision, the question is: what were the checks and balances in the ESA listing process, and why did these fail to detect and filter out a study with numerous limitations, errors, and unfalsifiable predictions? We argue that the reason is largely due to reliance on an ineffective peer review process and acceptance of "scientific" information that has not been sufficiently scrutinized (e.g. due to data being withheld or reliance on population predictions with unreasonable margins of error).

Peer Review

Science is a human activity, therefore errors can and do occur, and peer review exists as a filter on information quality. However, there is no guarantee that papers being peer reviewed will be examined in depth, results replicated, or reviewer comments fully addressed and made public. Unless peer reviewers are provided the original data along with sufficient time and resources to adequately investigate the analyses, the reviewers are forced to assume that the data are sound.

Currently, the USFWS does not require that the data used in research that it cites be made publicly available, nor do they actively engage in or encourage replication of results in peer review. Since 2002 however, IQA guidelines set a higher standard for federal agencies, including the USFWS. They require that studies be reproducible and provide a rebuttable presumption that peer-review of the studies was adequate (OMB 2002). Additionally, the U.S. Department of Interior's information quality guidelines (US-DOI 2002) require that reproducibility *"shall generally require sufficient transparency about data and methods that an independent reanalysis could be undertaken by a qualified member of the public."* And USFWS (2007) guidelines state that, *"higher levels of scrutiny are applied to influential scientific, financial or statistical information, which must adhere to a higher standard of quality."* It is apparent that these requirements were not applied to their full extent by the USFWS in its consideration of Garton et al. (2011) because the raw data were unavailable, and valid criticisms of the data and methods made by reviewers outside of the production of this monograph series were clearly ignored by both the editors of the volume and the USFWS in its decision. This raises questions about the efficacy of the peer review process in the production of this highly influential paper, and with the peer review of the USFWS decision that cited the paper 62 times.

It also raises issues with the efficacy of the peer review of the recent USFWS and State-sponsored Conservation Objectives Team Report (COT 2013), which cited Garton et al. (2011) 61 times and based their population threats analyses, population definitions, current and projected numbers of males in each population, and probability of population persistence on Garton et al. (2011).

As long-time students of the ESA and peer reviewers of USFWS recovery plans and proposed rules, it has been our experience that peer reviewer and public comments on proposed rules are typically combined into broad categories, paraphrased, and summarized by the USFWS. Responses are then prepared to these summaries. Many valid criticisms and details are potentially lost in this process, diminishing the value of reviews and public comments. For example, valid issues raised in outside peer reviewer comments of Garton et al. (2011) were only discussed in a brief paragraph in the USFWS's "warranted but precluded" decision (USFWS 2010):

> *"We received these reviews and have reviewed them in the context of all other data we received in preparation of this finding. Their primary concern was about the applicability of analyzing and presenting future population projections in the manner done by Garton et al. (in press), based on the limitations of the data, the assumptions required, and uncertainty in the estimates of the model parameters. Garton et al. (in press) acknowledged these concerns, as several of the reviewers pointed out, and their analyses underwent peer review via the normal scientific process prior to acceptance for publication."*

The last sentence of this summary also illustrates a key false assumption in the ESA decision-making process: that the *"normal scientific peer review process"* leading to publication is automatically a good filter on information quality. Empirical evidence and the collective experiences of many authors renders this assumption disputable (Mahoney 1977; Roy and Ashburn 2001; Hilborn 2006; McCook 2006; Sandström and Hällsten 2008; Casadevall and Fang 2009; Fang et al. 2012; and Ramey 2012). While traditional peer review is a useful tool, it is clearly an imperfect tool and applied with great variation. As a result, proposals have come forth on how to improve its effectiveness or adopt innovative alternatives (Weicher 2008; Suls and Martin 2009).

Despite variation in how peer-review is conducted, there are at least two well-justified standards that distinguish a rigorous peer-review process from a less than rigorous one. One is: required preparation of a detailed response to each of the peer review criticisms, and discussion of why the criticisms might not be considered valid and should be ignored. While the extent to which this occurred in production of the *Studies in Avian Biology* monograph (of which Garton et al. 2011 is one of 25 chapters) is unknown because reviews were confidential (itself a violation of the Information Quality Guidelines), the USFWS's response to outside peer reviewer's criticisms (see previous paragraph) is illustrative of a process that deviates from this standard.

The second standard is: the role of editorship and authorship need to be independent so that editors are not in a position to review and approve articles that they have authored. In

the case of Garton et al. (2011), one of the authors, J. Connelly, was also one of the two editors of the monograph that Garton et al. (2011) was published in. (Both editors were authors on multiple papers in this monograph.)

There is the need for greater accountability and a more comprehensive review process for highly influential scientific papers used in ESA listing decisions (and of the listing decisions themselves). However, it is questionable whether an additional round of peer review or the convening of expert panels would be adequate. An extensive social psychology literature points to the reasons *why*: even with intentions of neutrality, traditional peer review and expert panels may be unable to uncover the whole truth because of inherent cognitive and motivational mechanisms that contribute unintentionally to bias (e.g. strategy-based errors, confirmation bias, or majority amplification; see MacCoun 1998 for an extensive review).

Better access to data

In an ideal world, all of the data used to develop a highly influential scientific paper would be publicly available to allow for independent replication and ensure the potential for falsifiability. Therefore, it is worth asking: why is this not the case with Garton et al. (2011) and many similar, highly influential papers, especially given that *"The* [sage grouse] *monograph is recognized by the USFWS and the Court as the primary source of science for the new review and listing determination."* (USGS 2009b).

Until such time that underlying data of highly influential studies used in ESA decisions are mandated to be publicly available, few options exist to gain access to these data. While the option to obtain data under FOIA from federal agencies is available, and has been used for replication and publication of analyses (e.g. Turner et al. 2004, 2006), federal agencies must possess the data if they are to be obtained under FOIA. However, the little known OMB Circular A-110 provides a second option for public access to data under FOIA when studies are federally grant-funded (OMB 1999):

> *"(d) (1) In addition, in response to a Freedom of Information Act (FOIA) request for research data relating to published research findings produced under an award that were used by the Federal Government in developing an agency action that has the force and effect of law, the Federal awarding agency shall request, and the recipient shall provide, within a reasonable time, the research data so that they can be made available to the public through the procedures established under the FOIA."*

Procedures are well established, as some agencies (such as the National Institute of Health) are familiar with the responsibilities of granting agencies and awardees. To our knowledge, no data requests under A-110 have yet been submitted to the USFWS.

A third potential remedy exists in the form of "requests for correction" under the IQA. This administrative procedure only allows for suggested corrections to the record and does not provide legal remedy should an agency fail to correct or provide information.

The remedy of last resort, costly and time consuming for all involved, but comprehensive in its potential depth, is the power of subpoena.

From our viewpoint, these remedies should not be necessary. It is in the best interests of biodiversity conservation, responsible agencies, and researchers, to provide ready access to data used in scientific papers and key decisions, either online or in publicly accessible archives.

CONCLUSIONS

It is our view that a scientifically critical review of the study by Garton et al. (2011) on greater sage grouse would have concluded that there was no scientific basis for a "warranted" decision (for a ESA threatened listing) because of fundamental problems with the available data as well as with the analyses. Instead, the decision should have called for development of better data collection, with the goal of revisiting the issue in 5 years, when the relationship of lek counts to actual population data might be better understood, or a probability-based census method implemented. This would have minimized Type I error without increasing Type II error.

We acknowledge that multiple studies have presented documentation of the loss of sagebrush in the western U.S. and Canada (i.e. Miller and Rose 1999; Schroeder et al. 2004), however, the extent to which this loss of habitat translates into loss of sage grouse, is not certain. Therefore, the policy-relevant questions about sage grouse should be: 1) are populations in decline; 2) if so, where; 3) why has it occurred; and 4) what can be done to insure the stability of these populations? In order to address these questions, reliable data on population numbers and trends are needed. Those data are currently lacking.

To their credit, Garton et al. (2011) called for establishment of range-wide, standardized methodologies based on probability sampling of leks, breeding males, and females, that would allow for more meaningful population analyses in the future (e.g. sentinel-lek and dual-frame sampling methods). Walsh et al. (2010) have recently proposed the application of mark–resight methods to estimate population size in sage grouse and other lekking species.

From our assessment, the data collected for more than 50 years by thirteen states and provinces are inadequate to answer the above questions regardless of the analysis applied. Repeated calls to reform this weak and outdated methodology, whose limitations have been clearly documented here and elsewhere, have not yet moved agencies into reforming their "business as usual" approach to counting male sage grouse on leks each spring. This puts the overall management of this species on a shaky database and will continue to hinder effective management until more biologically relevant and statistically defensible census methods are adopted.

The issues and potential solutions identified here also apply to the ESA listing of species outside of the U.S. (an increasing trend) and more broadly to endangered species laws of other nations (e.g. Australia's Environment Protection and Biodiversity Conservation Act of 1999, Canada's Species at Risk Act of 2002, and South Africa's National Environmental Management: Biodiversity Act of 2004), as well as international treaties (e.g. the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) of 1973). Failure to implement changes will result in falure to adequately protect species that are truly at risk of extinction.

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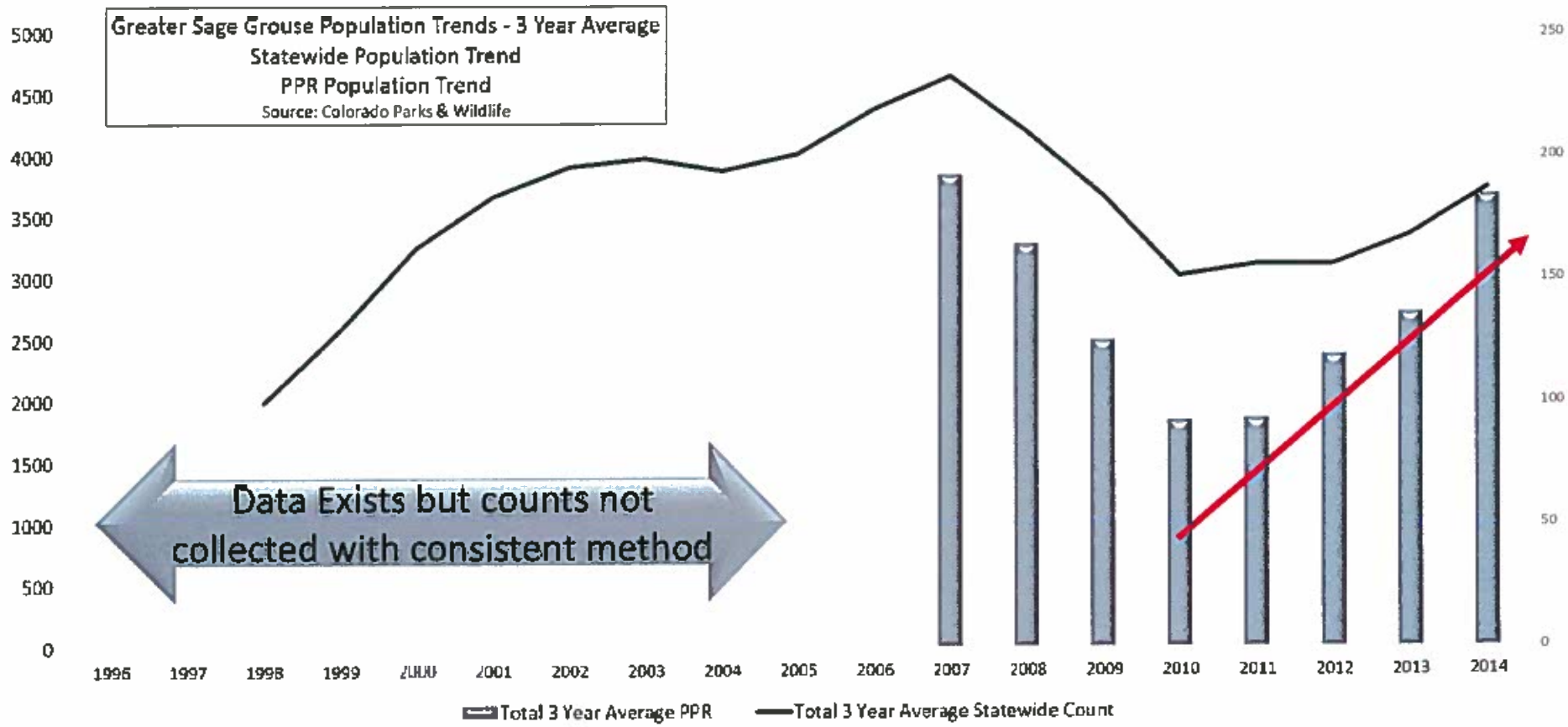
How are the Greater Sage Grouse doing in Colorado & PPR (Garfield & Rio Blanco Counties)?



- Upward Trend since 2010: 112+% Increase since 2010
- Largest lek in PPR in 2014: Reclaimed Natural Gas Well Pad: 31 Strutting Males

Garfield County

March 5, 2013

Karin Eichhoff
Colorado Parks and Wildlife
GIS Unit
317 W. Prospect Road
Ft. Collins, CO 80526

RE: Request for data related to the Greater Sage-Grouse and its habitat

Dear Karin,

As you know, Garfield County has made a CORA request for the data related to the Greater Sage-Grouse and its habitat in the area of the Colorado Parks and Wildlide's ***Parachute- Piceance – Roan Conservation Plan*** (PPR Plan) that fall in both Garfield and Rio Blanco Counties. I was instructed by Randy Hampton to contact you directly for any GIS data that you may have that would assist us. More specifically, we request for the following:

1) Precise data on radio-collared sage grouse locations and historic locations. For radio-collared bird locations, we request:
   a) The ID of the bird;
   b) The sex and age of the bird;
   c) The UTM or lat/long of the location (shape file preferred);
   d) The map datum used to determine location;
   e) The dates (day, month, year) they were recorded in those locations; and
   f) The method used to determine its location (i.e., VHS or satellite GPS collars).

2) For historic locations we request:

   a) The date of the observation;
   b) The number and sex of the birds;

c) The observer's name;
d) Cited document; and
e) The method used to determine its location (i.e., Lek count, aerial surveys, ground survey).

The Greater Sage-Grouse location data we request will only be used internally by County Staff and consultants for planning purposes and will not be released publicly or retained by consultants after the work is completed. (I have signed and attached the 'non-disclosure agreement' to this letter.)

Should you have any questions, please do not hesitate to me directly at 970-945-8212 or fredjarman@garfield-county.com. Thank you for your kind attention to this matter.

Sincerely,

Fred A. Jarman, AICP
Director, Community Development Department

Cc *Garfield County Commissioners*
Andrew Gorgey, Garfield County Manager
Frank Hutfless, Garfield County Attorney

Agreement for use of Colorado Parks and Wildlife electronic information

1) Colorado Parks and Wildlife (CPW) will provide information on species distribution for rare and sensitive species, specifically Greater sage-grouse lek data, as requested by Fred Jarman, to Garfield County Community Development Department for the purposes of evaluating grouse habitat in the Parachute/Piceance/Roan population in Garfield and Rio Blanco Counties, Colorado. These data will be used solely by Garfield County, their employees, and sub-contractors employed specifically to work on this project, and are not to be distributed to a third party.

2) CPW, for management and conservation reasons, considers this information confidential and sensitive due to the elements' vulnerability to intentional or unintentional disturbance, and/or due to agreements made with individual landowners to protect their privacy.

3) We, the undersigned, acknowledge that the information noted above is considered sensitive and confidential, and agree to the following stipulations:

- The information described above will be accessible only to the requesting Company and entities working directly for them on the project described above, and to no other entity; nor will it be made available for public viewing.

- The information may not be transcribed or reproduced in any manner, unless authorized by a staff person at CPW. The Undersigned may display locations spatially only in support of the needs of their clients or as part of an internal process. The Undersigned may display point locations spatially if necessary to their stated purpose, but agrees to do so in a manner and at a scale where specific locations cannot be derived

- The information will be used for the requested purpose described above and for no other purpose. The information will be returned or destroyed upon completion of the purpose described above. The undersigned agrees to bind entities hired to assist with this work by the same constraints listed herein.

- Requests involving biological interpretation or use of the information beyond the stated purposes will be referred to CPW.

- The undersigned acknowledges that the data represent features that are variable both over time and over the landscape. They are the best data available at this time. New data may become available at any time that will replace existing data.

Signature	Garfield County Community Dev.
	Company
Fred A. Jarman	March 5, 2013
Please Print	Date

COLORADO PARKS & WILDLIFE

Randy Hampton, Public Information Officer / CORA Manager
6060 Broadway • Denver, Colorado 80216
Phone (303) 291-7482
cpw.state.co.us

March 8, 2013

Mr. Fred Jarman
Garfield County Community Development Department
Via email to fjarman@garfield-county.com

RE: CORA request 022813-01

Mr. Jarman,

Thank you for your CORA requested dated Feb. 25.

On March 7 at 5:02 p.m., you were transmitted via email a zip file from GIS Analyst Karin Eichoff, which contains lek data sought separately in this request.

Attached, you will find the requested data as it applies to a completed research study that was conducted by grad student Christian Hagen in 1997 - 98. These documents are responsive to your request and are provided at no cost.

On Monday, March 4 at 5:16 p.m., I transmitted to you questions regarding how far Garfield County wanted us to go back in our archives to comply with the request. I have not received a response to that email. I believed from our telephone conversations that you were most interested in current data, which I believe the Hagen data and the lek data separately provided should fit.

In regard to the request for "precise data on radio-collared sage grouse locations", we are denying additional access to those records in accordance with the provisions of the Colorado Open Records Act, specifically, 24-72-204 (2)(a)(III), which excludes specific details of bona fide research projects from release. Radio-collared sage-grouse data is currently being gathered and analyzed as part of an ongoing research study conducted by Colorado Parks and Wildlife. When the study is completed and the results are published, we will be able to provide the requested data.

Thank you again for your CORA record. With this communication and transmission of the attached compliant records, we will consider CORA 022813-01 closed.

Sincerely,

Randy Hampton
CORA Manager
Colorado Parks and Wildlife
randy.hampton@state.co.us

STATE OF COLORADO
John W. Hickenlooper, Governor • Mike King, Executive Director, Department of Natural Resources
Rick D. Cables, Director, Colorado Parks and Wildlife
Parks and Wildlife Commission: Robert W. Bray • Chris Castilian • Jeanne Horne
Bill Kane, Vice-Chair • Gaspar Perricone • James Pribyl • John Singletary, Chair
Mark Smith, Secretary • James Vigil • Dean Wingfield • Michelle Zimmerman
Ex Officio Members: Mike King and John Salazar

Economic Impacts of Sage-Grouse Management: Supplemental Report

Piceance Basin Development Analysis

Prepared for
Garfield County Community Development Department
108 8th Street, Suite 401
Glenwood Springs, CO 81601

Prepared by
BBC Research & Consulting
1999 Broadway, Suite 2200
Denver, Colorado 80202-9750

BBC RESEARCH & CONSULTING

SECTION I.
Background & Objectives

This report is a supplement to BBC Research & Consulting's detailed comments on the specific economic assumptions and calculations presented in The Northwest Colorado Greater Sage-Grouse Draft Land Use Plan and EIS (Sage-Grouse EIS), published in August 2013.

The objective of this report is to demonstrate the potential economic consequences for Garfield County of BLM's implementing the proposed Sage-Grouse habitat preservation plan and thus restricting the development of natural gas reserves in the Piceance Basin.

This presentation is not meant as a substitute analysis for the BLM's study, but rather a demonstration of the order of magnitude economic impacts to Garfield County that were not documented or revealed in the EIS.

It is hoped that representation presented here can illuminate the EIS's shortcomings and the magnitude of the document's missing information.

The Garfield County Commissioners, independent observers and consultants reviewing the Sage-Grouse EIS, have raised concerns about the reliability of the EIS document's economic impact assessment given the lack of clarity on how oil and gas extraction—and to a lesser degree grazing and recreation—might be affected by these new management systems. The failure to acknowledge and reveal the significant consequences to Garfield County is a notable shortcoming of this document.

SECTION II.
Sage-Grouse EIS Background and Issues

This section summarizes the economic impact findings within the Greater Sage-Grouse EIS and associated issues raised by Garfield County reviewers.

The Northwest Colorado Greater Sage-Grouse Draft Land Use Plan and EIS

The Northwest Colorado Greater Sage-Grouse Draft Land Use Plan and EIS (Sage-Grouse EIS) identifies the environmental and socioeconomic impacts of alternative management strategies for preserving habitat and species population for the Greater Sage-Grouse (GRSG).

The Sage-Grouse EIS document was published in August, 2013 and covers a planning area of approximately 15 million acres of public and private property across 10 counties in northwest Colorado. The Planning area is approximately 57 percent public lands. According to the document this area includes approximately 1.7 million acres of BLM-administered and National Forest System lands, and approximately 2.8 million acres of BLM-administered subsurface federal mineral estate that may lie beneath other surface ownership[1].

Habitat designations. The Sage-Grouse EIS identifies areas of Greater Sage-Grouse habitat in northwest Colorado along a long spectrum of habitat suitability[2]. Designations include:

- 2.4 million acres of designated **Preliminary Priority Habitat** (PPH): areas identified as having the highest conservation value, including breeding, late brood-rearing, and winter concentration areas;
- 1.5 million acres of **Preliminary General Habitat** (PGH): seasonal or year-round habitat outside of priority habitat;
- 295,800 acres of **Linkage/Connectivity Habitat**: areas that have been identified as broader regions of connectivity important to facilitate the movement of GRSG and maintain ecological processes.

NEPA regulations require that the BLM/USFS formulate a reasonable range of alternatives for accomplishing habitat protection and managing use of the subject BLM properties. In the Sage-Grouse EIS, the BLM offers four alternatives, A-D, which include a continuation of current management alternative (Alternative A).

Garfield County has approximately 148,000 acres of PPH property, 72,000 of PGH property, and about 7,600 acres of linkage habitat.

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[1] Sage-Grouse EIS Section 1.3.1 page 6.

[2] Acreage figures for subsurface federal mineral estate include public and private surface ownership.

Alternatives and management practices. NEPA regulations require the BLM to formulate a reasonable range of alternatives that offer feasible and distinct management options. In this instance, the BLM Planning Team developed one no action alternative (A) and three action alternatives (B, C, and D). Each of the action alternatives includes a collection of management strategies designed to protect Sage-Grouse habitat and the broader mission of BLM property management.

Five specific Sage-Grouse management measures were identified as potentially reducing economic use of BLM lands and subsurface resources managed by BLM. These management strategies are:

- Closure of Federal Mineral Estate Lands to Leasing;
- No Surface Occupancy (NSO) Stipulations on All or Parts of New Leases;
- Right of Way (ROW) Exclusions on Lands Needed for Road and Utility Access;
- Restrictions on Amount or Location of Surface-Disturbing Activities (Well Pads, Access Roads, Pipelines, Power Lines) on New or Existing Leases; and
- Seasonal Closures, Undergrounding of Electric Distribution Lines, Noise Abatement, Visual Screening, Higher Reclamation Costs, Specialized Fencing.

The BLM contemplates managing resources under a *disturbance cap* concept that would allow more stringent controls as habitat losses exceed certain threshold levels for identified zones of activity. This strategy would place a 5 percent cap on human disturbances on ecological sites that support sagebrush. The disturbance calculations would apply to both public and private lands, such that reduction of habitat on private property could trigger the more stringent regulatory efforts on public lands. New projects would generally not be approved if a disturbance cap for a particular zone has been exceeded. How such caps would be measured, monitored, and imposed is characterized but not specifically detailed in the EIS document.

Acreages affected. The Sage-Grouse EIS states that although the planning area includes private and public lands, management decisions would only apply to BLM-administered surface properties and BLM-administered federal mineral estate that may lie beneath other surface ownership within designations PPH, PGH, and linkage/connectivity habitat.

The following Figure II-1 (derived from Section 2 of the Sage-Grouse EIS) shows the acreage of habitat by designation category and the acreage closed to Fluid Mineral leasing under each Alternative. The Sage-Grouse EIS acknowledges significant economic effects associated with Sage-Grouse management strategies, principally stemming from reduced recreation, grazing, and mineral extraction activity. Under the most restrictive scenario, the anticipated effect of these actions will be to close a significant amount of public lands to fluid mineral leasing.

Figure II-1
Comparative Summary of Alternative (Acres)

Resource or Resource Use	Alternative A	Alternative B	Alternative C	Alternative D
GRSG Habitat Areas*				
Preliminary Priority (PPH)	0	1,576,900	1,576,900	1,576,900
Preliminary General (PGH)	0	1,134,800	1,134,800	1,134,800
Linkage/Connectivity	0	181,900	181,900	181,900
Fluid Mineral Leasing				
Closed to Fluid Mineral Leasing	100,200	1,347,400	2,473,000	100,200

Note: *BLM/USFS surface and federal mineral estate, including coal.

Source: Table 2.2, page 42, Sage-Grouse EIS.

Other economic use of these properties for grazing, recreation, or other mineral extraction would also be restricted.

Current federal oil and gas leases comprise 653,700 acres, or 26 percent, of the total subsurface federal mineral estate in the planning area. Unleased subsurface federal mineral estate within areas of high potential for oil and gas comprises an additional 521,600 acres, or 19 percent, of the total federal mineral estate within the planning area.

Oil and gas drilling reductions. Figure II-2 shows the number of anticipated oil and gas wells (20 years) completed in the Socioeconomic Planning Area for each alternative. Alternative A is a baseline scenario that assumes a continuation of current leasing and regulatory practices. Alterntive A anticipates 34,694 wells, or approximately 1,734 wells per year, will be completed in the multi-county Planning Area.

Figure II-2.
Oil and Gas Well Numbers: 20-Year Forecast

Source: Elaborated by BLM staff based on field office Reasonable Foreseeable Development Scenarios and available information. Sage-Grouse EIS, Appendix M page 35; Table M-17.

Federal, State, and Fee Surface	Anticipated Wells in Primary Study Area
Alternative A - Completed Wells	34,694
Alternative B - Completed Wells	33,091
Alternative C - Completed Wells	28,704
Alternative D - Completed Wells	33,893

Alternative C, which is the most comprehensive habitat preservation alternative, still anticipates 28,704 wells. This is a reduction of about 6,000 wells over a 20-year period in comparison with Alternative A.

Mineral production. Similarly, Table II-3 shows expectations of the projected quantity of oil and gas production over the 20-year forecast period on federal surface and on federal, state, and fee surface.

Figure II-3.
Projected Oil and Gas Production, 20-Year Period

Alternative A		Alternative B		Alternative C		Alternative D	
Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)
Federal Surface							
52,650	17,424	38,994	15,702	27,069	12,478	45,822	16,563
Federal, State, and Fee Surface							
96,211	36,108	82,556	34,386	70,631	31,162	89,384	35,247

Source: Sage-Grouse EIS Table M.17

These production forecasts by alternative anticipate impacts to oil and gas production over time in similar proportions to the drilling effects shown in prior Figure II-2.

Economic Impact. The economic analysis published as part of the Sage-Grouse EIS (Figure II-4) offers a summary of the economic effects associated with oil and gas operations under each management scenario. Alternative A is a continuation of current practices. Alternatives B, C, and D reflect variations of increased regulation for Sage-Grouse management objectives.

As noted below, the Sage-Grouse EIS authors anticipate $2.974 billion of oil and gas output and 19,073 jobs will be supported by oil and gas activities (average annual over 20-year forecast period) in the primary study area under current management practices (Alternative A). Under the most stringent Sage-Grouse habitat practices, the corresponding figures are $2.108 billion in output and 13,532 jobs. This represents a loss of $866 million in economic output and 5,541 jobs on an average annual basis.

Table II-4
Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings by Alternative

	Alternative A	Alternative B	Alternative C, Primary Study Area	Alternative D
Output (2011)	$2,974,932,481	$2,683,008,735	$2,108,789,332	$2,828,970,608
Employment	19,073	17,215	13,532	18,144
Earnings (2011)	$1,078,265,304	$973,088,057	$764,866,305	$1,025,676,680
Average Earnings per Job (2011)	$56,533	$56,526	$56,522	$56,529

Source: Greater Sage-Grouse EIS; Table 4.16 Calculated using the IMPLAN model as explained in the text and in Appendix M, Socioeconomics.

Based on known reserves and worker commuting patterns, most of this impact would occur in Garfield County. This job loss happens against an assumed backdrop of robust oil and gas development. These losses do not appear to include the lost jobs associated with operating wells. Although the Methodological Appendix M includes an explanation of the operating employment calculation process, it does not appear that the final projections are included in the EIS impact projections (see BBC specific comments).

Similarly proportioned, but more modest, economic losses are associated with grazing, recreation, and other activities restricted from access to federal lands.

EIS Conclusions

In essence, the Sage-Grouse EIS suggests that even under the most aggressive habitat management option, gas production will be diminished by only about 300 wells per year, causing a reduction in employment of about 5,500 jobs (annual average). Presumably, economic losses would be largely, but not exclusively, in Garfield County.

Conceptual Issues Underlying Calculations of Economic Impacts

The Draft Sage-Grouse EIS describes habitat management philosophy and general approach under each alternative, but lacks detail on how the collective management strategies contemplated would be measured, monitored, and implemented. Economic impacts are largely determined by these detailed management determinations. The Garfield County Commissioners, local officials, industry representatives, and the planning staff working on the review of the Sage-Grouse EIS have expressed concerns about the validity of the document's economic impact calculations given the lack of clarity on how oil and gas—and to a lesser degree, grazing and recreation—might be affected.

BBC has identified a number of technical issues with the Sage-Grouse economic impact analysis that have been detailed and forwarded to the BLM separately. From the broadest approach perspective, Garfield County's concerns regarding the EIS's representation of economic effects fall into four areas:

> **Concentration of effects.** The Sage-Grouse EIS covers a very large geographic area and a sizeable and diverse economic base. The economic impact analysis does not recognize the concentration of effects in smaller areas within this region. The great majority of northwest Colorado oil and gas activity anticipated in the coming years will occur in the Roan Plateau area and the broader Piceance Basin, which is primarily in Garfield and Rio Blanco counties. The effects of a diminished oil and gas industry will not be spread over a large planning area as represented in the Sage-Grouse EIS analysis, but instead will be sharply focused on Garfield County and to a lesser degree Rio Blanco and Mesa counties.
>
> **Impacts on private lands**. The BLM analysis states that only new mineral leases on public lands, or on split estates with minerals managed by BLM, will face additional regulatory constraints with more pervasive Sage-Grouse habitat management. In this area of the country, it is very common to have federal land interspersed with private lands, and for energy companies to pursue leases that have both public and private lands. Even if private lands are not the target of new regulations, in many instances it may be impossible to use these properties without crossing federal lands or using federal lands for staging and piping. While the BLM does not have the authority to restrict development on private land, they could preclude or limit project authorizations on public lands in order to compensate for habitat disturbances on private land. Consequently, decisions made on private lands might affect what the BLM can authorize on public lands. The EIS shows a

misunderstanding of the realities of public land management and its impact on private land uses.

Impacts to existing leaseholders. While the Sage-Grouse EIS acknowledges valid existing leaseholder rights, habitat management restrictions could in practicality undermine the development of existing leaseholds. For example, the disturbance cap concept proposed by BLM could result in the denial of projects simply because other disturbances have decreased available cap space, ultimately denying valid existing lease rights. Or conversely, activity on existing leases may quickly exceed the disturbance caps and effectively preclude development on remaining federal lands subject to Grouse management efforts.

On split-estate lands with federal minerals and private surface, BLM would apply disturbance cap restrictions to federal mineral leaseholders as lease terms and conditions of approval (COAs), regardless of ownership or lease rights on the surface property.

Impacts on financial viability of drilling activity. Seemingly minor changes in drilling requirements can fundamentally alter the economic viability of pursuing resource reserves. Investments in Piceance Basin are generally large scale projects that are planned and executed over many years, often decades, and typically incorporate state and federal and private lands in large multi-year drilling units. The cost of getting rigs into the area and efficiently pursuing the resource requires some predictability and flexibility so that long term operating efficiencies can be realized. Vague standards for drilling practices can be as punitive as complete prohibitions against activity. Many properties will very likely face significant new barriers to resource development, such as limitations on seasonal activities, pipeline locations, road access or changes in accepted drilling practices, any of which that will effectively reduce or eliminate drilling viability on a wide range of private and non-BLM properties.

In sum, the cumulative impact of the closures and designations in the DEIS could effectively preclude or significantly diminish energy resource development on hundreds of thousands of acres across northwest Colorado, greatly reducing the development potential of the Piceance Basin reserves, one of the major natural gas reserves areas in the country. The extent of these prospective impacts is not disclosed in the EIS document.

The following section offers an economic analysis that demonstrates the potential losses of jobs, investment and assessed value, assuming the practical impacts of the proposed new management regulations have a more restrictive combined effect than suggested or represented in the Sage-Grouse EIS.

SECTION III.
Illustrative Example: Economic Impacts of Reduced Oil and Gas Development on Garfield County

Some of the most promising gas resources in Colorado and in the nation as a whole are in and around the Roan Plateau and adjoining portions of the Piceance Basin, north and west of the Roan Plateau. This area also contains prime and secondary Grouse habitat subject to BLM management proposals, although the extent of such habitat is uncertain. The area contains a patchwork of private, public, and federal fee lands and contains many existing drilling leases.

This section examines the oil and gas development prospects in Garfield County and the potential property value and jobs at risk with the proposed BLM Sage-Grouse habitat management plans.

Example of Garfield County Development Prospects

By way of example, BBC has developed an illustrative economic impact analysis that focuses on Garfield County, but uses many of the production, employment, and valuation assumptions underlying the Sage-Grouse EIS report.

The objective of this exercise is to demonstrate the order of magnitude of economic development opportunities associated with development of the Piceance Basin and thus the potential economic value jeopardized if habitat management limits the development of these reserves.

Summary of impacts. The results of this process are summarized in Figure III-1. Additional details on assumptions underlying these projections are provided in the accompanying text or in attached Appendix A.

Over a 20-year development period, approximately 25,000 wells are reasonably foreseeable in Garfield County—about 70 percent of the 34,700 wells that are projected in the Sage-Grouse EIS for northwest Colorado. Based on Sage-Grouse EIS multipliers, this level of development in year 20 would result in over $12.3 billion in annual resource production value, 48,000 annual jobs, and nearly $10 billion in new county assessed value. The county's current mill levy (13.66 mills) would produce over $130 million in annual county general fund tax revenue by year 20. Applicable school, fire and special districts would have similar outsized revenue benefits.

This is the level of economic activity is put at risk by the proposed Sage-Grouse habitat management plans, a concern that is not disclosed or discussed in the Final Draft Sage-Grouse EIS.

Figure III-1 shows annual and cumulative economic impacts associated with Piceance Basin resource development. The assumptions underlying Figure III-1 are largely drawn from the EIS and described in the remainder of this report.

Figure III-1.
Potential Oil and Gas Development in the Piceance Basin and Resultant Economic Effects

	Year 1	Year 5	Year 10	Year 15	Year 20	Cumulative
Number of Wells						
Annual New Wells in NW Colorado	1,750	1,750	1,750	1,750	1,750	35,000
Annual New Wells in Garfield County	1,250	1,250	1,250	1,250	1,250	25,000
Cumulative Wells in Garfield County	1,250	6,250	12,500	18,750	25,000	
Production Value in Garfield County						
Annual Value from Wells ($millions)	$1,409	$5,769	$9,176	$11,187	$12,375	$170,380
Assessed Value ($millions)	$1,127	$4,615	$7,341	$8,950	$9,900	$136,304
Annual County Property Tax ($millions)	$15	$63	$100	$122	$135	$1,861
Employment from Garfield Co Wells						
BLM DEIS-based						
Annual Drilling and Completion	26,625	26,625	26,625	26,625	26,625	N/A
Annual Operating Jobs	2,520	10,320	16,414	20,013	22,138	N/A
Total Annual Jobs	29,145	36,945	43,039	46,638	48,763	N/A
Leeds Statewide-based						
Annual Drilling and Completion	15,998	15,998	15,998	15,998	15,998	N/A
Annual Operating Jobs	2,662	10,902	17,339	21,140	23,385	N/A
Total Annual Jobs	18,661	26,900	33,337	37,139	39,383	N/A
2008 AGNC Study-based						
Annual Drilling and Completion	8,387	8,387	8,387	8,387	8,387	N/A
Annual Operating Jobs	516	2,581	5,161	7,742	10,322	N/A
Total Annual Jobs	8,903	10,968	13,548	16,129	18,709	N/A

Source: BLM Sage-Grouse EIS; BBC Research & Consulting, 2013. Note: three sources of job multipliers are shown to demonstrate variations in multipliers; see text. All job estimates are by place of work (wells in Garfield County) a share of these workers will live outside the county, most likely in Mesa County.

The current value of all Garfield natural resource properties is about $2.0 billion. The above data indicate new energy resource assessed valuations in the country could rise to nearly $10 billion with development of the Piceance reserves. At this level of assessed value, the Garfield County general fund mill levy would produce over $130 million per year in property tax receipts. Local school, fire and hospital districts would witness similar proportional increases.

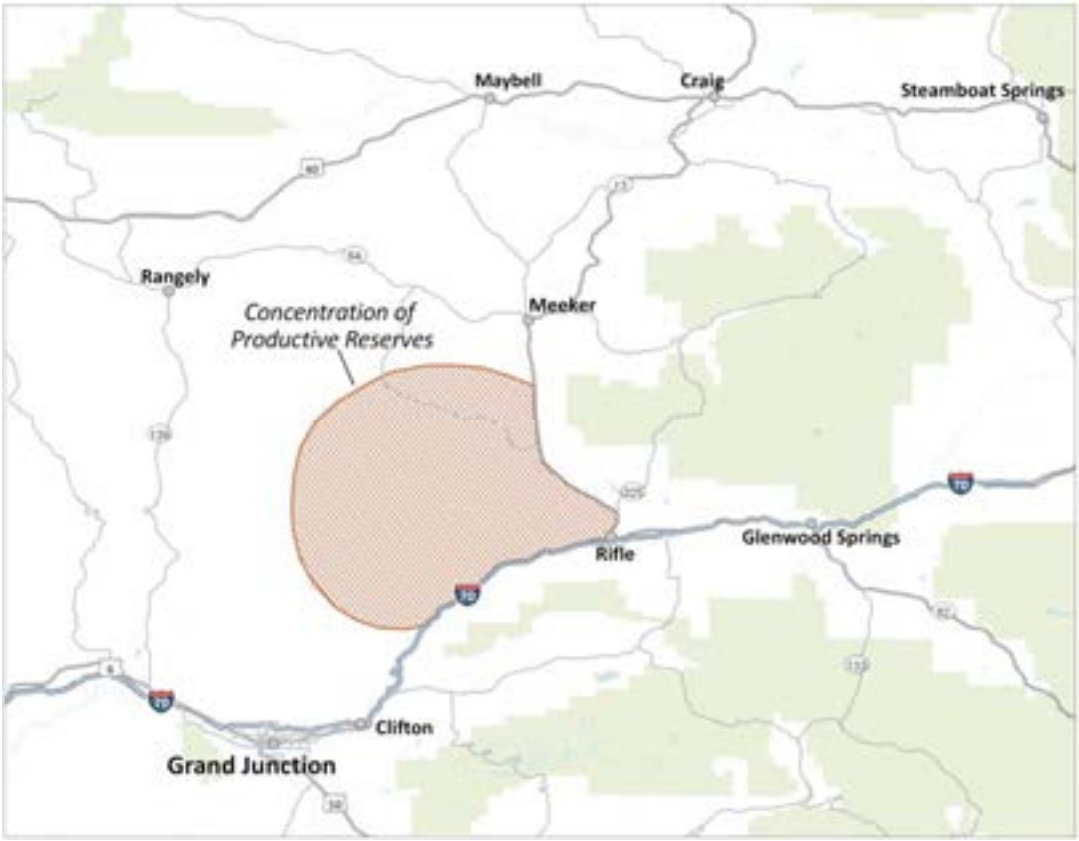
These jobs and tax consequences, or some significant share of these estimates, are in jeopardy under all of the action scenarios in the Sage-Grouse EIS. This is the type of economic impact that the EIS is required to analyze and reveal.

Modeling Approach

The following offers more detail on the modeling approach and assumptions underlying the prior Figure III-1.

Drilling activity. Figure III-2 shows the general location of the most promising gas development prospects. The pace of future development of the region's oil and gas reserves is uncertain. Exploration and production will ultimately depend on competitive influences, regulatory practices, and natural gas prices. The projections presented here are based entirely on the drilling expectations in the Sage-Grouse EIS.

Figure III-2.
Piceance Basin Area of High Oil and Gas Production Prospects



Source: BBC Research & Consulting

A large share of the productive mineral resource in the Piceance Basin is owned by the federal government, either as federal lands or federal mineral rights below private surface rights. Private property is interspersed throughout the area. There are multiple existing lease holders in the area, including Encana Corporation, Bill Barrett Corporation, and WPX. Private property owners in this area include Chevron, Shell, and Exxon.

Reserves. The amount of natural gas reserves in the Piceance Basin is uncertain. Estimates vary widely but significant reserves have been proven and are currently in development. The following are recent estimates (with references):

- 300 trillion cubic feet of natural gas in the basin (http://oilshalegas.com/piceancebasin.html)
- Estimates from the central part of the basin, where reserves are greatest, range from 60 to 120 billion cubic feet per square mile, decreasing nearer the edges of the basin.

(http://gvinsider.com/2011/understanding-the-geology-of-piceance-basin-natural-gas/).

- 200 to 300 trillion cubic feet within the basin (http://www.api.org/~/media/Files/Policy/Exploration/Energy-Resources/SER_PiceanceBasin.pdf)
- 300 trillion cubic feet of natural gas in the basin (http://www.energyandcapital.com/articles/investing-in-the-piceance-basin/3752)

Development expectations. Estimate of likely gas production in the Piceance Basin and related development activity are derived from the Sage-Grouse EIS estimates.

- According to the Sage-Grouse EIS, estimates of the number of wells drilled and the number of wells completed under the No Action Alternative (Alternative A) were based on the n*umber of wells expected to be drilled and completed* per year in each BLM field office's current reasonably foreseeable development scenario (Appendix M, page 34).

- As noted previously, the Sage-Grouse EIS anticipates 34,694 completed wells on "Federal State and Fee Surface" properties over the next 20 years in the full Sage-Grouse Planning Area. Approximately 70-80 percent of this activity is expected to be concentrated in Garfield and Rio Blanco counties and the Piceance Basin, suggesting about 25,000 new wells on public lands and federal fee properties in these counties. It appears that the Sage-Grouse projections do not include private lands with private minerals, but it is unclear what is intended. The Sage-Grouse EIS indicates that private lands would be subject to the development caps.

- These estimates may be conservative. There are three known levels of natural gas reserves in the Piceance Basin. Most wells have been drilled into the Mesaverde formation, but recent exploration has shown very high productivity from the deeper Upper Mancos formation, which could provide many decades of additional gas production.

- One example of the industry's interest in this area, which corroborates this level of likely drilling activity, involves Encana Corporation and Nucor Steel Company, who have entered an agreement for a joint natural gas drilling program on leased lands known as the Big Jimmy. According to the Oil and Gas Journal[3], if allowed to proceed, the partners are committed to spend over $3.6 billion, producing 3,500 wells on about 55,000 acres. This project alone could produce over 34 billion in resource value over a 20-25 year period.

For the purposes of this exercise, BBC has used the EIS projection of wells in northwest Colorado and modeled 1,250 wells per year in the primary drilling area within the Piceance Basin, which is subject to the prospective BLM restrictions. Additional wells will occur elsewhere in the

[3] Confirmed by communication with Jason Oates, Group Leader Regulatory, South Rockies Business Unit Encanna Oil and Gas, October, 2013.

county. This pace of well development is conservative, less than the drilling level that occurred in 2007/2008 period in Garfield County.

Production costs and value. Sage-Grouse EIS Appendix M, Table M-19 indicates $2.7 million per well for drilling and completion costs. BBC has used these estimates and assumed that each well will produce about 2.5 billion cubic feet over a 20-year period, slightly less than the expectations used in the EIS. We have incorporated a production decay cure that mirrors the very high, early years' productivity and the diminishing production over time that characterizes shale gas wells. This productivity curve explains the flattening of production in later years. By year 20, the Piceance could be producing over $12.0 billion in the market value of gas production.

Employment. The authors of the Sage-Grouse EIS rely on a commonly used economic impact model (IMPLAN) to forecast economic activity associated with this level of resource recovery investment and development. The Sage-Grouse EIS assumes 11.7 direct construction jobs per well and 9.6 indirect and induced jobs per well (drilling and completion but not operations) or about 21 jobs per well drilled (Appendix M, Table M21). It does not appear that the production workers were actually included in the Sage-Grouse EIS modeling.

The multipliers used in the EIS produce very high employment estimates, forecasts that strain credibility. As a check against these estimates, BBC derived additional employment ratios from the 2013 *Assessment of Colorado Oil and Gas Industry—Industrial and Fiscal Contributions in Colorado*, conducted by the Business Research Division, Leeds School of Business at the University of Colorado, 2013. In addition, BBC used its own calculations that were developed in the 2008 Energy Study for the Associated Governments of Northwest Colorado. This later study relied largely on traditional horizontal wells and likely produces lower estimates than more recent analyses that use more current information. By year 20, this new gas production could readily employ over 30,000 workers, or as many as 48,700 according to the EIS calculations

State & federal revenues. Oil and gas activity produces revenues accruing to the federal government (from mineral leasing on federal lands) and state government (from severance taxes and state sharing of federal lease revenues). For local governments, property taxes are the most important source of ongoing tax receipts although there are other share back provisions from federal and state resources.

The EIS takes a very broad brush approach to lost tax revenues. Property taxes in particular are unspecified by location.

Property taxes. Property tax revenues reflect a property's taxable assessed value and applicable tax rates. An oil and gas property's taxable assessed value is based on its production. The prior year's primary production values are assessed at 87.5 percent. Equipment, buildings, fixtures, and leasehold improvements are assessed at the commercial property assessment ratio (29% of actual value). The appropriate tax rates (mill levies) are then applied to the assessed property value.

BBC has employed the same methodology used in the EIS to calculate production related assessed valuation (annual production X market value X assessment ratio in %). We have

reduced the EIS assessment ratio for 87.6 % to 80% to reflect various allowed value adjustments. Results are shown in prior the prior Summary Table III-1 and the following Figure III-3.

The importance of property taxes to Garfield County and related service providers is readily documented below. In 2013, despite lower gas values and reduced assessed values, the energy industry represented over 70 percent of the county's assessed value base and even higher proportions of the county's two associated school districts and the Grand River Hospital District. Current levels of assessed value for Garfield County and oil and gas affected districts is shown in Figure III-3.

Garfield County currently has more than $2.0 billion of assessed mineral value, but this value will diminish as well production slows. BBC's analysis indicates that Piceance Basin drilling activity alone would push that assessed value to about $9.9 billion.

The location of drilling versus individual district boundaries will ultimately determine which districts are beneficiaries of this increased value of Garfield County. Some districts are also subject to the Tabor Amendment, which limits realized increases in tax revenues. Property taxes from resource development are substantial. As noted above, the increase in mineral assessed value projected for this area is far in excess of the entire valuation of the existing county.

Figure III-3.
Current Garfield County Assessed Value

Taxing Entity	2012 Mill Levy	2013 Oil & Gas Assessed Value	2013 Total Assessed Value	% Assessed Value Attributable to Oil & Gas	2013 Estimated Revenue Attributable to Oil and Gas
Garfield County	13.66	$2,033,460,260.00	$2,896,661,540.00	70.20%	$27,766,899.85
RE-2 School District	13.76	$851,907,900.00	$1,115,636,270.00	76.36%	$11,723,956.52
School District 16	6.77	$834,285,190.00	$900,613,910.00	92.64%	$5,644,773.60
Town of Parachute	13.56	$5,621,910.00	$25,548,360.00	22.00%	$76,244.34
City of Rifle	5.26	$478,960.00	$98,516,850.00	0.49%	$2,519.81
Town of Silt	8.97	$0.00	$22,692,110.00	0.00%	$0.00
Burning Mtn Fire	6.10	$405,119,870.00	$520,432,670.00	77.84%	$2,472,041.45
Debeque Fire	3.93	$337,601,310.00	$357,706,100.00	94.38%	$1,326,773.15
Grand Valley Fire	3.27	$857,441,670.00	$924,731,600.00	92.72%	$2,801,261.94
Rfile Fire	6.10	$379,784,460.00	$526,060,910.00	72.19%	$2,317,444.77
Grand River Hospital	5.60	$2,016,732,740.00	$2,322,671,040.00	86.83%	$11,287,653.15

Source: Garfield County Assessor, 2013 and BBC, 2013

Production in the Piceance Basin offers an opportunity to continue the county's well funded, low tax rate structure for many decades to come. The county's oil and gas assessed value has the prospect of rising about five fold above current levels. Similar increases would occur in the school, hospital and fire districts and the affected municipalities.

APPENDIX A.

Piceance Basin Development Assumptions

	Constant Value		Year 1	Year 5	Year 10	Year 15	Year 20
Development							
Annual New Wells in NW Colorado Region by Year	1,750	BLM/BBC	1,750	1,750	1,750	1,750	1,750
% of Wells in Garfield County	71%	BBC					
Annual New Wells in Garfield County			1,250	1,250	1,250	1,250	1,250
Cumulative New Operating Wells in Garfield County			1,250	6,250	12,500	18,750	25,000
Investment per Well	$2,800,000						
Production & Value							
Production per Well (BCF Over 20-year Life)	2.5	BBC					
Annual Production from Cumulative New Wells (BCF)			355.8	1,456.8	2,317.1	2,825.1	3,125.0
Value per MCF	$3.96	BLM M.23					
Annual Value of Total Production (in $millions)			$1,409	$5,769	$9,176	$11,187	$12,375
Assessed Value (of Production Value)	80.0%	BLM	$1,127	$4,615	$7,341	$8,950	$9,900
Annual County Property Tax (in $millions)	13.65 Mill Levy		$15	$63	$100	$122	$135
Labor Force							
Using BLM DEIS Assumptions							
Drilling and Completion Workers per Well	**21.3**	**BLM**	**26,625**	**26,625**	**26,625**	**26,625**	**26,625**
Direct	11.7	BLM	14,625	14,625	14,625	14,625	14,625
Indirect and Induced	9.6	BLM	12,000	12,000	12,000	12,000	12,000
Operating Workers per BCF Production	**7.08**	**BLM**	**2,520**	**10,320**	**16,414**	**20,013**	**22,138**
Direct	0.78	BLM	279	1,142	1,817	2,215	2,450
Indirect and Induced	6.30	BLM	2,241	9,178	14,598	17,798	19,688
Total Employment Effect			**29,145**	**36,945**	**43,039**	**46,638**	**48,763**
Using Assumptions Based on 2012 Leeds Study							
Drilling and Completion Workers per Well	**12.8**	**Leeds/BBC**	**15,998**	**15,998**	**15,998**	**15,998**	**15,998**
Direct	5.2	Leeds/BBC	6,455	6,455	6,455	6,455	6,455
Indirect and Induced	7.6	Leeds/BBC	9,543	9,543	9,543	9,543	9,543
Operating Workers per BCF Production	**7.48**	**Leeds/BBC**	**2,662**	**10,902**	**17,339**	**21,140**	**23,385**
Direct	3.02	Leeds/BBC	1,074	4,399	6,996	8,530	9,435
Indirect and Induced	4.46	Leeds/BBC	1,588	6,503	10,343	12,611	13,950
Total Employment Effect			**18,661**	**26,900**	**33,337**	**37,139**	**39,383**

Source: BBC Research & Consulting, October 2013.

Comments on Preliminary Proposed RMP
Land Use Plan Amendment
Final EIS for Cooperating Agency Review

Comments:

#1: Chapter and Page: 1-4, Row # or Line #: 26-31, Reviewer Name: Tom Jankovsky/Fred Jarman
Garfield County is a Cooperating Agency in the Roan Plateau Resource Supplemental EIS (SEIS). We have been told by the BLM that the GRSG will not be analyzed in the Roan SEIS but the SEIS will be amended from the NW Colorado Sub-regional GRSG LUPA, and EIS, contrary to the statement on 1-4; line 26-31.

#2: Chapter and Page: 1-5, Row # or Line #: 6-11, Reviewer Name: Tom Jankovsky/Fred Jarman
Garfield County disagrees with the statement that the National Technical Team Report (NTT Report) provides the latest science and best biological judgement to assist in making management decisions relating to the GRSG. To the contrary, Garfield County supports the analysis in the NTT Data Quality Act Challenge[1] that raises serious questions about the scientific integrity of that Report such that it should not be used as the basis for Alternatives in the FEIS. Ultimately, the statement that the NTT 2011 report provides the latest science and best biological judgement to assist in making management decisions relating to the GRSG is inconsistent with the findings of Garfield County and the policies in the Garfield County Sage Grouse Plan.

#3: Chapter and Page: 1-5, Row # or Line #: 12-14, Reviewer Name: Tom Jankovsky/Fred Jarman
Garfield County questions the accuracy of the habitat mapping for Garfield County as provided in the FEIS. As CPW and the BLM both explained to Garfield County[2], the mapping provided by CPW to the BLM is a Sensitive Wildlife Habitat map used for consultation purposes rather than a depiction of actual priority habitat. This Sensitive Wildlife Habitat map was generated from a 50,000 ft. viewpoint as testified by CPW in a Garfield County Coordination meeting on September 5, 2012.[3] Current mapping in the GRSG FEIS (notably all the mapping FEIS Figures that depict Priority and General Habitat as well as Linkage / Connectivity areas) is not the best available science and remains inconsistent with habitat mapping found in the Garfield County GRSG Conservation Plan[4] or in the peer reviewed manuscript used as the basis for habitat modeling in Garfield County.[5]

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[1] *See* BLM NTT Data Quality Act Challenge files with the BLM on March 18, 2015, attached as Exhibit Z.
[2] *See* Letter to Mike King, Director, Colorado Department of Natural Resources, October 21, 2013 attached as Exhibit S.
[3] *See* Garfield County Coordination Meeting Official Transcript on September 5, 2013, lines 4-9, page 80, attached as Exhibit J.
[4] *See* Garfield County Greater Sage-Grouse Conservation Plan, as amended, November 17, 2015 attached as Exhibit V.
[5] *See* Use of Modeling in a Geographic Information System to Predict Greater Sage-Grouse Habitat, January 21, 2015, attached as Exhibit Y.

#4: Chapter and Page: 1-6, Row # or Line #: 24-33, Reviewer Name: Tom Jankovsky/Fred Jarman The USGS "Conservation Buffer Distance Estimates for GRSG – A Review" as discussed in the Data Quality Act Challenge of the USGS Monograph Report[6] is inconsistent with Garfield County findings. Garfield County questions buffer distance estimates as they might apply to habitat in Garfield County which is naturally fragmented with wildly undulating and steep topography and vegetation type variability uncommon to the national (and typical) range. The BLM's science and application of buffers is inconsistent with findings in the Garfield County Plan.

#5: Chapter and Page: 1-8, Row # or Line #: 12-13, Reviewer Name: Tom Jankovsky/Fred Jarman Garfield County is quite concerned about the Conservation Objectives Team Report (COT Report) and formally supported the Data Quality Challenge regarding the same.[7] Garfield County also questions the professional adequacy of the team members such that some are not GRSG biologists.

#6: Chapter and Page: 1-10, Row # or Line #: 17-18, Reviewer Name: Tom Jankovsky/Fred Jarman Garfield County questions the Purpose and Need of the GRSG LUPA the USFWS March, 2010 "warranted but precluded" ESA listing petition decision. Garfield County questions the non-transparent "sue and settlement agreement" with the plaintiffs and the USFWS. Garfield questions the USFWS population estimates and the model used regarding extinction prediction. The same points were raised in the Center for Environmental Science, Accuracy and Reliability report, "Science or Advocacy."[8]

#7: Chapter and Page: 1-10, Row # or Line #: 24-26, Reviewer Name: Tom Jankovsky/Fred Jarman GRSG populations in Garfield County and NW Colorado are not in decline. In fact, the PPR population which includes Garfield County shows a 112 percent increase since 2010 (High Male Count) in data from Colorado Parks and Wildlife (CPW).[9]

#8: Chapter and Page: 1-10, Row # or Line #: 31-32, Reviewer Name: Tom Jankovsky/Fred Jarman BLM Instructional Memorandum 2012 – 044, BLM National GRSG Land Use Planning Strategy under policy and action states, "the conservation measures developed by NTT must be considered and analyzed, as appropriate, through land use planning process by all BLM State and Field Offices that contain occupied GRSG habitat. While these conservation measures are range wide in scale, it is expected that at the regional and sub-regional planning scales, there may be some adjustments of these conservation measures in order to address local ecological site variability." Garfield County specifically has local ecological site variability mentioned in IM 2012-44. The NW Colorado GRSG LUPA does not take into consideration the uniquely naturally fragmented habitat,

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[6] *See* USGS Monograph Report Data Quality Act Challenge filed with the USGS on March 18, 2015, attached as Exhibit BB.

[7] *See* USFWS Conservation Objectives Team Report Data Quality Act Challenge filed with the USFWS on March 18, 2015, attached as Exhibit AA.

[8] *See* Center for Environmental Science, Accuracy & Reliability's Report entitled, "Science or Advocacy" as a part of the Data Quality Act Challenge of the USGS Monograph filed with the USGS on March 18, 2015, attached as Exhibit BB Sub-Exhibit A.

[9] *See* Garfield County graph entitled "How are the Greater Sage Grouse doing in Colorado & PPR (Garfield & Rio Blanco Counties)?" attached as Exhibit CC.

dramatic changes in topography and vegetation in Garfield County. The LUPA is not consistent with Garfield County GRSG Conservation Plan (43 CFR; 1610. 3-2 Consistency requirements) nor has the BLM coordinated in the LUPA to address the inconsistencies with the Garfield County Plan. Although Garfield County attempted to Coordinate with the BLM[10], the BLM has not resolved the conflicts and inconsistencies between the two Plans.

#9: Chapter and Page: 1-11, Row # or Line #: 22-24, Reviewer Name: Tom Jankovsky/Fred Jarman Decisions in this LUPA are only applied to BLM-administered lands, National Forest Surface, and those lands that have a federal nexus due leased federal minerals. In our still valid comments regarding the DEIS[11], Garfield County thoroughly explained our concerns regarding the BLM's intent to use disturbance cap programs to penalize (reduce cap threshold availability) activity on public lands because of their inventory of disturbance on private lands without legal authority to do so.

#10: Chapter and Page: 1-19, Row # or Line #: 33-39, Reviewer Name: Tom Jankovsky/Fred Jarman This paragraph starts to acknowledge the difference in the PPR habitat on narrow mid-elevation ridges. The habitat in Garfield County is naturally fragmented, with dramatic changes in topography and vegetation. This habitat is different from the rest of the national range. The national studies and reports sited in the LUPA are inconsistent with Garfield County habitat, Garfield County Conservation Plan.

#11: Chapter and Page: 1-28, Row # or Line #: 28-42, Reviewer Name: Tom Jankovsky/Fred Jarman The BLM Instructional Memorandum 2012-044 states "the PPH and PGH data and maps have been/are being developed by the BLM through a collaborative effort between the BLM and the respective state wildlife agency and these science based maps were developed using the best available data and may change as new information becomes available. Such changes would be science-based and coordinated with the state wildlife agencies so that the resulting delimitation of PPH and PGH provides for sustainable populations."

As testified by the BLM during the formal Garfield County Coordination meetings[12], there are no maps that have been developed by the BLM in the EIS. As stated in comments above, the Colorado Parks and Wildlife provided the habitat maps to the BLM which were designed as broad Sensitive Wildlife Maps used for consultation purposes and were not designed to identify specific GRSG priority habitat. In Garfield County, the best science-based habitat to date continue to be the objectively peer reviewed habitat maps contained in the Garfield County Greater Sage Grouse Conservation Plan and the maps are Garfield County GRSG peer reviewed maps. [13] The BLM has not reviewed nor resolved the inconsistencies between the Garfield County Conservation Plan Map and the BLM LUPA/DEIS map for Garfield County.

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[10] *See* Garfield County Coordination Meeting Official Transcripts attached as Exhibits G, I, J and N.
[11] *See* Garfield County comments to the BLM on the Draft Resource Management Plan Amendment and Draft Environmental Impact Statement filed with the BLM on December 2, 2013 attached as Exhibit T.
[12] *See* Garfield County Coordination Meeting Official Transcripts attached as Exhibits G, I, J and N.

[13] *See* the Manuscript: Use of Modelling in a Geographic Information System to Predict Greater Sage-Grouse Habitat, January 21, 2015, attached as Exhibit Y.

#12: Chapter and Page: 1-30, Row # or Line #: 17-22, Reviewer Name: Tom Jankovsky/Fred Jarman
1.5.1. The Scoping Process. Garfield County questions the BLM's procedures and commitment to the scoping process. Under FLPMA regulations, "43 CFR 1610.3-1/3-2, Coordination of Planning Efforts, the BLM is to assist in resolving inconsistencies between federal and non-federal government plans, and develop resource management plans collaboratively with cooperating agencies. The BLM LUPA and FEIS is inconsistent with the Garfield County GRSG Conservation Plan pertaining to GRSG maps, buffers, disturbance caps, habitat management in GRSG general habitat and regulatory assurance. These inconsistencies have not been resolved nor has there been collaboration between the BLM and Garfield County.

#13: Chapter and Page: 1-31, Row # or Line #: 34-39, Reviewer Name: Tom Jankovsky/Fred Jarman
Issues identified for consideration in the NW Colorado LUPA are not consistent with the Garfield County GRSG Conservation Plan and Garfield County comments on the BLM RMPA and DEIS comments concerning predation and hunting as an issue and threat to the GRSG. Also refer to the COT Data Quality Challenge. Concerning Fluid Minerals, the largest LEK in the PPR is on a reclaimed well pad, 31 strutting males, CPW Nov 2014 PPR GRSG work group report.

#14: Chapter and Page: 1-32, Row # or Line #: 1-5, Reviewer Name: Tom Jankovsky/Fred Jarman
Planning Criteria - "Planning criteria are based on appropriate laws, regulations, BLM and Forest Service, service manual and Handbook sections, policy directives, as well as on public participation and coordination with cooperating agencies". Garfield County questions the planning criteria follow appropriate laws and regulations. Refer to comments above illustrating Garfield County's concerns over the BLM ignoring their own policy directives in IM 2012-44. Refer to the BLM desk guide to cooperating agency relationships and coordination #2012.

#15: Chapter and Page: 1-32, Row # or Line #: 6-10, Reviewer Name: Tom Jankovsky/Fred Jarman
1.8 Relationship to other Policies, Plans and Programs. "While the BLM and Forest Service are not obligated to seek consistency, the agencies are required to describe the inconsistencies between the proposed action and other plan, policies and controls within the EIS." Garfield County alternative #2.11.2 BLM response to the inconsistencies with Garfield County GRSG conservation plan are inadequate in that it states "the Garfield County Plan is contained within the existing range of alternatives and is not significantly distinguishable from those alternatives." This statement is patently false. The Alternatives do not address / include specific components of the Garfield County Plan. The NW Colorado GRSG LUPA and FEIS does not address inconsistencies with the Garfield GRSG conservation plan in habitat maps, buffers disturbance caps, threats, regulatory assurance or implementation of policies. (Chapter and Page: 1-32, Row # or Line #: 6-10)

#16: Chapter and Page: 1-35, Row # or Line #: 31-35, Reviewer Name: Tom Jankovsky/Fred Jarman
Proposed LUPA management action concerning buffer from LEKS in PHMA and ADH. Due to naturally fragmented habitat, drastic changes in topography and vegetation in Garfield County

and the PPR, there is no scientific evidence that buffers work in this terrain. With topography change within .6 mile could be 2000' below a lek and completely out of GRSG habitat. These buffers consistency have not been resolved between the Garfield County Greater Sage Grouse Conservation Plan and the NW Colorado BLM LUPA and FEIS. (Chapter and Page: 1-35, Row # or Line #: 31-35)

#17: Chapter and Page: 1-42, Row # or Line #: 11-45, Reviewer Name: Tom Jankovsky/Fred Jarman
"The disturbance cap in Proposed LUPA/FEIS, was changed from 5 percent in lands that support sagebrush to 3 percent in PHMA." The disturbance cap has no scientific basis and is arbitrary.[14] The problem issue with the disturbance cap in Garfield County and the PPR is difference and inconsistency in the habitat mapping comments #3 and comments #9. The difference in PHMA between the two maps is significant and reflects to the disturbance cap. Chapter and Page: 1-42, Row # or Line #: 11-45.

#18: Chapter and Page: 1-43, Row # or Line #: 7-17, Reviewer Name: Tom Jankovsky/Fred Jarman
The FEIS Social and Economic Conditions is a superficial discussion of potential impacts, it fails to give a concrete economic analysis of the proposed action. It greatly discounts the adverse effects of the proposed action. There is no analysis of loss of jobs in Garfield County, State and Federal revenues and property tax. Table 3.95, page 3-281 refers to tax revenues by County. There is no further analysis to show Garfield County property tax revenues are 70.2 percent attributable to oil and gas property tax. Nor do the Social/Economic conditions reflect the importance of oil and gas property taxes to the special districts in Garfield County. Three fire districts, two school districts, a hospital district and park district receive 70-95 percent of their property tax revenues from oil and gas property taxes.[15] (Chapter and Page: 1-43, Row # or Line #: 7-17.)

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[14] *See* Data Quality Act Challenges for the NTT Report, filed with the BLM on March 18, 2015 and attached as Exhibit Z.

[15] *See* Economic Impacts of Sage-Grouse Management Supplement Report, Piceance Basin Development Analysis prepared by BBC Research and Consulting for Garfield County Community Development Department, attached as Exhibit ___.

BLM – NORTHWEST COLORADO DISTRICT
RESOURCE MANAGEMENT PLAN AMENDMENTS AND ENVIRONMENTAL IMPACT STATEMENT

Comments on *Preliminary* Proposed RMP/Land Use Plan Amendment/Final EIS for Cooperating Agency Review
April 29, 2015

Cmt #	Chapter and Page #	Row # or Line #	Reviewer Name	Reviewer Office/ Affiliation	Comment	A/R/M[1]	Response / How Resolved *(Reviewers: Leave this column blank)*
1.	1-4	26-31	fj / fj		#1		
2.	1-5	6-11			#2		
3.	1-5	12-14			#3		
4.	1-6	24-33			#4		
5.	1-8	12-13			#5		
6.	1-10	9-14			#6		
7.	1-10	17-18			#7		
8.	1-10	24-26			#8		
9.	1-10	31-32			#9		
10.	1-11	22-24			#10		
11.	1-19	33-39			#11		
12.	1-28	28-42			#12		
13.	1-30	17-22			#13		
14.	1-31/~~32~~	34-39			#14		
15.	1-32	1-5			#14		
16.	1-32	6-10			#15		
17.	1-35	31-35			#16		
18.	1-42	11-45			#17		
19.	1-43	7-17			#18		
20.	~~1-44~~	~~38-42~~			#19		
21.	3-252/~~52~~						
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33.							

[1] A = Comment accepted; R = Comment rejected with explanation; M = Comment-response modified

AUDIOTAPED BOARD OF COUNTY COMMISSIONERS

COORDINATION MEETING

GARFIELD COUNTY, COLORADO

108 8th Street, Room 100

Glenwood Springs, Colorado

Wednesday, August 14, 2013

1 p.m.

RE: GREATER SAGE-GROUSE HABITAT MAPPING

APPEARANCES:

Commissioner Chairman John Martin, Garco
Commissioner Tom Jankovsky, Garco
Commissioner Mike Samson, Garco (late arrival)

Representative Bob Rankin
Fred Jarman, Director of Planning, Garco
Drew Gorgey, County Manager (late arrival)
Dr. Rob Ramey, Wildlife Science International
Jim Cagney, Bureau of Land Management, BLM
Eric Jones, Bureau of Land Management, BLM
Kathy Griffin, Colo Parks and Wildlife, CPW
Ron Velarde, Colorado Parks and Wildlife, CPW
Chad Bishop, Colorado Parks and Wildlife, CPW
Steve Yamashita, Acting Director of CPA, CPW
Lauren Ris, Dept of Natural Resources, DNR
Zach Perdue, Pendo Solutions
Eric Petterson, Rocky Mountain Ecological

(Recording begins midsentence.)

REPRESENTATIVE RANKIN: -- a lot of work on the part of a lot of people, and most of you have been involved in that leading up to it.

And, you know, particularly thanks to Garfield County for being proactive and doing this study. You've got some great consultants. You've pulled in, Eric, Zach, and Rob. And you guys have done a great job leading us up to this.

And, you know, certainly you're operating on behalf of your citizens and your tax base on a lot of things, but you've done an exceptional job, I think, of getting the ball rolling on this.

And the State, this is one of my crusades is to get the State to help local citizens when they have these kinds of issues.

And I think in this case you guys have really jumped in and have been very responsive. So thank you for that.

And welcome to Western Colorado. I was talking to Lauren earlier. Next time we want to keep you a little longer and take you fishing and take you for a hike.

I mean, you know, you shouldn't come all the way out here without enjoying all the wonders of

1 Western Colorado. So keep that in mind the next
2 time we get you out here.
3 And certainly to BLM, I mean we do know
4 how hard it is to get public input early and public
5 input at all.
6 We know that you work very hard at that.
7 So despite the fact that we complain sometimes, we
8 really appreciate your help on these matters.
9 And this stuff is not easy. Let me just
10 say that I've learned in watching this process that
11 coordination like this is not easy, nor should we
12 expect it to be.
13 There are three entities here, and we all
14 have different roles. We have different obligations
15 to our missions and to our constituents and to the
16 public.
17 So we shouldn't expect it to be easy, nor
18 should we look for 100 percent correlation in these
19 things.
20 We would be doing a disservice to the
21 public if we agreed 100 percent on an issue like
22 Sage-Grouse protection or habitat maps.
23 We have different roles to play. And we
24 need to keep that in mind as we go through these
25 things and work through the process without malice

1 or bad thoughts about each other because we each
2 have very strong roles to play.
3 And I do want to put in a plug for my own
4 crusade. I mean there is no better example for me
5 of a problem that I will be working on as long as
6 I'm in the House, and that is, more state
7 involvement in public lands decisions.
8 And I've talked to a lot of you about
9 this. I'll be running a bill next year that sets up
10 a mechanism where the State early and continuously
11 helps local entities deal with Federal Government
12 agencies as they put together alternatives under the
13 NEPA process. Because, you know, too often we get
14 off on the wrong track with these things, and we end
15 up in lawsuits or public outcry.
16 I must be monitoring five of these right
17 now where people feel very strongly about it. So
18 I'll be working on this issue very hard. And this
19 will be my test case or my example of, you know, why
20 and how we should coordinate better.
21 So with that, you know, let me just say
22 again I really appreciate everybody's concern and
23 hard work on this issue. And hopefully we're
24 getting close to some agreement and language
25 correlation across our agencies and maps. Thank you

very much.

MR. CAGNEY: Can I add a point to what you said?

REPRESENTATIVE RANKIN: Yes, Jim.

MR. CAGNEY: You made the comment, I just tried to write it down, help local entities work with Federal agencies and stuff like that. And I would add that you're also helping Federal agencies in those processes so that we don't have to work in isolation on really difficult issues.

REPRESENTATIVE RANKIN: Thank you, Jim. Very good.

MR. CAGNEY: We will characterize that as, you know, helping them deal with us. You're helping us get right at the beginning.

REPRESENTATIVE RANKIN: Right. Thank you, sir. I appreciate that comment.

COMMISSIONER JANKOVSKY: And maybe before I turn it over to Fred, I'll just summarize a little bit of why we're here.

As a cooperating agency working with the BLM, we got to look at the maps that were available from CPW to the BLM. At least in Garfield County, we started to question those maps because we felt there was a lot of habitat that was not priority

Sage-Grouse habitat. So we started to question those maps.

And a lot of that was through the cooperating agency process with the BLM. Then we came back to the State and talked with Rick Cables and Chad a little bit more about the mapping and CPW maps and so forth, and just felt that it would be good if we could get all three agencies together today to further that discussion.

And so with that, I will turn it over to Fred. Fred has a little bit of a slide show and will bring the maps up. And, please, everybody, just as we're going along interrupt, add your ideas and so forth so we can just have this be a free-flowing discussion.

MR. JARMAN: Okay, thank you, Tom. I would echo all the sentiments and thanks for coming. I know particularly with the BLM folks, I know you're not busy at all, so we appreciate your ability to break away and sit down with us and talk once more again about our favorite topic which seems to be the maps. I don't know that there's anything else we have been talking about.

But, in any event, I wanted to walk through, at least on paper what you've got in front

of you. Does everybody have an agenda so you can see this? Okay, great. That's what this is on the screen.

So just quickly, ultimately the whole discussion today we're hoping to have is about habitat mapping and the various perspectives of that. So under 4A, we want to first start talking about the CPW sensitive wildlife habitat map and the RSO map.

And then, of course, as we all know, the Colorado Oil and Gas Conservation Commission is underway with its rulemaking with those two maps and a variety of others, but specific to the Sage-Grouse anyway. Then come back and again talk about the EIS and the map that is at least published for the PPH and the PGH.

And then we want to then talk about the work that we've done since we really sat down the last time together. We've had our team spend a lot of time looking through and revising our maps based on really good input from CPW.

We met, gosh, a while ago now. I can't remember the date, but we met with the research team on that. And that was extremely helpful. And so we've done some changes based on a lot of that

input, and so we want to talk about that with this group really for the first time.

And then really then bring it back to the instructional memorandum to the BLM and then finish up. So that's really what the day looks like as far as topics go.

I think everybody's been here. You know where the bathrooms are. I think there might be some food by the Chairman that's coming, not that he made it, but I think he ordered it, anyway to take a break, clear our heads. So that's what the agenda looks like.

So to begin, this is a slide that I think most of you have seen many times before. And this, of course, continues to be one of the leading questions that the county has always had as we've moved through the EIS.

And that is, you know, we've done a lot of mapping work with the Federal and State agencies, produced the map on the left, and then all of a sudden we get to where the BLM is right now accepting a map from CPW that looks like the map on the right. In fact, it is the map on the right, and that's the PPH and the PGH.

So here we are. And, you know, of course,

we'll see what comes out on Friday. I won't say anything about that until we see it on Friday when the draft of the EIS is released.

Again, to underscore the questioning that we have or the concerns we have about those mappings is precisely illustrated in these two photographs. The photograph to the top is a photograph of priority habitat in our area, the PPR area.

And then the lower photograph on the right is a BLM shot actually of work done in the Pinedale, Wyoming region, which we believe a lot of the science is focusing on and then focusing policy on based on that.

And we think, well, these are two very different worlds. Is there a way that we can maybe reconcile between the two particularly when it comes to mapping habitat for Garfield County?

So on to the first topic really. This is the map that is published on the COGCC website. This is the sensitive wildlife habitat map done by CPW. Let me back up.

We had a couple conversations with Chad and Rick, of course, before Rick left, on this trying to get our hands around what this means and how it's used really.

Ultimately, as we look at this and then the next map, which we sort of see is in tandem, and so the next map being the restricted surface occupancy map, and having discussions about what these maps are and how they're applied.

And particularly this map raised some discussion with the County in our discussions because it's a lot different than this map. So this map is very similar to the preliminary priority habitat that's being used in the EIS for the BLM, also supplied by CPW.

But then in conversations with CPW, what we understand is really this is what they intend. And I'm not going to put words, Chad, in your mouth, but I know you'll have something to talk about here.

But this map is what we understood you to say was really more of a map that would really dictate restrictions rather than this map, which is the SWH map is really a consult basis map.

And, as I remember, based on this same mapping that's being used and has been used for the last three or four years, that those 40 applications have come in and you've commented on those and there have been no changes and what have you. And I think, Ron, you had that comment.

MR. VELARDE: Yeah, that's correct.

MR. JARMAN: All right. So that was the conversation we had with CPW before this meeting. And so we started to really look at this and see how that plays against the mapping we've already done in Garfield County that some of you have already seen.

Certainly, I go back again. It's very different than the way the County understands that the BLM is using CPW's maps right now. And so we think that there may be a disconnect there.

So we're hoping this meeting will help us understand what those maps are and how they're used. Are we running into cross-purposes with one map against the other, particularly when it comes to permitting for oil and gas development?

So we're eager to talk about that. Maybe that's the best place to stop right now and maybe have a conversation about that. We do have it overlaid. I can show those.

REPRESENTATIVE RANKIN: Why don't we go to -- I think the overlay is important.

MR. JARMAN: All right. So what you're seeing here, this map is -- underneath is the map that the County has generated to date. And Zach Perdue is going to walk through more of that to give

you an update on how we've arrived at what that looks like.

But overlaying in the purple is the sensitive habitat map of CPW. And then you go to the next one. So this is the RSO overlaying on top of our map to give you a sense of how those correlate.

So we think there's actually a high degree of correlation between the two which we were encouraged to see. And I know that there's a lot to talk about here. So maybe I'll leave this one up so we can have a conversation.

Because I think the next piece is back to the PPH map. So I think with that, I'll leave it there. Again, we're trying to reconcile in our own minds how these different maps are to be applied practically.

So we're going to have the EIS that's going to come out. It's going to have a map that is produced by CPW. So that's the BLM's world, so to speak.

Then you have the COGCC, who is the agency responsible for permitting oil and gas development who are going to rely then on these maps that they're in the midst of updating right now through

1 the rulemaking.
2 And so I think maybe to kick it out there,
3 how are these going to play together or will they?
4 And so I would kick it out there like that.
5 MR. BISHOP: Well, I might just start on
6 again, you know, we did have these conversations
7 and, you know, House Bill 1298 established that we
8 would have a two-tier system, two different maps for
9 a given species and how we're going to look at
10 regulation.
11 And I just, for everybody else's benefit,
12 you know, I shared that with you guys in that
13 meeting. Any given set of -- the exact same set of
14 data can produce a series of maps, right? So it's
15 the intent of a map you're producing. It's the
16 underlying assumptions. It's what's that map trying
17 to accomplish.
18 And I think we all can have common ground
19 on that. And I'm going to turn it to Ron in terms
20 of field application here in a minute.
21 But with what 1298, you know, this RSO
22 map, that's intended to protect -- and it's not an
23 NSO, as the way the State is applying it. It's an
24 RSO, Restricted Surface Occupancy, but it's trying
25 to key in on those most critical habitats which in

this case would be a point 6 mile lek buffer that we say is critical to protect those areas, right, from development.

And then the sensitive wildlife habitat map is trying to identify that broader sensitive habitat zone for any of these species. Sage-Grouse is the one we're doing today, but we have it for a host of species.

And then that we understand -- and again, I'd like Ron to speak after this and so all of us haven't been in the room together at one time -- but the sensitive wildlife habitat maps are saying, hey, this is overall in that key habitat zone for species. We think it's important we have the opportunity to consult on the ground.

But certainly, from the 1298 COGCC process, it's not intended to be an RSO or an NSO. It's intended to be where we go out and consult, and then our field staff on the ground understands. And you can walk out there and cite specific and evaluate that and make recommendations going forward.

And that's how those two maps are used. Ron, do you want to --

MR. VELARDE: All I can add -- and you've

1 covered it well. The only thing I will add is, is
2 that even with RSOs that all that does is alert us
3 to alert the energy company or the BLM or the
4 private landowner that that is in an RSO. But that
5 does not mean they can't drill.
6 I mean, if that's the only place they can
7 drill, they drill. All it does is, is for us as an
8 agency is to ask, and I'll say ask for restrictions
9 that would mitigate for any type of habitat issues
10 out there. That's really what it's about.
11 So I know there's a lot of confusion on
12 that. But I can tell you from a CPW perspective, we
13 try to work close with the energy industry, private
14 landowners, whomever it is on whether it's the
15 sensitive areas or the RSOs.
16 COMMISSIONER JANKOVSKY: Thank you on
17 that. And I guess, you know, we're seeing this
18 overlay, and with our mapping there's a close
19 correlation with the RSO, much closer than there is
20 to the sensitive wildlife map because then we start
21 getting into habitat which we don't believe is
22 Sage-Grouse habitat.
23 And so we wanted to kind of get that in
24 front of the BLM as well and kind of hear your
25 thoughts on that, Jim.

1 MR. CAGNEY: First and foremost, and I
2 think this is really critical, is that the Bureau of
3 Land Management has relied on state game and fish
4 agencies for our habitat maps for the entire 15
5 years of the BLM. And we have no data or
6 information by which to ponder a different map.
7 I mean, we can't put any effort into that
8 because it would be redundant to what Parks and
9 Wildlife does. We have no basis to judge that map.
10 And so, you know, I feel really strong
11 about saying that I have no desire to change that
12 long-standing relationship between the BLM and game
13 and fish agencies. We use their winter habitat
14 maps. That's just how we've done business
15 successfully for a long time, and I'm opposed to
16 anything that breaks that relationship.
17 I mean, the alternative to that is to set
18 up a scenario where individual entities can create
19 their own maps. And then we have competing maps
20 that the Bureau of Land Management needs to sort
21 out, and we can't live there. I mean, we can't
22 afford to play that game. We can't be successful
23 like that.
24 So if the State of Colorado -- and
25 basically from my perspective it's the map that the

Governor gives us is the one we're going to use. So what we've got is a group of Colorado people here, and we're going to honor the results of that process.

I don't want to present myself as a Grouse biologist, but I think the core issue here is that the Bureau of Land Management has long been trying to manage Sage-Grouse by buffering leks.

We tried a quarter mile, didn't work. We tried 6/10 of a mile, and the information is, is that that approach is failing.

So the directive that we've gotten is to look at a more connected habitat-based approach. And I'm just assuming that what the Parks and Wildlife has put on the table is to connect those yellow spots that you're showing, Fred.

I mean, that's the point is to connect them. And saying that those individual little yellow spots don't work in isolation. They have to be connected. So, like I say, I don't want to present myself as a Grouse biologist, but that does seem to be the essence of this argument.

And so with that in mind, that's the BLM's perspective. And whatever you all come up with as some sort of a result of this process, our intention

is to honor it.

COMMISSIONER JANKOVSKY: And, you know, I agree with you there, Jim, I mean that your relationship is with the mapping that comes out of Parks and Wildlife or the State of Colorado.

And I think one of the problems here is that the buffer around the leks where here we have a 6/10 of a mile buffer and at least we're looking at a four-mile buffer. Potentially, we don't know yet, but we believe it's probably a four-mile buffer in the EIS.

And in our particular situation here on the Roan, the birds that are up there are in a fragmented habitat. I mean that's just part of the habitat up there. And maybe that's why there's 500 birds up there and not 1,000 or 2,000, because the habitat is fragmented.

And it's just naturally fragmented. It's fragmented by topography. It's fragmented by different types of habitat, different species, different forests besides sagebrush.

And so I think that's really what has just thrown us for a loop and set us on this direction of well, we need to come up with our own mapping because we were questioning the overall map.

1 And here we have two maps from CPW which
2 we were -- first of all, it surprised us when we
3 pulled them up. We pulled them up off of the
4 website and looked at them and did this correlation.
5 We saw, well, look, the RSO map is very
6 close. Other than a few spots here, it's very
7 close to our mapping. And so that's really -- I
8 mean, we found just kind of through the process and
9 talking with Chad and going online that there are
10 two maps.
11 And, you know, you could take this RSO map
12 and put a four-mile buffer on there, and we could
13 end up with the other map. But then we're closing
14 up a lot of terrain and habitat that's just not
15 Sage-Grouse habitat.
16 And in this case we believe, you know,
17 birds are getting from location to location.
18 They're flying. They're getting from location to
19 location, and they're flying from leks and so forth.
20 And as I've said before, they're kind of island
21 jumping because we don't have that rolling sagebrush
22 habitat like we have even in Moffat County.
23 So, you know, and I hear what you're
24 saying, and that relationship between CPW and BLM,
25 we honor that. It needs to be there. We're just

1 questioning which map at this point, I guess, is
2 where we're coming from in this meeting.
3 MR. VELARDE: I was just -- and it's just
4 for information only, and I have not been to your
5 other meetings.
6 But I do want to point out especially to
7 the counties, when I got here 13 years ago and it's
8 before the energy development really got going, but
9 for a couple of different reasons I've asked for
10 research in the Piceance Basin for both deer and
11 Sage-Grouse, thinking ahead as to what some of the
12 issues would be.
13 And part of it came from, in talking to
14 county commissioners, not necessarily Garfield
15 County, but other counties to the north, we were
16 using information that was based out of Wyoming.
17 And every time I'd meet with the county
18 commissioners, they'd say, yeah, but that's in
19 Wyoming.
20 So it took quite a while and obviously
21 with support from our previous director and our
22 present director and from the terrestrial unit, we
23 actually started doing research in the Piceance
24 Basin. Otherwise, we wouldn't even have the
25 information that we presently have regarding the

Piceance Basin.

So I give a lot of credit to -- I mean, I know you've met with Brett Walker. I'm not sure if you've met with Tony Apa. I'm not sure if you have or not. But, you know, I have a lot of faith in the type of research they're doing and what they're coming up with.

And so it does apply their information, to a situation whether it's in Moffat County, Rio Blanco County or Garfield County. And I just wanted to throw that out there that the reason we're spending a lot of money is so that we can get information that's pertinent to the counties that we're dealing with, not necessarily to Wyoming.

And I just wanted to throw that out there just as an information because we've spent a lot of money, a lot of taxpayers' money -- or not taxpayers. I didn't want to say that, excuse me, a lot of sportsmen's money doing that.

MR. BISHOP: And if I might -- thanks, Ron. And just adding on that, I think now is a good time to bring that up is I think everybody in the room is aware, Brett Walker does have -- because that's what you guys have been using to validate with Brett -- he's done original research.

He's on a fast timeline to restructure his schedule to try and publish that as soon as we can. We want to respect his right as a researcher having collected that data to publish that.

And we've said all along to BLM this happens to be an area, because of what Ron described that we have more information in certain other areas of Sage-Grouse range in Colorado.

And so when he finishes his analysis, it just gives us an opportunity to do a more refined analysis in that area, the PPR population. We think it's appropriate to do that because it is a little bit of a different area than certain other Sage-Grouse areas.

And he's trying to get that completed this fall. Then we'll make that available. We plan to make that available to BLM because then we'll have that information because we invested the money in it. So we just kind of want to make that kind of on the record that we are working on that and doing that.

But building also on Ron's point, even our preliminary priority habitat map was based on data from Colorado, not Wyoming. So I think that's important. Those models are based on Colorado data.

1 DR. RAMEY: Chad, can I ask you a
2 question? So it's a little like asking a graduate
3 student when they're going to finish their
4 dissertation, but when do you think Brett will be
5 done and, you know, basically the analysis going
6 public?
7 MR. BISHOP: All I know is fall.
8 MS. GRIFFIN: His plan is to have it
9 completed before the end of the comment period for
10 the BLM draft.
11 UNIDENTIFIED FEMALE: Which is November
12 14th.
13 MS. GRIFFIN: November 14th, that is his
14 goal.
15 REPRESENTATIVE RANKIN: And that will
16 revise both maps, the restricted occupancy and
17 the --
18 MS. GRIFFIN: No, that would -- I guess
19 that remains to be seen. We haven't talked about it
20 in relation to the COGCC or the 1298 maps. But it
21 would be used to refine the BLM habitat map in PPR,
22 because that's where his research was done.
23 REPRESENTATIVE RANKIN: Well, I guess my
24 question is, we're really sort of discussing what
25 the BLM should use out of the state. And we talked

about those two maps, so I'm trying to get a handle on where this new -- where will that fall?

MR. BISHOP: It would modify the current sensitive -- one thing it could do is we could use this within the concept of sensitive wildlife habitat area on the Roan to update it with this information because we happen to have it there.

I think a really key distinction though is unless something changes, COGCC will adopt these maps unless something changes that for their process. And I think that's the key. A really important point in this, is that's the state's COGCC process. And I think we have a very good process with that.

That doesn't mean -- there's not a single, in my perspective -- there's not a single one just perfect map. It's what you do with those maps. And I think this works for the State and COGCC and we apply it.

We have the state process, and we're comfortable with the current sensitive wildlife habitat map. We're comfortable that our guys have the opportunity to go out on the ground. The comment about siting of energy development in those areas, we think it's appropriate.

We know sometimes a well pad or a site will fall in non-habitat with this process. It's not unreasonable, though, because it's in that overall sensitive zone for species. When our guys, when Ron's guys go out there and we see that, we recommend that go forward.

But it gives us a chance when that non-habitat is very close to a lek or it's going to have road implications or something that then we can work with the developer to try and site that appropriately.

Then there's the BLM map which is a separate process.

MR. VELARDE: I'd just like to -- I know one of the issues are the different maps. And although I was not involved in the COGCC process, I was not.

A gentleman by the name of Rick Kahn who worked in the terrestrial section was nominated -- I don't know if you want to call it that -- by our director to work on it which I have to give him all the credit in the world.

But the process was totally different to get the COGCC maps and the map that was generated for the overall habitat for Greater Sage-Grouse. It

was totally different.

I guarantee you the COGCC map did not look like the final product, I can tell you right now. It was larger. It had more habitat that we thought should be protected.

It's obvious through the process, and it happened with elk, happened with deer, happened with other species that the map was reduced through the COGCC process working with all of the entities involved. And that's what it came out, right, wrong or indifferent.

And we're okay with that. We're fine with it. But that's how it occurred. So I just think we need -- I wanted to throw that out there.

REPRESENTATIVE RANKIN: Well, is the COGCC map the RSO map? I mean, are those synonymous?

MR. VELARDE: The RSO that's in the COGCC is the final RSO map, but it wouldn't necessarily be an NSO if we were working with the BLM.

And that's where all these terms -- and it does get confusing and I understand that. But that was the term for COGCC.

REPRESENTATIVE RANKIN: And while I'm asking questions, Jim, what's the practical impact of the maps that end up in your EIS, I mean, in

terms of restrictions on development, drilling, so forth.

MR. CAGNEY: In the document that's coming out Friday, there will be a table in Chapter 2 that has the stipulations. There will be stipulations on transportation, there will be stipulations on right-of-ways, on oil and gas, grazing.

And they vary by alternative. But those stipulations will be applied to general habitat, they'll be applied to priority habitat. It's really no different than an elk winter range.

When you get an application for an oil and gas lease, you check it against what layers that you've got stipulations in your land use plans and then you apply them as conditions of approval.

So, you know, we got the map issue is one thing. But, you know, the upcoming BLM part of that is what stipulations will we apply to that map. And that phase is still pretty open.

I mean, we got a draft document coming out but, you know, there's a preferred alternative, but that ain't the decision.

MR. BISHOP: And that's -- I know when Rick and I met with some of you, I think that's one of the points we've been trying to make is that

there's a huge amount of this where the decisions of how management decisions are made within that habitat zone.

COMMISSIONER JANKOVSKY: And just to kind of -- you know, you guys are talking about COGCC and so forth. And the way I -- you know, you're looking at the maps one way or COGCC is looking at the maps one way.

And our concern with the BLM is that if we have that -- we're not getting two sets of maps so we don't have -- well, we do have a priority in a general habitat map.

But our concern is that if we get areas that are on BLM that are all shown as priority habitat and we have caps on how much can be done as far as amount of disturbance and so forth on land, that we may already be at those caps because this is a high industrial area.

And it could potentially become almost impossible for any -- and it's not a huge amount of BLM land in Garfield County. It's 80,000 acres. That's a lot of land, but it is all very rich as far as gas reserves.

And our concern is that, you know, areas that could be reached because they're not habitat or

they're general habitat so you could reach gas supplies, it's just not going to happen through the EIS.

Once the EIS and the whole plan is approved, then it becomes much more restrictive. And that is our overriding concern.

MR. CAGNEY: And you should be concerned about that. I mean, there isn't any question about it.

I want to offer something about this Grouse document coming up. We're not over the cap. I mean that's management Unit 17, and I don't think we're over the cap.

But I don't think you should consider that to be great news because I don't think the cap is the most important part of this. We have alternatives where a priority habitat is no leasing, you know, and we have alternatives where it's no surface occupancy which means if you can put a well adjacent to that, you can directionally drill in there. I mean, there's different choices.

And then there's a lot of stuff, particularly there where it's pretty much all leased already, so those kind of stipulations don't matter. And then it becomes a question of what's the BLM's

1 ability to put new conditions of approval on valid
2 existing leases, and there's case law on that.
3 But I would urge you to concern yourself
4 with that more than the caps. Because one of my
5 concerns going into this project is that the caps
6 are going to get all the attention, and I don't
7 think that's the right way to look at this. Just be
8 on guard.
9 COMMISSIONER JANKOVSKY: But again on that
10 80,000 acres, I mean, if it's all priority -- and it
11 is all priority habitat right now, at least from
12 what we've seen. We don't know because we're two
13 days away from the release so there could be a
14 change, but I think more than likely it's going to
15 be the same map we've been working with.
16 You know, you can't get to the whole
17 80,000 acres if you're on the outside of it, on the
18 outside boundaries. It's just like the Roan, you
19 can't get there from the outside. You got to be
20 able to --
21 REPRESENTATIVE RANKIN: So when you make
22 that statement, Tom, you seem to -- and I don't,
23 understand exactly how the draft EIS used the CPW
24 map inputs. Could we talk for a minute about
25 exactly how those fit together? Well, like which

one -- what did you use, the state maps --

MR. CAGNEY: So one of the alternatives for oil and gas leasing, there might be say that any leases would be issued with a no surface occupancy requirement, which means you've got to drill it from the side. And the commissioner was just saying that's not all that great, but that's what it says.

So some of those would say that is applied to priority habitat. Some of them would say that it's applied to all designated habitat which would mean both priority habitat and general.

So what you've got is a bunch of land use restrictions applied differentially to the habitats on that map.

REPRESENTATIVE RANKIN: And how are those habitats defined having started with the CPW inputs as your input?

MR. CAGNEY: Well, we both started and finished with that. So maybe I don't understand the question.

REPRESENTATIVE RANKIN: Well, the State has two levels of maps. They've got the RSO and the SWH. Which one of those did you use to define priority habitat?

MR. CAGNEY: We used that red one, the red

and the green right there. That's the exact map we used.

REPRESENTATIVE RANKIN: So right now all of that is priority habitat?

UNIDENTIFIED MALE: The red is priority habitat.

MR. CAGNEY: And the green is general.

MR. JARMAN: But, Bob, let me go back. So remembering this map here, this is the map that was in the initial -- this is publicly available so I can say that.

MR. CAGNEY: You know, we're 36 hours from the release. I'm not very worried about that, Fred.

MR. JARMAN: Well, thank you for that leniency. So that's what we call the priority habitat map. That is in the EIS. That has been what has been in the EIS from the CPW all along, and that's what we've been contesting frankly.

Let me go back. That looks very similar to the map that you just saw which is this map. This is the live, I should say -- I'm sorry, this is the proposed CPW map for sensitive wildlife habitat that is being proposed that the COGCC would use.

So if you're in this red then -- go ahead.

UNIDENTIFIED MALE: Are those going to be the PPH, PGH map, is that the same boundary acreage as the SWH now?

MR. BISHOP: The PPH.

UNIDENTIFIED MALE: PPH is the same as SWH?

MR. BISHOP: The priority habitat map is the same being proposed for the sensitive wildlife habitat map definition.

MR. JARMAN: Are you sure about that? I only say that because if you look at the shape of this map, this includes in particular this area right here, okay? Remember this when I flip to the next map, right in here. I would tell you that that's general habitat, isn't it?

UNIDENTIFIED FEMALE: No.

MR. JARMAN: Maybe I got that wrong. Good. Then I misspoke. So this is the general stuff out here?

UNIDENTIFIED MALE: Yes.

MR. BISHOP: The dark green is general.

MR. JARMAN: So the red stays the red, if that's fair to say?

MR. BISHOP: Right. And that's what's going forward. And, in fact, we're purposely trying

to align those. And, you know, for 1298 it's a reduction from what's there now.

UNIDENTIFIED MALE: That's right.

MR. BISHOP: Because at the time the standard on Sage-Grouse, so this notion if you're talking as a general priority habitat is a four-mile lek buffer, you know, and that's what we originally put in place.

And so with our ability to model and on our Colorado statewide Greater Sage-Grouse data, we lessened that some within those four-mile buffers. And that's how we produced based on, you know, our models to produce the priority habitat. It's less than the full four-mile lek buffer.

MR. JARMAN: But at the end of the day, and this is where I think Representative Rankin was going, is the same question that we have is, this is the map, back up again, right now CPW is using this map for oil and gas and consultation, right, Ron?

MR. VELARDE: Yes.

MR. JARMAN: So if someone comes in with a permit --

MS. GRIFFIN: Proposed. It's proposed.

MR. JARMAN: Okay, it's proposed.

MR. BISHOP: It's bigger than that, it's

bigger than that right now. This is our proposed to align with --

MR. JARMAN: What I want to do is I want to cut to how it is really applied in the field. So we can talk about this stuff here, but at the end of the day, people are going to start using these things as tools to manage for land use on the ground.

COMMISSIONER JANKOVSKY: And used in the field by two different agencies.

MR. JARMAN: Right, yeah, exactly. So and we kind of walked through this a little bit on the phone call with you, Chad, a little while ago.

But I want to do that with BLM here because right now COGCC and CPW are sort of married together in managing the red on this map.

MR. VELARDE: For Form 2A's.

MR. JARMAN: For Form 2A's.

MR. VELARDE: Yes, that's the key here that we need to remember. And that's where we're in consultation through the COGCC with the land use agencies, with the private landowners, and with the energy industry.

MR. JARMAN: That's helpful. So when a permit from an operator comes in the door on BLM

land, at the end of the day doesn't it go through the COGCC and they send it out for consult to you all.

MR. VELARDE: Yes.

MR. JARMAN: You make your comments on it. And ultimately at the end of the day, it's the Commission that issues that APD, isn't it? The BLM doesn't issue the APD, I don't think.

MR. CAGNEY: On public or private land?

MR. JARMAN: On public land.

MR. CAGNEY: No, we issue it.

MR. VELARDE: On public, the BLM does. On private, it's the COGCC.

MR. CAGNEY: Right, and the BLM does it on Federal minerals too, private surface.

MR. VELARDE: Yes.

COMMISSIONER JANKOVSKY: If I could break in, I would like to introduce Commissioner Mike Samson who just walked in. And then also Drew Gorgey, who's our County Manager. They have both joined the table. So I'm sorry for the interruption.

MR. JARMAN: So practically is there an opportunity for cross-conflict between administering land use under this map versus what is going to be

in the EIS?

That's, I think, the ultimate question because you've got two different maps. You're going to have the map of COGCC, right, might look like this, and in the EIS you're going to have a map that's going to look maybe similar to this.

But the management fallout, what happens in those two areas, are going to be very different.

COMMISSIONER JANKOVSKY: Extremely different.

MR. VELARDE: Here's the difference, though. With this, if that's what the COGCC ends up approving, we through our Form 2A do an analysis and send it to the COGCC.

When we work with the BLM, we'll try to do on-sites and when we had a full complement of people in the Meeker area or wherever we had the majority of the wells, we would do on-sites, go with the BLM, and then make joint recommendations.

But keep in mind, ours are only recommendations to the BLM. That's all they are. Hopefully they'll take them, but they don't have to.

MR. JARMAN: All right. So stay there. Thank you for that.

At the end of the day there, it would seem

to me to make sense that if, as Jim continually tells us, don't talk to me about the maps, the maps come from CPW. Talk to CPW about the maps which means CPW is always on first about the mapping they produce.

COMMISSIONER JANKOVSKY: I want to interrupt because I think once the decision is made, I think the map that is in that decision is the map. Am I correct in that?

MR. CAGNEY: You're fundamentally correct.

COMMISSIONER JANKOVSKY: And so my concern goes back to we have the sensitive wildlife map which to me is a general priority habitat map, but it becomes a priority habitat map in the BLM decision, then all of a sudden all that 80,000 acres that's up there which, you know, has high quality gas reserves -- has been in the news for the play that's in there -- becomes off limits.

And that is my number one concern, and that's why I've been so adamant about the correct mapping in that area.

MR. BISHOP: And this is a key point, right? It comes back now to which alternative is selected to how off limits it is, correct?

UNIDENTIFIED MALE: Absolutely.

1 MR. BISHOP: I mean, that's where our
2 position would come in. The map only goes so far.
3 The maps don't dictate policy.
4 And if you asked our ecological staff, our
5 science staff, if we thought like that RSO map for
6 example, as Ron pointed out, that where we ended up.
7 But none of our staff would say if you protected all
8 that, that would be sufficient for the Sage-Grouse.
9 I mean, nobody would agree.
10 That's just kind of to identify the most
11 key stuff that you wouldn't -- so we would say it's
12 that broader priority habitat is what you want to be
13 thinking about when you're trying to conserve this
14 bird. That doesn't mean we believe it should be off
15 limits to development.
16 But if we're going to provide a map, it's
17 going to be more like that priority habitat map than
18 that if we're trying to say what you need to
19 consider for Sage-Grouse.
20 MR. JARMAN: In one of your
21 recommendations, wouldn't you suggest, though, that
22 the management based on those maps should be one and
23 the same? The policy --
24 MR. BISHOP: Just what Ron's saying,
25 there's a State process and then there's a BLM

1 process. And we're getting ready to go to a refined
2 BLM process because of the EIS.
3 MR. JARMAN: No, and I appreciate that,
4 but that's not what I'm suggesting. What I'm
5 suggesting is why shouldn't everyone play from the
6 same field and come together on the same policies
7 for the same species.
8 It seems to me we've got two different
9 things happening here. You've got CPW and COGCC
10 operating in an administrative function, and then
11 you have BLM. And in our view anyway there's a
12 major disconnect between the two.
13 Not only is there a disconnect in policy,
14 but there's a major disconnect in how the maps are
15 treated. So just from an outsider looking in,
16 shouldn't it all be the same if everyone is
17 concerned about the species as we are -- that's our
18 goal, everybody in this room.
19 But that's where we're having a real
20 breakdown, I think, is how can't you marry those
21 things up.
22 MR. BISHOP: See, we can come at it
23 different. We're embarking on a public process to
24 help set policy, but we don't want to change our
25 biological basis of maps because of the process. We

1 want to have it based on what we think is
2 biologically defensible.
3 That's what we'll put forward, and then
4 we'll be part of the table to having the policy
5 management discussions of how that should be
6 managed. I think that's how --
7 COMMISSIONER JANKOVSKY: I guess the other
8 thing, and at the same time -- and I think, Fred,
9 what you're talking about is an ideal world. So I
10 don't think that's quite there where State and the
11 Federal government are going to have the same
12 policies and so forth. I would like to see that,
13 but I don't know that that's the case.
14 But again my concern is that we're going
15 to have habitat that has a 50 percent slope. It's
16 going to be priority habitat. We're going to have
17 habitat that has thick conifer trees be priority
18 habitat, and it's not. It really is not priority
19 habitat.
20 MR. CAGNEY: I'd really like to jump in on
21 an exchange that took place mostly between Ron and
22 Fred there where Ron was talking about consultation
23 during implementations of individual actions, and
24 you were perceiving that as the exact same thing as
25 the land use plan process.

1 You said the BLM just puts it onto game
2 and fish, and then the -- went back to Wyoming --
3 Parks and Wildlife and then Parks and Wildlife says
4 it's only a recommendation. So I want to close that
5 loop here.
6 What we do in our land use planning
7 process is we use Parks and Wildlife maps to
8 establish what the ranges are and how we establish
9 our land use plan, goals, and those -- I mean these
10 are a little bit more site specific in this Grouse
11 EIS than a standard BLM land use plan. I would
12 warrant that.
13 And that's the basis for your concern
14 which I think is justified. But normally those land
15 use plans are 30,000 foot stuff, and there's lots of
16 room to discuss implementation issues on a
17 case-by-case basis.
18 So what Ron was saying is that we go out
19 and we look at it and we say we can put this pad
20 here, but we have a much better issue if we put that
21 pad over there because of the way the site lines go,
22 you know, the noise, that type of thing.
23 So that might have seemed like a conflict,
24 but only because he was talking about implementation
25 issues and you were talking about land use plan

1 issues.
2 MR. JARMAN: Yeah, I mean that helps, Jim.
3 I still think there are some breakdowns in how it's
4 going to be applied. But I think at this point we
5 ought to keep going with where we are.
6 MR. CAGNEY: Well, it's not going to be
7 applied any differently than any elk winter range
8 stip that's ever been done in the last 20 years.
9 It's going to be identical to the same way we've
10 always done this.
11 The difference being these measures are
12 tighter and more important than normal.
13 MR. JARMAN: Well, okay. Along those
14 lines, though, the BLM is going to push maybe,
15 certainly the NTT suggests a cap, as we've talked
16 about before, okay? And so maybe in the alternative
17 that comes out, there's a cap. That's a discrete
18 calculation that figures in to what you're talking
19 about.
20 That's different than just a site-by-site
21 thing. That actually accumulates to where there
22 ultimately is an NSO result, right?
23 UNIDENTIFIED MALE: It could.
24 MR. JARMAN: I mean, at the end of the
25 day, what you're saying is the document that's going

1 to come out may suggest that there is a cap. And
2 it's all well and good to go out and look and see
3 what's okay on the ground to move a pad here or a
4 pad there.
5 But the policy, the cap -- the policy, I'm
6 not talking about map, but comes from a map. It's
7 applied from a map. So at the end of the day, the
8 map is extremely important.
9 MR. CAGNEY: Oh, yeah, I agree with that.
10 MR. JARMAN: Which is way different than
11 the way the CPW administration functions now with
12 Ron and his crew that will say, well, no, just put
13 your pad here and not here. You've consulted with
14 us. That works great. Fine. Everything's okay.
15 At the end of the day, that's very, very
16 different. There is no cap in the world they play
17 in.
18 MR. CAGNEY: Correct. You're right.
19 MR. JARMAN: And I'm just trying to point
20 out some of the differences, that's all.
21 But, anyway, there's a lot more to talk
22 about here. I don't want to cut this conversation
23 off at all.
24 DR. RAMEY: Let me just add one point
25 there that, you know, one big difference here is

1 that CPW has more boots on the ground, so to speak.
2 And I'll assume that the NTT report recommendations
3 fit into a number of these alternatives, which is
4 maybe an assumption right now, and those tend to be
5 one size fits all prescriptions across the range.
6 So there really is a difference between
7 sort of a local knowledge and conditions, local
8 knowledge of ecological conditions versus that of
9 the NTT. So that's another major difference in how
10 it's implemented.
11 MR. CAGNEY: Well, right. But that begats
12 the question: Are we discussing the map, or are we
13 talking about the BLM land use issues NTT that get
14 applied to that map?
15 DR. RAMEY: It underscores this issue
16 that's been discussed about the importance of the
17 map in the process and then how it's used. It just
18 underscores it.
19 REPRESENTATIVE RANKIN: I'm still trying
20 to understand some of the terminology. But NSO, are
21 there any -- in the original EIS or the draft EIS
22 that's coming out, will there be some areas that are
23 already identified as no surface occupancy? And if
24 not, how do those emerge over time?
25 MR. CAGNEY: There will absolutely be some

areas that are no surface occupancy. The Colorado alternative has no surface occupancy for the priority habitat. The NTT, National Technical Team, alternative has no leasing for priority habitat.

Now keep in mind -- so that would say, well, you know, the cap's not very important. But keep in mind that a lot of that stuff is already leased.

So then somebody comes in and says, okay, we want to put our application permit to drill out there, and they propose a pad that's X number of acres. And we go, come on, man, you got to keep that down to lesser acres because we're playing cap management.

And then Ron's going, all right, I can live with that, but you got to move it over there. You know, you're putting that thing half a mile from this lek on an existing lease, and there's no reason why you can't get that over there where it's, you know, in a position where Grouse aren't going to hit that stuff when they're flying in and while they're lekking.

REPRESENTATIVE RANKIN: So did you just tell me that there is an alternative where there is no surface occupancy in any of that area that shows

red on the map?

MR. CAGNEY: Yeah, and there's also one that says no leasing.

COMMISSIONER JANKOVSKY: That's an even more restrictive one than that.

MR. CAGNEY: And there's one that says no leasing for the -- flip to that next one. This is all the predecisional information. Go one more.

MR. JARMAN: Which map did you want, Jim?

MR. CAGNEY: The one that's got both priority and general.

MR. JARMAN: Oh, here.

MR. CAGNEY: That one there. I mean there's one that's no leasing on all designated habitat which is the red, the green and the cross-hatched. Nobody heard that until the day after tomorrow.

MR. BISHOP: Jim, what did you say about the subregional (inaudible) Colorado alternative? And what did you just say there about NSO?

MR. CAGNEY: The Colorado alternative is NSO for the red, and there's exception criteria that was very carefully considered at the cooperating agency meetings.

And those have got to be linked to the

1 health of Grouse populations in the management unit.
2 That's management Unit 17 we're talking about.
3 So the reason that the NTT alternative
4 said we want that no leasing, it's because they
5 didn't want the BLM getting involved in leases,
6 modifications, waivers.
7 The Colorado alternative puts that back in
8 business, but it's got some pretty rugged criteria
9 to warrant that. Otherwise, we're just walking into
10 a leasing decision, and we can't do that.
11 REPRESENTATIVE RANKIN: Are there any
12 other alternatives which might be less restrictive?
13 MR. CAGNEY: No action.
14 REPRESENTATIVE RANKIN: So any alternative
15 except no action would basically put the red areas
16 off limits to either leasing or occupancy at all?
17 MR. CAGNEY: Not quite that bad.
18 REPRESENTATIVE RANKIN: It sounds like it.
19 MR. CAGNEY: Well, it's not quite that
20 bad.
21 COMMISSIONER JANKOVSKY: But a lot of this
22 red area is private land. The majority of the --
23 140,000 of the 220,000.
24 REPRESENTATIVE RANKIN: So 80,000 of it,
25 what is that, roughly a third, is BLM land?

1 COMMISSIONER JANKOVSKY: BLM land.
2 REPRESENTATIVE RANKIN: And we don't
3 know --
4 COMMISSIONER JANKOVSKY: Yeah, we do have
5 a map that shows that.
6 MR. JARMAN: We'll show that here in just
7 a second. But the cap applies to private land in
8 the sense that, and I don't want Jim to yell at me
9 for going predecisional here, but there will be an
10 accounting of projects that make their way across
11 BLM desk on private land.
12 Those get collected and counted against
13 the cap, against land used on BLM. Is that fair to
14 say?
15 MR. CAGNEY: Yes. Now let me talk about
16 that because this is really important.
17 MR. JARMAN: I'm not trying to unveil
18 anything here, but --
19 MR. CAGNEY: On private surface, if it's
20 Federal minerals, obviously, we know about that. If
21 it's a pipeline that we do an EIS on that's going in
22 and out of private land, we know about that. We're
23 going to include that.
24 If somebody puts a wind farm on private
25 land, obviously we're going to do that. The BLM is

not going to monitor people's private land to see if they built a barn. We neither want to go there nor have the ability to go there.

So, you know, the stuff that we know about that's apparent, we have to consider that in the cap.

Now the private landowners, surface owners can do anything they want, not BLM lessors of Federal minerals, but private surface owners. And if we get to the caps, then we have to offset that by what we approve on the public lands, okay? That's the way that's going to work.

But I would ask everyone to not focus on these caps. There's other stuff that's more important in those Chapter 2 tables. I'm really worried that those are going to catch all the attention, and I don't believe that's the important issue here. What Bob was getting at is more important.

MR. JARMAN: I hear you. Well, the offset is that you would say, look, the activity on private land has exhausted the cap.

MR. CAGNEY: Right.

MR. JARMAN: And so I know you've come to me for a lease -- well, let's say a new lease

1 anyway, I can't give it to you because the cap is
2 eaten. So you've got to wait until something gets
3 reclaimed or, you know, mitigated -- I guess
4 reclaimed for that cap to open up again.
5 MR. CAGNEY: Correct.
6 MR. JARMAN: And I think that's where
7 Commission Jankovsky was going in part because a lot
8 of the natural gas development that we see and
9 permit locally on private land will have a tether to
10 some component on either split estate or BLM,
11 particularly when you're looking at gathering
12 systems or road networks or what have you.
13 So there is that very direct, at least the
14 way we see it, a very direct connection to private
15 private from -- I should say it this way, the way
16 the BLM's EIS will come out, it will absolutely have
17 a direct impact on private land, private minerals,
18 private surface because of the way it's set up, the
19 cap will.
20 MR. CAGNEY: I disagree. Private
21 landowners can do anything they want.
22 UNIDENTIFIED MALE: Up to the cap.
23 COMMISSIONER JANKOVSKY: Right, but it
24 could affect what happens on adjacent public lands,
25 yes, right, because of the cap.

MR. CAGNEY: Excuse me, go back a little bit more to where it shows all the habitat.

MR. JARMAN: You want the preliminary priority --

MR. CAGNEY: Green, red and cross-hatched. See Rio Blanco and then BLAN. Okay, that priority habitat just below there, okay, that's that Magnolia Hill in the middle and it's got that compressor station on that. That piece is above the cap. It's the only place that looks to me like we got cap problems.

Now we haven't done any inventories. That's just when we GIS'd what we knew about. The cap's not -- I think we can deal with the cap.

COMMISSIONER JANKOVSKY: Let's go back to the slide that shows BLM and private. That doesn't have split estate on it, does it, that map? It does have that.

MR. JARMAN: That's the green. See where my hand is.

COMMISSIONER JANKOVSKY: So the yellow is BLM, and then the lighter green over there is the split estate, and that's all --

MR. JARMAN: So the nexus, the Federal nexus certainly occurs on the split estate. So you

1 would apply terms and conditions --
2 MR. CAGNEY: We would apply to our lessor
3 but not the surface owner.
4 COMMISSIONER JANKOVSKY: So we get back to
5 how the maps are interpreted is just -- and that's
6 why we're making such a fuss because it's --
7 REPRESENTATIVE RANKIN: So to that point,
8 could we go back to the one that shows the RSO,
9 green areas, the State RSO.
10 So what we would probably like to have
11 seen is an alternative which makes those green
12 arrows, those green areas perhaps the priority
13 habitat and the rest of the red the general habitat.
14 I mean, we would like to have seen an alternative
15 like that; would we not?
16 COMMISSIONER JANKOVSKY: That is
17 absolutely correct. That ties in with our mapping
18 and so that's where Garfield County stands, yes.
19 REPRESENTATIVE RANKIN: Such an
20 alternative does not exist.
21 COMMISSIONER JANKOVSKY: The mapping does
22 not exist.
23 MR. CAGNEY: Actually such an alternative
24 like that is still selectable because we have the no
25 action alternative, and we can pick anything between

1 the no action alternative and the most restrictive.
2 And managing by any one of these maps is still left
3 on the table.
4 So we go back to the green one, we could
5 do that. But I got to tell you that we've been told
6 in very specific terms that you manage like that by
7 little buffers around leks and you get a listing. I
8 mean that's --
9 REPRESENTATIVE RANKIN: That's the next
10 discussion we ought to have. I mean what do we have
11 to do to prevent listing. But I'm just trying to
12 get on the table what it is that we as a county
13 would like to see. I'm thinking for them at the
14 moment. I'll talk with the State in the next
15 moment.
16 MR. CAGNEY: So from a BLM perspective, we
17 can still select anything that's in the range. We
18 don't have to select an alternative en masse. Say I
19 like this plank from that alternative and this plank
20 from that alternative.
21 The Garfield County, we included that as
22 an appendix and said we're taking public comment on
23 that. We didn't have time to analyze it because you
24 put it out on the same day we, you know, finished
25 our, you know, and then we had to keep going.

1 But we said we'll take comment on this
2 because it's in the range and it's selectable in the
3 final. We'd have to analyze it in the final to do
4 that.
5 REPRESENTATIVE RANKIN: But your advice is
6 that's a real bad idea because it would lead to --
7 MR. CAGNEY: No, no, I'm talking -- yeah,
8 I'm talking about, I'm saying to manage Sage-Grouse
9 with buffers around leks instead of landscape
10 perspective is a listing, absolutely.
11 COMMISSIONER JANKOVSKY: Let's go back to
12 our landscape perspective which is the dark red and
13 then the RSO is laid over it. If it were just, like
14 I said before, if it were just the habitat, we'd
15 give you ten miles worth of just the habitat that's
16 Sage-Grouse habitat.
17 But I think back to Jim, if the State is
18 going to look at Brett Walker's, what he's doing,
19 and there may be refine mapping that comes from his
20 research, if the State were to supply that and say
21 this is our map before the scoping's over, comments
22 are over, would that be considered at this time?
23 MR. CAGNEY: No, I started out this
24 meeting saying that whatever Colorado gives me is
25 what I'm going to use.

REPRESENTATIVE RANKIN: But what they have given you is they gave you two maps, and one of them seems to imply no restricted occupancy, and the other is let's talk about it. And that's not the way you're using them.

COMMISSIONER JANKOVSKY: Well, they only got the one map from CPW.

REPRESENTATIVE RANKIN: They did?

MR. CAGNEY: We were supplied the RSO.

REPRESENTATIVE RANKIN: Well, okay, take it back.

COMMISSIONER JANKOVSKY: So I mean our work then may be with the State of Colorado to see if there's any room for adjustments on the mapping.

MR. BISHOP: And that's something we can talk about. I mean again we've got Brett in an accelerated timeline to try and produce this.

And it's just acknowledging what Ron said earlier that we invested money into this, and so this is something we can probably get a little bit more refined product than we have in the broader -- Colorado as a whole model. And so we're making a commitment to try and do that, to supply that.

But I do think it's important again from our perspective, you know, the RSO is a specific

1 aspect just like it is for all those other species
2 tied to House Bill 1298. We weren't asked to
3 provide a map like that as BLM is asked.
4 We were asked to provide a map that kind
5 of captures the sense of wildlife habitat or
6 priority habitat zone for the species. I mean
7 that's why that RSO didn't go.
8 But again, it comes down to now this whole
9 discussion of alternatives and how we decide to
10 manage that landscape to balance the needs of the
11 Grouse and energy development. And so that's a key
12 aspect.
13 If we can refine that and take out some of
14 those non-habitat zones that we don't think --
15 that's currently in the priority habitat and we
16 think we have a defensible way with Brett's data to
17 do some of that, I think we would provide that.
18 MR. CAGNEY: And that's exclusively up to
19 you. But I would say one thing, if you do that and
20 then Grand County does that and Rio Blanco County
21 does that, et cetera, et cetera, et cetera, we'll
22 get wrapped around the axle.
23 And the result will be we present no
24 information on that listing decision because we
25 don't get it done in time. And then all the work

that we've done to this date is for no purpose.

MR. BISHOP: Let me address that very clearly. And, Ron, you jump in if you see this different, and Steve.

But this is a really important point is that we would say our current priority habitat map across all the rest of Western Colorado is highly defensible.

And the only reason we would look at it on the PPR population is acknowledgement that it's a little bit different habitat. It's broken up a lot more. Kathy, you agree with that?

MS. GRIFFIN: Yes.

MR. BISHOP: It's an important policy statement here. But we would not be making any indication by doing that we would consider that for any other county, because this is a different population.

I shouldn't say county, I should say a different population. If you look at North Park and you guys can apply your own model in North Park and it will be bigger than our priority habitat map. If you applied your current model right now, we would need to have more habitat identified.

So I mean that is an important piece of

this is this recognition we do know this population is a little different.

But, yeah, we are with you entirely. If that happens, it's not good for any of us, I don't think. And that's not an appropriate place to go.

COMMISSIONER JANKOVSKY: And what we're trying to do as a county is what you said, is find that balance between the habitat and the oil and gas production, gas production, find that balance so we can take care of the bird but not completely shut down oil and gas in this area.

MR. VELARDE: I'd only just say a couple things. And we agree totally. I mean it's obvious we support energy development. I mean that's our state policy. We have a Commission policy that says that. There's no if, ands, or buts.

But I think two things, I mean, I think we need to have, as Chad pointed out, defensible, biological, scientific information to what we're putting out there. And at the same time, we need to keep the bird off the list. I mean, I would hope that every citizen in Garfield County would say that. I mean that's our goal.

Well, I hope they do. If they don't, I mean that's where we went with the Gunnison

Sage-Grouse. I mean, if you'll look at the letter that Rick, our former director, sent to the Fish and Wildlife Service, I think it surprised a lot of people.

But the bottom line is we supported the counties, we supported Gunnison County, and we believe that we did everything possible and necessary to keep the bird off the list.

I mean the former DOW and CPW spent somewhere around $35 million. We've already spent 40 million just on the Greater Sage-Grouse, and we're not done yet.

So I mean that's our goal. And we're all in this together. And, I don't know, I just wanted to put that out there.

COMMISSIONER JANKOVSKY: And we appreciate that. And we have followed the Gunnison Sage-Grouse and have seen the mapping that was done in Gunnison County, and it's excellent. It mirrors very closely to the mapping that we have here. I mean they've done very specific mapping there.

And then they have somebody in their county that goes out and, you know, inspects any kind of new building or permits that are in that. And if it's in the priority habitat, they don't

allow it. And those are the kind of regulations potentially that are going to have to be out there. But we do respect what was done in Gunnison County.

MR. JARMAN: You know, along those lines we do have Zach and Eric here to walk through the latest mapping which I think is going to be I think really helpful here. I was going to say maybe take a five-minute break and --

COMMISSIONER JANKOVSKY: Could you put up just the BLM, there, that document, could we just take a look at that?

MR. JARMAN: Oh, sure. So what Tom is asking me here, everybody has got a copy of this.

COMMISSIONER JANKOVSKY: Yeah, the instructional memorandum.

MR. JARMAN: Right. And so this was the direction to the BLM. Jim can probably quote this in his sleep, and maybe Erin too, maybe more Erin than Jim for all I know.

But in any event, I have read and reread and reread this over a long period of time, and there are three key areas that we think are still very important that I'll highlight two of them anyway here. I've boxed three of them for you on your sheet.

1 But the first one, and Jim has seen this
2 before, but this talks about through this EIS it has
3 to address local ecological site variability. And
4 it really mirrors, Ron, what you were saying.
5 But, yeah, we are different. And
6 everybody acknowledges that. We also believe, Chad,
7 our mapping is extremely defensible. So yours is
8 defensible, that's great. So somewhere in there
9 it's doubly defensible if we can make it work. I
10 don't know.
11 But at the end of the day, it does require
12 via this memorandum and NEPA a hard look analysis.
13 And I suspect Jim's response to that might be, well,
14 we put it in the EIS for public review, and it's
15 going to get that scrutiny, and we'll certainly look
16 at it as that review goes along.
17 But I just want to underscore this. This
18 is from I believe the Secretary to the BLM to do
19 this.
20 And then the second point, this is the
21 bottom one on your sheet I think it is, but this is
22 more germane specifically what we're talking about
23 today. And this is, it talks about the PPH and the
24 PGH maps. That's the red and the green.
25 Those are being developed in this case, of

1 course, through CPW. That's been done.
2 But then it goes on to say, these science
3 based maps were developed using the best available
4 data and may change as new information becomes
5 available. That is absolutely where we think we are
6 here. To me, that's sort of the core of what we're
7 talking about.
8 We have a lot of very new data. And so
9 we're looking for that "may change" opportunity. So
10 this is not direction to the CPW. This is direction
11 to the BLM.
12 Anyway, it goes on to say, may change as
13 new information becomes available. Such changes
14 would be science based, absolutely, and coordinated
15 with the state wildlife agencies. So the resulting
16 delineations of PPH versus sustainable population.
17 So I put this in here by design. I mean
18 this is not something we're saying, well, you've got
19 to listen to us and listen to our maps and our maps
20 are better. No, we're not saying that per se.
21 But this was the direction to the BLM to
22 say, this can happen. And so our question back to
23 this whole group is, how and when does that happen
24 so we can do this.
25 MR. CAGNEY: This top thing with the blue,

1 that not only can happen, that has happened. We did
2 nine cooperating agency meetings, and we did exactly
3 what you're talking about in there.
4 Now within the context of that map, you
5 could take those little yellow lek things and we
6 could say in priority habitat, within a quarter mile
7 of leks within priority habitat, here's what the
8 deal is. And so we could do exactly what you're
9 suggesting in the BLM land use plan without changing
10 the map at all.
11 I mean we're not going to do that because
12 that would immediately result in a listing decision
13 and a dismissal of Jim from my current position. I
14 mean my instructions are put a proposal on the table
15 that prevents a listing, and that is not ambiguous.
16 So in the cooperating agency meetings,
17 there was objections to that. And I was saying, no,
18 we're not -- we can't do that. That's a listing.
19 You know, and I think we've pushed it as
20 far as we can to the draft. Now it's time to take
21 some public comment on that.
22 So we can get there without changing the
23 Colorado map and we did. In the Colorado
24 alternative, we said we were going to manage the cap
25 just on sagebrush ecological sites and essentially

1 made a new subset within the Colorado map. We
2 already did that.
3 COMMISSIONER JANKOVSKY: That changes the
4 map without changing the map, per se.
5 MR. CAGNEY: Yeah, and the reason that's
6 not good enough or the reason is we only did that
7 for cap management. And it didn't change the way
8 we're going to manage habitat on the whole.
9 But we can do that in the final. But if
10 it's going to result in a listing, I mean, I already
11 said this six times, if it's going to result in a
12 listing, then we can't do it.
13 MR. JARMAN: I appreciate that. I'm only
14 suggesting here that this language in the top box,
15 to me anyway, suggests that the BLM should consider
16 in its range of alternatives local plans that
17 address local ecological site variability.
18 And from what I understand -- now it's not
19 Friday -- but there is some degree of that in the
20 EIS draft.
21 MR. CAGNEY: We did the best we could.
22 MR. JARMAN: I'm not saying -- more
23 importantly is this bottom one, I think, for today's
24 discussion I think. It really gets at the -- I
25 guess it's a question of Chad, but we really look

1 forward to that opportunity to work with you as you
2 do refine your maps.
3 And what I understand you said earlier
4 today was that before the final rod, I guess, or
5 whatever it is that comes out on the EIS in the end
6 of November, you're hoping to inform those maps
7 differently than they are now based on Brett
8 Walker's research.
9 MR. BISHOP: And again, I think this is an
10 important kind of bridging of what Jim just said, if
11 we think we can produce a better product for the PPR
12 based on Brett's data that reflects priority
13 habitat, we'll do that.
14 And that's just because we think when we
15 have that data, we might be able to do a little bit
16 better job of capturing the needs of that bird in
17 the landscape, and it might reduce that red amount
18 of area down a little bit.
19 To me that's independent of the process
20 that Jim's talking about. Whether it's the current
21 priority habitat map or a refined map, so much of
22 this is in how people go forward in making the
23 decisions of what's going to come out and how we
24 manage priority habitat.
25 Does that make sense, though? I mean, we

will do that and we'll look at it, but I don't think anybody in the room should view that as that's the end-all process for what we're working on here.

But, yes, we will work to do that. And that fits that second blue box there if we think we can come up with --

MR. JARMAN: So along those lines, we have presented CPW with what we believe is the best available science to help inform you in your decision-making in what those maps look like.

Are you going to consider that information with Brett Walker's information in what you forward to the BLM?

MR. BISHOP: Well, when we get to that point, I think -- we need to see that. I think there's a key point is we're producing our maps based on our science and what we're asked to do.

We've cooperated with you. And my understanding is that we've done a good job of that. We've had our researchers meet with you. And that we can say, we met with you and cooperated with you. But that's your map that you would advance in this process.

But I think we're going to stick to our -- this is our current map right now. And if Brett

1 produces a product in time that we believe better
2 represents priority habitat on the PPR, we'll
3 consider submitting that.
4 MR. JARMAN: So you won't consider what we
5 have to offer you as best available science to
6 inform that?
7 REPRESENTATIVE RANKIN: You just said you
8 would consider it. You did not say you would use
9 it.
10 UNIDENTIFIED MALE: Before we make that
11 commitment, why don't you go through the process of
12 how you conceived your maps and let us respond to
13 that after. I think we need to take a look at that.
14 COMMISSIONER JANKOVSKY: Let's go ahead
15 and take a ten-minute break. Commissioner Martin
16 has brought in some food for us to keep us going
17 through the afternoon. So everybody please help
18 yourself to that, and the bathrooms are out the
19 doors here to your left.
20 (A break was taken.)
21 (Back on the record.)
22 COMMISSIONER JANKOVSKY: (Begins
23 midsentence) -- all of our GIS work and our mapping
24 along with Eric Petterson, who's also been involved
25 in that and also our local biologist here in the

field and has helped us a lot, just on his time up in the room and actually feet on the ground looking at the habitat.

So with that, we'll turn it over to you and let you take us through the --

MR. PERDUE: Since Jim is walking back in, I'm going to ask him.

COMMISSIONER JANKOVSKY: Jim, I have a question for you before Zach gets started here on our mapping. And that was you talked about subsets of Sage-Grouse habitat. Can you talk to me about -- I didn't fully understand what you were saying there.

MR. CAGNEY: There's an alternative where we said we were only going to apply the cap to ecological sites that support sagebrush. So if you were going to drill a well in pinon juniper, then the cap management wouldn't apply.

COMMISSIONER JANKOVSKY: So to some extent that would tie back into our mapping that we've done here because we have a pretty good (inaudible, other people talking).

MR. CAGNEY: Right, but the greater issue is that within the context of the map that Parks and Wildlife already has on the table, we can make those

kind of decisions to supply subsets as long as it doesn't trigger a listing issue.

COMMISSIONER JANKOVSKY: Thank you. I appreciate that qualification. Zach, we'll turn it over to you.

MR. PERDUE: So I guess just to begin, I wanted to remind everybody kind of what the intent here with mine and Eric's involvement is.

We were essentially contracted by Garfield County to assess the PPH and PGH data set, the accuracy of the data set and the applicability of the data set towards the PPR region and what we know about the population and the habitats that exist up there in the region.

One of the primary concerns was exactly what Jim was just discussing which was the issue of the caps. And for that reason, one of the over-arching issues that came to light on the front end of this was the concern that the PPH/PGH data set that's been created by CPW captures enormous areas, interstitial areas of ineffective habitat that consist primarily of aspen, conifers, so on and so forth.

And so the concern here was if the PPH/PGH data set is adopted, how does this cap stuff relate

towards the future development of the region. You know, if an operator needs to go in and clear three acres of aspen to put a pad in that's not necessarily destroying effective habitat, should that count against the cap, and so on and so forth?

And I guess before I go into this, I'm going to let Eric just say a few things about the cap issue and the habitat effectiveness before we get into the modeling.

MR. PETTERSON: So I guess one of the things that in this process, we definitely didn't have all the answers going into this. It's definitely been something of a learning curve as the EIS process has progressed.

One of the things that I think that we all need to really keep in mind is that definitely the goal is to prevent a listing. And one of the things that we found through our work up there is that -- and I think we've incorporated, well, we've cut and pasted a lot of CPW's research into this process.

All the work that Brett Walker's done, you know, we didn't make up what is habitat, what's not habitat. We just took what he has reported and plugged it into a model. The only thing that we've really done is increase the accuracy of the

vegetation layer in that model effort.

And now that, you know, we've spent some more time up there stomping around. We've got some new data to look at.

One of the concerns that I have is that -- and I understand what the CPW's, the rationale for casting a large net with these kind of mapping issues and these habitat issues because you do want to capture a lot of those transitional habitats, those suboptimal habitats, because it is really important for species for buffering, for scape cover, a whole suite of different reasons.

One of the things that I'm now concerned with, and this is only like the last couple days, is that with casting a large net of habitat on a system where we have very small fragmented habitats, which is actually what's on the ground up there, not only are we -- I think what's going to happen and my concern is that we would be watering down what is the really important stuff up there.

Let's say we did even like a one percent cap, you know, I could see a one percent cap in this area. And because, unfortunately, all the best operable terrain is coincidental with a lot of sagebrush up there.

1 My concern would be that even if we do
2 like a one percent cap, if a lot of that development
3 is concentrated in these small highest quality
4 fragment habitats, we could still be consistent with
5 the habitat caps, the intent of the EIS, but we've
6 still lost the best habitat.
7 And that in three to five to six years,
8 we're going to see something where Sage-Grouse
9 populations are continuing to decline on the Roan.
10 And then, you know, well, it's not working. We have
11 to list it anyway.
12 And I guess my concern now is that how
13 could that be addressed by CPW through your mapping
14 process because, essentially, I think the BLM,
15 they're going to go with whatever you guys provide.
16 And I think that after spending some time
17 up there looking at that, this area up there, I
18 really think that in order for anything that moves
19 forward to really be effective and really help the
20 Grouse so we do see long-term persistence with these
21 populations up there, we are really going to have to
22 protect these small interstitial areas with real
23 core habitats just because there's not a lot up
24 there.
25 MR. CAGNEY: Eric, can I interject?

1 MR. PETTERSON: Absolutely.
2 MR. CAGNEY: Remember that conversation
3 between, you know, implementation versus land use
4 planning? Okay, what we've got here is a land use
5 plan. And then what you're kind of getting towards
6 there is that in the implementation process we're
7 going to allow all the activity to hit the best of
8 the best.
9 And we have processes at implementation
10 like the on-sites that Ron was talking about. And
11 that's not going to happen. There's going to be
12 wildlife biologists siting that. And there will be
13 leases, and the lease might be this size, and
14 there's going to be a decision that says we're going
15 to put the rig over here so that we don't hit that
16 best of the best.
17 So basically what you described is saying
18 that we would blindly implement this as the actual
19 proposals come up. And there's a whole level of
20 discussion that goes into that.
21 COMMISSIONER JANKOVSKY: And for what you
22 said, Eric, though, and the thing is, is that right
23 now on top of the ridge is where most of the
24 activity is. That's where most of the roads are.
25 But that's also where the priority habitat is, the

1 best habitat.
2 MR. PETTERSON: Based on what we're
3 seeing, yeah.
4 COMMISSIONER JANKOVSKY: So there are
5 going to have to be some changes, as you've said,
6 there are going to have to be some changes to how
7 people operate.
8 MR. CAGNEY: I mean there's issues. Okay,
9 we're going to put wells on steep slopes so we can
10 avoid the sagebrush. And there's a lot of those
11 kind of issues on this Grouse project that nobody
12 likes.
13 MR. PERDUE: And I mean, it's not an easy
14 fix. I mean I think a lot of people think the Roan
15 is flat. But you get up there, it's not at all
16 flat. And, you know, putting a road and pads on
17 hillsides has its own challenges.
18 Anyway, I guess I was -- and I appreciate
19 your comments. It's not just a tabletop GIS
20 exercise. We do have the on-sites, we do have that
21 process.
22 And I think that's going to be really
23 important because right now I think the way that
24 maybe this might be perceived is that, you know,
25 well, here's priority habitat, here's the cap,

here's the stips, you know, this is what the operators have to deal with.

COMMISSIONER JANKOVSKY: And, Zach, do you want to explain the mapping? Thanks, Eric.

MR. PERDUE: So to get back to the mapping, some of you have already seen some of this. But we will start just from the beginning for those of you who haven't.

Initially we started with Garfield County by initially establishing two different techniques that we were going to approach in terms of modeling perceivable habitat on the PPR, both of them being techniques of weighted overlay analyses. One called a habitat suitability index, and the other is a fuzzy modeling process.

So initially we started to look at some of the literature that exists out there specific to the PPR. A lot of that was apart from Brett Walker's research that he's done as well as Tony Apa, some stuff from Rice's paper.

But by and large, a lot of the criteria that we fed into these models were driven by the expert literature that exists for this specific region.

And so initially we started to look at

1 some of the variables that have been introduced in
2 Brett Walker's study. It was the one that we kind
3 of thought was the most scientifically defensible.
4 It was a very robust sophisticated model. A lot of
5 effort and research went into it, and so we sought
6 to take advantage of that.
7 But if I recall correctly, Brett had, you
8 know, somewhere around nine, ten, eleven, twelve
9 variables in his model. And we wanted to
10 essentially try to produce a conservative estimate
11 of the habitat that existed out there so as not to
12 unduly constrain us based on feeding in more and
13 more variables.
14 The way these models work is, generally
15 speaking, this isn't an absolute but, generally
16 speaking, the more and more variables that you feed
17 into the model, the more it works to constrain the
18 results of the suitable habitat.
19 So initially we tiered to Brett's report
20 and selected four dominant criteria which included,
21 of course, vegetation diet, so sage in
22 sage-dominated communities, slope, distance to
23 forested areas, and (inaudible) percent canopy
24 cover.
25 And the big difference, I guess, between

our model and some of the previous models that have been done is that initially we had utilized publicly available data sets in all of the model iterations including a CVCP data set that was utilized in both Brett Walker's and Mindy Rice's models, but as well as the USGS Landfire.

And the reason that we looked at the USGS Landfire was because based on our assessment of the CVCP data within this region, we were observing a lot of cover-type inaccuracies as well as horizontal precision accuracies.

And so we first looked to some of the other sources that existed out there to try to rectify that issue. And we did run some models with the Landfire data understanding that, again, we had some inaccuracies inherent to the data.

So the next process that Garfield County set out on was to actually remap the vegetation data on the PPR. And previously we provided a pretty detailed presentation on the steps to do that. But in an effort to not put everybody to sleep this afternoon, we'll just gloss through that real quickly.

But we performed a classified image, a supervised image classification process on color

infrared topography and geared the vegetation communities, forest, the sagebrush -- I'm sorry, towards the Greater Sage-Grouse habitats.

And so at the point we had run, I think, about a half dozen different models using publicly available data sets, we then took the remap's vegetation that we created, the initial version of it, and fed that into the model. And we produced the results that you're seeing on the screen here.

It is currently, I believe -- correct me if I'm wrong -- but I believe this is currently what's adopted in Garfield County's Conservation Plan, that the model returned just shy of 29,000 acres of suitable habitat.

By contrast compared to some of the previous results, keeping all the other variables static and just substituting the vegetation data layer, when we ran the same model with the CVCP data set, we had approximately 21,000 acres. And when we ran it against the Landfire data set, we had approximately 18,000 acres.

So the addition of the remap's habitat actually served to expand the suitable habitat, keeping all other criteria static.

We met with Jim Gammonly and Brett Walker

1 and Karen Eichhoff on this and a few other people in
2 April; is that correct?
3 MR. PETTERSON: That's right.
4 MR. PERDUE: In April to have them
5 validate the model result that we had done, and
6 discuss the process in detail, and so on and so
7 forth.
8 And the results that you see on the screen
9 are the validation. And I'll highlight some numbers
10 so you can see. On the left-hand side are various
11 model results. The one that we performed for
12 Garfield County is listed at the top.
13 And then there's various models below that
14 on the left. Sauls was the model that was performed
15 by BLM and adopted as the PPR plan; is that correct?
16 UNIDENTIFIED MALE: I think it was a joint
17 project of CPW and BLM.
18 MR. PERDUE: And then below that we have
19 the Rice and Walker models that I referred to in
20 this conversation. To the right we have kind of
21 validation results in terms of points missed over
22 here and points captured within the model results.
23 And so within our model results, we had an
24 initial direct capture of about 61 percent, and
25 about 39 percent of those fell out of the direct

habitat that the model mapped.

And so we then start to look at, okay, so how far were we missing the points for the data. And we asked Karen to tell us, you know, some statistics on where these points were occurring.

And what we noticed was that a lot of them, the far majority of them were occurring outside the parameter of the mapped habitat with a mean distance of about 100 meters.

And what we also noticed was that a lot of these kind of occurred in the mixed mountain shrub transition communities that have kind of been a big issue, you know, throughout this process, but also within the heads of drainages that weren't necessarily getting picked up because they were exceeding what appeared to me to be slope constraints.

And so in following that meeting we went back to the board and kind of revised the model parameters to produce a larger habitat area effectively, trying to capture the outliers that were missed in the initial result.

And so to do that, we actually changed three different criteria in the model. Number one was that we had a chance to perform a validation

1 against our vegetation data set.
2 And we subsequently converted a fair
3 amount of vegetation predominantly in the southern
4 portion of the unit but also as well as in the
5 northern portion of the unit we were missing a lot
6 of PJ communities. And in the south we had a lot of
7 mixed mountain shrub communities that were
8 incorrectly typed as sagebrush communities.
9 So in the revised model we had an
10 opportunity to feed in the revised vegetation data
11 set. But we also relaxed the slope parameters
12 because that seemed to be the biggest driver in
13 terms of why we were missing some of these points.
14 And we also fed in a different criteria,
15 an additional criteria which was a land forms. And
16 the land forms is basically a data set that's
17 produced off of digital elevation models that
18 identifies and distinguishes between valley bottoms,
19 (inaudible) slopes, middle slopes, head of slopes,
20 head of drainages and ridge lines and top of slopes.
21 And so we fed in the land form to
22 reinforce the habitat suitability on these ridge
23 lines but also in the heads of drainages which is
24 where we seemed to be missing a fair portion of
25 these.

The results of the second, the revised modeling exercise produced this map here that you see. And the results there produced approximately 61,000 acres of habitat.

And what we saw was that a lot of the core areas from the previous model results got expanded, pushed out, but we weren't sure, you know, how well it was going to validate.

So we recently had Karen validate these model results as well. And those results are presented here.

And what we've got here, the metrics are slightly different in this validation. It wasn't the exact same numbers that were produced in the revision so it's hard to compare some of these numbers directly.

But in terms of a direct capture rate, we had the model jumped up to about 68 percent which was honestly less than what we were hoping for. We had pushed out a little bit more to capture some of these, and so we started to look at the data a little bit more.

And I asked Karen to break down the birds that we were missing by 25 meter intervals so we could understand exactly what the issue was in terms

of missing this.

And based on what we're seeing here is that while the model did push out and capture some more of these birds, it would appear that it didn't push out quite far enough.

So that there are still a population of birds on the perimeter of our habitat results that are not being directly captured. With that being said --

DR. RAMEY: Zach, let me interrupt. So the 25 meter intervals, that's to capture some of the inaccuracy in the location data?

MR. PERDUE: Well, there's a correlation there. That's one thing that needs to be understood is that we do not know the context of these points that are used in the validation. We do know that they were observations captured out in the field by CPW staff.

But in talking with Brett, we also know the method in which they were captured which were the birds are basically tracked on the field via radio collars and then they stay some distance so as not to disturb the bird and make observations on a map in terms of this is where the bird lies and this is where I recorded the point from. And then that

is subsequently translated into data.

Obviously with that method, there becomes some horizontal imprecision. But the bigger thing is not understanding the context of what the bird was doing there. We don't know if the bird was actually foraging, if they were strutting, or if they had run down to a location because there was a coyote on the top of the ridge.

And so that's why I wanted to understand how far we were missing these points from because with the VHF precision and the manner in which they were collected, there can be some horizontal imprecision expected in the marked locations. With that being said, we've got --

DR. RAMEY: What level of imprecision would be expected?

MR. PERDUE: With the VHF, my understanding is up to 50 meters. And so we wanted to look at how do these numbers validate when you look at -- when you start to include some of these mislocations within the 25 meter, 50 meter, 75 meter distances.

And so within 25 meters, we captured 82 percent of the population. Within 50 meters, we captured 87 percent of the population. To get to

the bottom there, within 100 meters is 92 percent of the population.

And again these are validated against the direct model results. It's not necessarily the end conservation layer, if you will, that will be utilized by the Garfield County plan.

Because this is a direct translation of (inaudible) data, there are holes in the data, there are rough edges that kind of arbitrarily cut off and, you know, contiguous sage patches that would likely be expanded to capture those areas.

So that was the result of the second model. In the first model one of the things that was put down here was this graph here showing some of the validation results compared.

And as you'll see, Garfield County is on the low end on this one. We had approximately 61 percent validation, and we have, you know, the Rice and Walker models coming in at 96 to 100 percent.

And, you know, I think it was Fred at one point asked me why the discrepancy, why are we seeing this kind of discrepancy. And basically it boils down to the model methodology and the end result.

With Brett Walker's model, number one, his

1 results will be produced in bins basically, discrete
2 bins, (inaudible) bins based on the type of model
3 that he's utilizing.
4 In the same manner, Rice's model basically
5 paints the whole thing red. It says everything is
6 some degree of suitable habitat. And that's largely
7 a result of utilizing the one kilometer scale in the
8 model. And so it has a tendency to over-simplify
9 the results.
10 But, in addition, her model only included
11 vegetation associated variables. There were no
12 other variables that we do know, in fact, Grouse
13 habitat in their selection and suitability of
14 habitat.
15 So with that being said, these results are
16 somewhat skewed because, as I said, in Rice's model
17 the whole thing is captured, is painted up. So I
18 would expect that if you were to run the results
19 against the points captured within the PPR, you
20 should get 100 percent.
21 The interesting thing that's not here that
22 is just as important to the validity of these
23 results is the validation of absence points.
24 And that is the ability -- you know, a
25 model's accuracy is not only gauged on its ability

to collect the points in question that you're looking for to assess the suitable habitat, it's also accurate in the sense that it's able to predict the areas of non-habitat and non-use.

And that's where we would see a precisely different graph here if we were to look at this. According to Rice's model, there are no areas of non-habitat in the model.

I haven't seen, you know, Brett's results that he's working towards either, but based on the bin result method we would expect to again capture larger areas of non-habitat that would be lumped in with habitat.

So basically the result here it's not, in my opinion, accurate to draw a direct correlation here because they're different methods and they're different results with very different intentions.

DR. RAMEY: So by analogy you could paint the entire county red and you would capture 100 percent of the Grouse?

MR. PERDUE: Yes, that's correct.

COMMISSIONER JANKOVSKY: When you stand out 50 meters, that's 50 meters from the original, the first study you did, I guess, or the first --

MR. PERDUE: Well, the 50 meters was

1 actually on the second validation. So that was on
2 the revised model.
3 COMMISSIONER JANKOVSKY: And do you have
4 -- how many acres was that?
5 MR. PERDUE: Approximately 60,000, 61,000.
6 COMMISSIONER JANKOVSKY: And you said that
7 the Rice model was based on one kilometer in the
8 accuracy, correct?
9 MR. PERDUE: That was the spatial
10 resolution of the data.
11 COMMISSIONER JANKOVSKY: What was your
12 spatial resolution?
13 MR. PERDUE: Some of the models were run
14 at 30 meter spatial resolution, and some of them
15 were run at a ten meter spatial resolution.
16 DR. RAMEY: I have a question. It might
17 be a bit of a difficult question, but I think it's
18 an inescapable question for everybody in the room.
19 Important to any discussion of scientific
20 defensibility or reproducibility, one has to go back
21 to the question of are the data available for
22 independent review and analysis, are the data
23 public.
24 And I know this is a discussion various of
25 us have had previously, but I think it's one to ask

1 Chad and Jim and Fred perhaps, how to deal with this
2 issue. So you, Chad, guys have done great work and
3 you're producing a paper. But what about the
4 underlying data that the eventual model is based on?
5 Now I understand that under state statute,
6 location data of some sensitive species on private
7 lands is not public. I also understand that you
8 have an unwritten policy on data that are work in
9 progress are not public.
10 But I think it's an inescapable fact that
11 at some point those data that are used to derive
12 that model or any model, including this one, have to
13 be public.
14 And just a case in point here that, you
15 know, I'm just looking at the lek data and I'm
16 noticing that, you know, a few of these leks are
17 sitting on top of roads, active leks in fact. And
18 just having the ability to go back and check the
19 year of the observation to the location is valuable
20 for interpreting this.
21 And so how do we get past this, how do we
22 work on this difficult issue so the data could be
23 public?
24 MR. BISHOP: Well, I mean this is
25 something we deal with on a continual basis. I

1 think we've bent over backwards to make lek data
2 available. We've done it through nondisclosure
3 agreements.
4 And, you know, we've made the AG's office
5 cross-eyed over this. I mean we've probably had no
6 less than 25 meetings with our assistant attorney
7 general on this question.
8 And it's a balance between private
9 landowners' rights, as you stated, and the ability
10 to get information out there. So if it's management
11 data -- and it doesn't matter who we're dealing
12 with. I mean we've frustrated BLM at various
13 levels, NRCS.
14 And I think we're at a good balance point
15 in terms of we've given out a lot of that
16 information through nondisclosure. We hold back any
17 kind of identifiers that would identify a landowner.
18 So we are trying to do that because,
19 otherwise, that's a separate -- okay, so that's a
20 separate statute or whatever it is that is trying to
21 protect private landowner rights. Otherwise, if we
22 collect management data, it's available.
23 Then we have our research data. So I
24 think we're getting past that. I mean anybody who's
25 needed to work with that lek data, we've I think

1 been able to accommodate that.
2 Now if we go to our ongoing research data,
3 if it's published and it's done and we're working on
4 that as we speak but, you know, we're identifying
5 reasonable lines that, okay, that data is available
6 now.
7 But again, like with Brett's stuff right
8 now, if we don't protect that, it totally undermines
9 the principal investigator's ability to conduct and
10 publish science. We respect the importance of
11 Brett's current data, I would say this right now,
12 and that's why we've put him on this accelerated
13 timeline to try and get that done.
14 And again he's shooting for a draft done
15 this fall so that we can help inform that process.
16 But that's not going to make that data immediately
17 available because it's ongoing work. I mean it's
18 not ongoing work, but I mean until it's published.
19 But I mean we collected and invested in
20 that data in the interest of the State. And that's
21 what we're trying to do is the same thing you're
22 trying to do, we're trying to do it in our
23 scientific process and get that available to help
24 influence this process.
25 And I mean we could have -- in past

1 situations where people would use (inaudible) and
2 just try and take a researcher's entire data so they
3 could publish it. I mean we've seen that, so it is
4 an important balance. But that's how we're handling
5 it.
6 DR. RAMEY: So if I hear you correctly, or
7 correct me if I'm wrong, so you're saying that under
8 -- that data would be public at least under a
9 nondisclosure agreement at the time of publication,
10 the location data?
11 Because, as Jim pointed out, that the leks
12 are just a small part of the picture. If you want
13 to develop a listing, then just focus on the leks.
14 But seasonal habitat is of such great importance,
15 especially for the survivorship of the birds on the
16 Roan, as Tony Apa's work has shown.
17 So would the data be available at the time
18 of publication with some sort of nondisclosure
19 agreement as previously done?
20 MR. BISHOP: I don't want to be on record
21 right now today. I'll get to when exactly -- we've
22 been discussing this. We have made it clear that we
23 can't just hold onto that data indefinitely.
24 Whether it's literally the day of publication, I
25 don't know that we've gotten to that refined level

1 of discussion.

2 MS. GRIFFIN: It's my understanding it

3 depends on if there's subsequent papers that are in

4 the works that will also use that data. So it

5 depends on what the initial proposal states as what

6 the data will be used for and what publications

7 would come out of that data.

8 DR. RAMEY: And does the Department have a

9 policy written on some threshold at which public

10 interest overrides the individual researcher

11 interest at a point? Or do you have a policy on how

12 many years elapsed before a data set will go public

13 regardless of whether it's going to be used?

14 MR. BISHOP: This is what we're in the

15 process of doing all day long. And I think what

16 Kathy just expressed, that's kind of where we're at

17 right now.

18 But, yes, I mean I think at some point

19 we're beginning those discussions. We've never

20 really had to have these discussions before

21 recently. But I think we're getting to that point.

22 Let's say a researcher completed that work

23 and went five, six, seven years without publishing,

24 that's not in anybody's interest. But we do not

25 have a policy or anything written on that at this

1 point.
2 What we clearly have is an interpretation
3 of CORA. And that is if it applies to ongoing
4 research, then it does not fall under -- that's our
5 legal interpretation -- it doesn't fall under CORA.
6 MR. CAGNEY: What's Parks and Wildlife's
7 policy in terms of just public disclosure of leks
8 with regard to lots of people going out to watch
9 strutting and disrupting the strutting activity so
10 that you reduce nesting success?
11 I mean is anybody looking at that?
12 Because I know there's been some instances where
13 that's known to have happened.
14 MR. BISHOP: That comes into the
15 consideration as well, and I think that's why we do
16 that through nondisclosure as well. We want to
17 understand who's getting the data and why.
18 MR. CAGNEY: Yeah, so I mean you can make
19 a map -- I mean there are certain map scales where
20 you can present that data, and it's no big deal.
21 But if you start giving people GPS locations of
22 leks, then there's a whole other problem.
23 MR. BISHOP: So going back to CORA then,
24 we have the private landowner interest is one. And
25 I'm glad you brought that up, but we've use that at

1 times in the past with other sensitive species that
2 exact thing.
3 So that is a consideration. I forget the
4 statute but it's something about best interest of
5 the public or something if we release -- we do have
6 that consideration.
7 DR. RAMEY: I think really important here
8 is, you know, some narrow exemption which probably
9 falls under a nondisclosure agreement, as like the
10 lek data that you've released and the AG's having
11 problems with perhaps.
12 But that is perhaps a solution to this,
13 this question of reproducibility of the scientific
14 information. And so, you know, these data files I'm
15 assuming are going to be public as well, used in the
16 production of this model? Brett's, I'm assuming.
17 UNIDENTIFIED MALE: We want to get
18 published too, though.
19 MR. BISHOP: And I get that, and I get our
20 need to publish results and then make data
21 available. But I also think for the process here, I
22 think for the most part we're way more on the same
23 page than we're not. And I think you can look at
24 what you just -- we kind of know.
25 I mean that's why we reached out to sit

1 down with you from those points you made earlier,
2 and we did that. And what that does is, is it tells
3 us you just presented it, this is how much of that
4 data is being captured when you enlarge that.
5 Granted, we've got a little bit of
6 accuracy. You guys know a 50 meter accuracy is not
7 bad on VHF data when you're collecting it in the
8 field. And we can all see what we're kind of doing
9 there.
10 And I guess that's where I would get back
11 to we're going to do our best to get that done this
12 fall. And I think, you know, probably through
13 points you've made maybe -- all I know is that I've
14 been told -- Kathy, you know better than I do, I bet
15 -- part of our analysis that Brett's doing is based
16 on better veg data than I think was used before.
17 And that helps, and you just made that
18 point. I don't know if you guys prompted some of
19 that or not. But we are trying to produce a better
20 product. We're always trying to do that.
21 MR. PERDUE: Are you guys producing any
22 vegetation data set for the PPR region?
23 MR. BISHOP: I don't know that. I just
24 have been informed that Brett's model might run on a
25 little bit better vegetation resolution.

1 MS. GRIFFIN: It does have a different
2 resolution of data, veg data.
3 MR. BISHOP: And you made that point, I
4 think you went down 3,000 acres by a better
5 resolution, something like that.
6 As you were discussing, Representative
7 Rankin, we've already talked with you. I don't
8 think we have any problems when Brett gets his thing
9 done in doing a reverse conversation. We will try
10 and advance what we think is a defensible
11 modification perhaps to the PPR population of the
12 habitat map.
13 But I also don't think anything stops you
14 guys from advancing this as part of the appendix or
15 however that works into the equation. And I guess
16 what I'm getting at is I think we do see what's
17 being presented there. People can say that.
18 Does that make a little bit of sense? I
19 mean you guys put that investment in, and I think
20 that gets advanced as part of the conversation.
21 Because what I see you saying is that, and
22 we wouldn't disagree, that the priority habitat map
23 we have right now is going to capture those points.
24 You're arguing, man, we've got a lot at
25 stake with our land use, we think it's acceptable to

1 capture 70 percent of those total locations, we're
2 getting that core captured. I think that's what I
3 hear you saying.
4 MR. YAMASHITA: And I think what needs to
5 be made also is that, although you haven't had an
6 opportunity to investigate independently our data,
7 we haven't had an opportunity to investigate yours
8 either.
9 At some point in time, and I don't know
10 how it will correlate with the BLM's process, you
11 know, maybe that will happen, but until then the
12 data set that we have right now and the maps that we
13 have exist and they will persist until we have
14 something better to present.
15 I don't think that's happening
16 immediately. So I don't know how we get past that
17 because what we have is what we have. And it's our
18 best information currently that we have available to
19 us.
20 COMMISSIONER JANKOVSKY: And our concern
21 to that is that it gets done prior to public -- so
22 we can get public comments back to the BLM prior to
23 records of decision being made and so forth.
24 MR. YAMASHITA: And I hope everybody
25 understands we're doing everything that we possibly

can to get that best information forward in a timely manner.

MR. CAGNEY: There's another venue here, and what we're going to do is we're going to amend five land use plans with this process. And there's nothing that says we have to amend all five exactly the same.

Now clearly I don't want to get into a chaotic thing, you know, where everything is really different because that will clearly break down. But if there's a really valid reason to amend something a little bit different in the Colorado River Valley land use plan than we've got in the Kremmling land use plan, we can do that.

I mean there has to be a really superior reason. But it doesn't have to be exactly the same everywhere. So there's a venue there to do something other than change the map in a crisis atmosphere.

MR. JARMAN: Jim, in those district office RMPs, do they operate the same way where they're going to rely on CPW's mapping to inform what they do? Just like we're doing now with the EIS where you're relying on the State for your mapping, is that the same scenario at the individual district

offices then?

MR. CAGNEY: Yeah, for every species, elk winter range, deer, that's just how we do business.

MS. GRIFFIN: Jim, would those be amended at the final signing of the rod of the EIS? Is that the point of --

MR. CAGNEY: The rod is going to be that all land use plans are amended as follows. The White River land use plan is amended as follows, you know.

And, like I said, if I get into that too much, I can't finish this document on time. But we can do that a little bit if there's a really good reason.

MR. JARMAN: Let's say that we're unable to hit the target that Commissioner Jankovsky is talking about as far as trying to come up with a map that really does work well, at least in our view, with CPW and Garfield County by the time you're at the rod.

Then what is the process after that, notwithstanding what you just said about the individual BLM district offices, but what are the opportunities to amend the map? And maybe it's a question for both.

1 MR. CAGNEY: That happens all the time.
2 It's just standard for the elk winter range thing.
3 Okay, so if it's a small change, then we just, you
4 know, update our maps. And from that point on, we
5 apply the stipulations with the new map.
6 You know, and sometimes you'll just get
7 somebody that's got a lease and go, wait a minute,
8 that's not elk winter range anymore, you know, so I
9 want that off my lease. Well, then there's
10 exceptions and waivers for that kind of thing.
11 Then there's other guys that we put that
12 on their lease, and they go, that's a violation of
13 my valid existing rights, that's not what I bought
14 when I bought that lease.
15 You know, so it gets a little messy. But
16 it has to be because you can't have a map like that
17 that will stand up to forever.
18 MR. BISHOP: And that's been our
19 understanding. I think we still need to go back to
20 the point Jim was making earlier because it's so
21 important to the selection of an alternative or the
22 matching of alternatives.
23 Because isn't that going to still --
24 that's going to dictate so much in how the
25 development proceeds.

1 REPRESENTATIVE RANKIN: I think in those
2 modifications of maps going forward, do you still
3 wait for the State input, or does BLM take
4 independent action on modifications after the rights
5 in place?
6 MR. CAGNEY: The State is going to send a
7 map, and then we just start acting on that new map
8 to the extent that we can.
9 REPRESENTATIVE RANKIN: What about minor
10 changes?
11 MR. CAGNEY: Minor changes are -- I mean
12 there's different kinds. So you have a plan
13 amendment, and then you have a plan maintenance.
14 And, you know, if it's not a big deal, we just note
15 that we know that the map is new.
16 Now if it gets really significant, which
17 is like significant is the great leap of trigger
18 word, you know, then we might have to do a plan
19 amendment. It's case by case.
20 But updates of maps happens. I mean, it
21 can't not happen.
22 REPRESENTATIVE RANKIN: And you rely on
23 the State to work with you to update maps?
24 MR. CAGNEY: They don't work with us.
25 They give us the new maps that they have because

that's their business.

MR. JARMAN: So, Jim, a significant change, that's an EIS amendment. So do you go through a public process to do that?

MR. CAGNEY: Yeah.

MR. JARMAN: So, by way of example, if we were to somehow work with CPW and come together and produce a map that looks more like what you've seen on the screen today, or maybe what's in the Garfield County conservation plan, that would be a significant amendment clearly, I would think, to what that the red map shows now.

And so you would go through an EIS amendment for that? In other words, that's significant enough?

MR. CAGNEY: I would think so. You know, it depends. You're only talking about one of the 21 management units there.

MS. JONES: I feel like we're skipping a major step, though, in this discussion. I mean we're going from draft to rod.

I mean what we're coming up to is the most important part of this process is developing the final EIS. And we're going to have all the cooperators at the table deciding with us what goes

1 into that document.
2 So I mean we've got this huge range to
3 work with. And I think we need to remember that,
4 like I said, this is the most important critical
5 step of this process is deciding what that final
6 plan looks like.
7 MR. CAGNEY: But as factual as that is, I
8 don't want anybody to take away that, hey, there
9 will be no problem.
10 MS. JONES: It will be tough. I mean,
11 yeah, it's going to be really difficult, but it's
12 the next step.
13 MR. CAGNEY: So the point being made is,
14 wait a minute, we're talking about amending this
15 thing after we're completely done. So thank you for
16 bringing us back home on that.
17 MR. JARMAN: I wanted to ask Steve,
18 Steve, you had mentioned that you were interested in
19 understanding the modeling efforts that the County
20 went through to produce the map that you've seen.
21 Did you have any other questions about the
22 methodology, the level of vegetation data as far as
23 resolution we used, those kinds of things?
24 Because they are significantly different
25 than what your agency is relying on for what's in

1 the EIS right now. By way of example, the Heather
2 Sauls model.
3 MR. YAMASHITA: I have to admit to you
4 that it's at a technical level way above my head.
5 So I defer to Kathy, I guess. I think if Chad and
6 Kathy understand, I'm good with that because I'm
7 going to defer to their technical abilities.
8 COMMISSIONER JANKOVSKY: I guess the
9 question is, do we need to share more as well?
10 MR. YAMASHITA: It's hard for me to digest
11 in a few minute presentation, to be quite honest.
12 COMMISSIONER JANKOVSKY: Well, I think
13 we're getting close to the point to wrap up, maybe
14 summarize. But any other questions or talking
15 points that we need to cover from anybody in the
16 group?
17 MR. BISHOP: I'll just say one thing
18 because, you know, we're all stating our different
19 perspectives.
20 But I just want to come back to a
21 statement like we've made with you guys in the past
22 in that we're trying to do our best job. I know
23 Steve backs this, we're trying to do our best job to
24 do our job in this overall process for the State of
25 Colorado.

1 We also respect the challenge that the
2 PPR, you know, brings. We respect the science that
3 you guys are bringing forward, and we sat down and
4 tried to help with that.
5 And so at the end of the day, it's
6 important you hear that. We're all trying to, as
7 you said, bring our different -- I think we all have
8 maybe slightly different missions, and we're trying
9 to bring the best information forward. And we're
10 trying to be cooperative in that regard.
11 MR. YAMASHITA: Really our working
12 obligation with the counties has always been to try
13 and bring the best science that we possibly can for
14 the decision-makers.
15 And oftentimes we're not the
16 decision-makers. It's the county or it's at a
17 federal level for them to make their best decisions.
18 And that's what we're simply trying to do here.
19 COMMISSIONER JANKOVSKY: And I'll try to
20 maybe summarize a little bit and kind of talking on
21 those issues. I mean we do have different missions,
22 to some extent.
23 The County, we're concerned about the
24 welfare of our county. We are in this area where
25 we're looking at Sage-Grouse habitat has one of the

largest reserves in the United States of natural gas, larger than anywhere else in the nation.

And it is important to the western end of our county and also to the welfare of our county as far as the operations of our county that we can continue the natural gas exploration.

At the same time, we understand the importance of this bird. And we want to do what's right for the bird. And we think, as Chad has mentioned, there is a balance and that we can balance out oil and gas production and taking care of the population as well.

Now for what Jim has had to say is that the maps really come from CPW. And we look forward to working with you guys and hope that we can get a more revised and the best science available to the BLM.

I think we have to also listen to what Jim had to say. And he said, you know, the map is part of it, but it may not be the most important part; to look at the stipulations that are out there and what is going to become part of the record of decision. I think that's extremely important.

And you guys' mission is to take care of the parks and wildlife in this state. And we

1 understand that's where you're coming from as well.
2 And, I don't know, Bob, I'm going to hand it off to
3 you, if you think there's some more we need to add
4 to that.
5 REPRESENTATIVE RANKIN: Well, Tom, I think
6 you summarized well. I was thinking while you were
7 talking about next steps. I mean, you know, I think
8 we all need to look forward to where we go from
9 here.
10 Clearly revised maps, you know, we'll be
11 working together hopefully to share data and see how
12 that proceeds. That's sometime off, somewhat
13 uncertain future. That's a step.
14 Meanwhile, I think, to look at the
15 stipulations in the various alternatives is where
16 we'll be focusing as soon as you publish.
17 And so, you know, those are, as I see it,
18 the big actions going forward. So I don't see
19 anything beyond that we can talk about that's very
20 specific action.
21 But I'd like your thoughts if anybody has
22 specific things we ought to do next. From my point
23 of view, this has been a great meeting. If we
24 didn't come to hard conclusions, the processes is
25 good, you know.

I think we've shared a lot of knowledge and all understand that we each have different missions which is important. And we will take that into account as we deal with each other going forward. So that's a terrific conclusion in its own right.

So, you know, I feel very positive about the meeting. I'm still quite concerned, quite concerned about, you know, the difficulty of dealing with oil and gas development in light of what comes out in the EIS. And I think we all are.

At the same time, I think we're all educated on how important it is not to list this bird, you know, to do all the things that are important.

So we're saying all the right things, but there's a good bit of work to do looking at those alternatives and considering what effect on the EIS new mapping has.

But I thank you all again for participating and being so interested in getting together.

MR. CAGNEY: Could I offer what I think is the next step? That we're entering the public comment period and, you know, we're going to get

1 thousands of comments saying things like what about
2 the predators, you idiot. You know, I mean lots of
3 stuff that everybody knows about.
4 But when you go through those comments,
5 you know, and you get the angry stuff, you know, and
6 blah-blah-blah, you know, then you read along and
7 then you get to that comment where this person is
8 telling you something that's really, really
9 important and you didn't think of that, you know.
10 And those are the ones that we're really
11 looking for right now. I mean, you know, and we've
12 been working on this a long time and think we might
13 know all about this. Well, we don't.
14 So any help that we can get to encourage
15 those really good ones like, wow, I did not think of
16 that, this is critical, you know, at the meetings,
17 that kind of thing, you know.
18 So any help I can get getting through the
19 angry obvious stuff to the stuff that's, you know,
20 really meaningful, that's what we've got to have.
21 And any help I can get from anybody is critical.
22 COMMISSIONER JANKOVSKY: Jim, a question
23 to you, is there going to be a socioeconomic study
24 with this?
25 MR. CAGNEY: Yeah, it's in the draft.

1 But, you know, BLM socioeconomic stuff frustrates
2 people. Now the natural gas is fine. But, you
3 know, those analysis get regional and that type of
4 thing, and sometimes they don't really portray that
5 the way local communities would like to.
6 I'm going to give an example. We're
7 really having troubles with the motorcycle folks in
8 the Grand Junction plan. You know, the
9 socioeconomic section on a BLM analysis that says if
10 it's a destination resource, it's bringing money
11 into the community, you know.
12 But all these local guys, if they're not
13 buying motorcycles, they'll go bowling instead, and
14 there's no value to the community. Now if you own a
15 motorcycle shop, then that's pretty important to
16 you. But it's not to the community.
17 So there's a lot of times where people get
18 really frustrated by those kind of economic
19 analysis. So, yes, it's in there, but it's not
20 going to say exactly what you'd like it to say.
21 COMMISSIONER JANKOVSKY: I mean for us,
22 you know, there's TCF, I guess, can come out of a
23 well. And so I mean and then that relates back to
24 us in jobs and in royalties and royalties to the
25 State and so forth.

1 So I mean that's the type of thing we're
2 looking for in socioeconomic because it is truly a
3 lifeblood for us.
4 MR. CAGNEY: And, generally speaking, what
5 we do raises the cost of doing business. It doesn't
6 prevent getting the gas.
7 COMMISSIONER JANKOVSKY: And that's what
8 we want to hear, it doesn't prevent getting the gas.
9 MR. CAGNEY: Right, but it raises the cost
10 of doing business. So if you're going to say, well,
11 we're not going to drill it on those terms, then
12 maybe it would. But that's a step removed. That
13 stuff gets really complicated.
14 COMMISSIONER JANKOVSKY: Any other
15 comments before we -- I want to thank everybody.
16 Thanks for driving all the way over from Junction,
17 from Denver. We are still getting out of here
18 fairly early.
19 I appreciate your time. I appreciate
20 everybody's civility in this, and I look forward to
21 working with all three agencies here working
22 together, so thanks.
23 (The meeting concluded at 3:25 p.m.)
24
25

1 REPORTER'S CERTIFICATE

2 STATE OF COLORADO)
) Ss.
3 COUNTY OF ADAMS)

4 I, Geneva T. Hansen, do hereby certify that I am a Professional Shorthand Reporter and
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6 I further certify that the foregoing transcript constitutes a true and correct transcript
7 to the best of my ability to hear and understand the audio recording.
8
I further certify that I am not related
9 to, employed by, nor of counsel for any of the parties or attorneys herein, nor otherwise
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11 IN WITNESS WHEREOF, I have affixed my

12 Signature and seal this _____ day of September,

13 2013.

14 My commission expires 11-18-15.

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Geneva T. Hansen
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