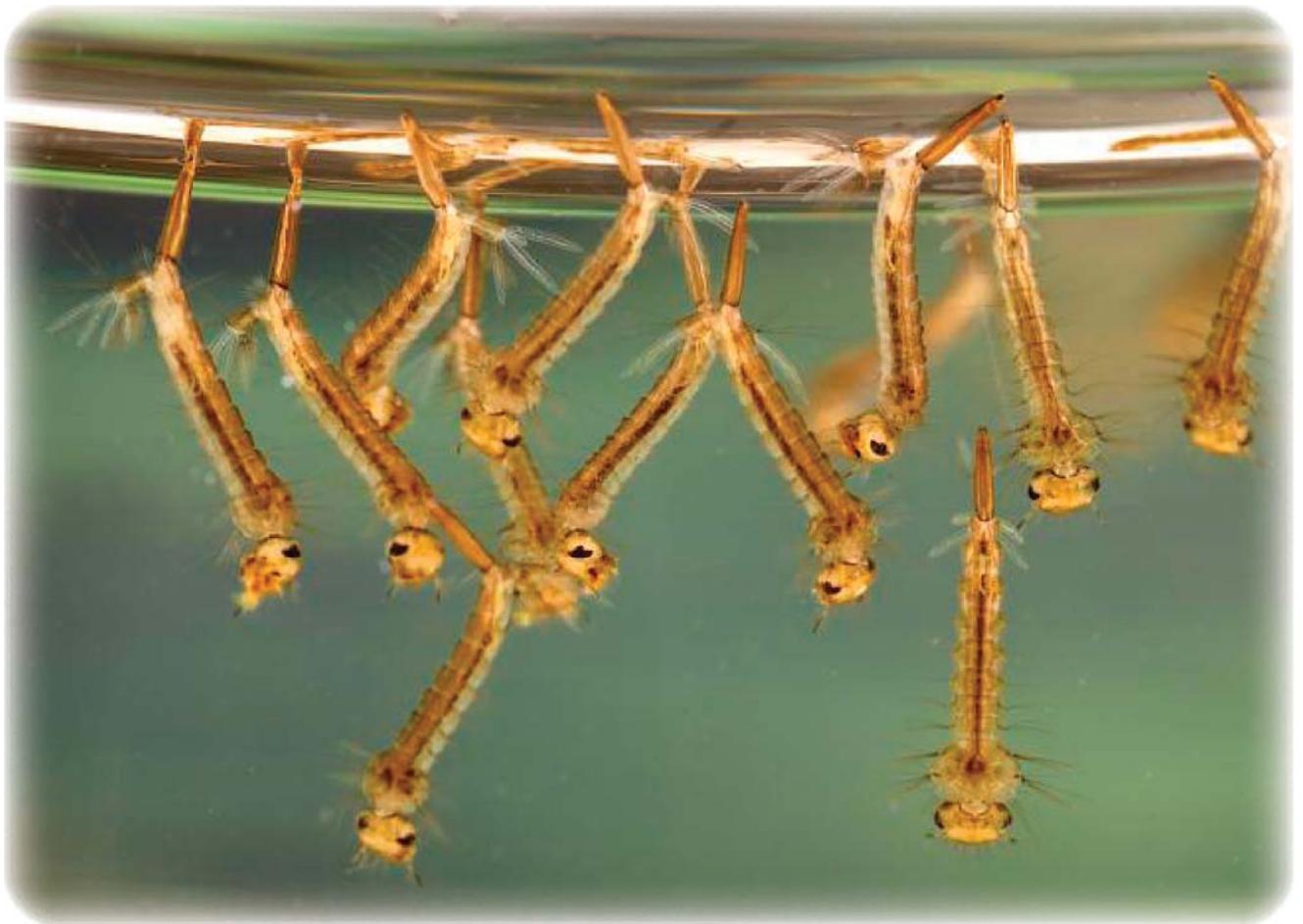


2006 Annual Report
Garfield County
Mosquito Control Program



October 2006

Colorado Mosquito Control, Inc.

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On The Cover:

Culex mosquito larvae feed at the water surface. These disease-vector mosquito larvae will soon pupate and emerge as adult mosquitoes capable of transmitting West Nile Virus and other mosquito-borne encephalitides to birds, horses and humans. To date, over 2,700 human cases with 87 deaths have been reported for 2006 in the United States.

Colorado Mosquito Control, Inc.

**GARFIELD COUNTY COOPERATIVE
MOSQUITO CONTROL PROGRAM
GARFIELD COUNTY
ANNUAL REPORT 2006**

TABLE OF CONTENTS

	<u>PAGE</u>
MISSION STATEMENT & OBJECTIVES	2
COOPERATING ENTITIES	3
2006 SEASON PERSPECTIVE	4
WEST NILE VIRUS RELAPSE	6
<i>US MAP (2006 HUMAN CASES)</i>	
<i>COLORADO MAP 2006 WNV HUMAN CASES</i>	
<i>COLORADO 2003-2006 HUMAN WNV INFECTIONS BY COUNTY</i>	
LARVAL MOSQUITO CONTROL	9
<i>LARVAL SITE INSPECTIONS BY SERVICE AREA</i>	
<i>LARVAL SITE TREATMENTS BY SERVICE AREA</i>	
<i>LARVAL ACREAGE TREATMENTS BY SERVICE AREA</i>	
CMC SURVEILLANCE LABORATORY	12
<i>CDC TRAP DATA COMPARISON</i>	
ADULT MOSQUITO CONTROL	15
<i>2003-'06 ADULTICIDE COMPARISON</i>	
PUBLIC RELATIONS & EDUCATION	17
<i>MOSQUITOLINE CALLS BY SERVICE AREA</i>	
SUMMARY	20
APPENDIX: GRAPHICS AND DATA SUMMARIES	21
<i>LARVAL CONTROL DATA SUMMARY 2006</i>	
<i>CDC TRAP DATA COMPOSITE SUMMARIES</i>	
<i>ADULT MOSQUITO SURVEILLANCE CDC & GRAVID TRAP SUMMARIES</i>	
<i>ADULT MOSQUITO CONTROL REPORT 2006</i>	
<i>MOSQUITOLINE DATA SUMMARY 2006</i>	

***THE GARFIELD COUNTY COOPERATIVE
MOSQUITO CONTROL PROGRAM
MISSION STATEMENT***

The need to protect residents and visitors from the health risks, severe annoyance, and discomfort associated with biting mosquitoes is a chronic annual problem. The primary objective of the Garfield County Cooperative Mosquito Control Program is to suppress the development of larval mosquitoes in wetland and other sites, to monitor and reduce numbers of adult mosquitoes thereby reducing overall mosquito populations to an acceptable low-biting “annoyance level”, while reducing the threat of mosquito-borne disease transmission, all at the least possible cost, and with the least possible impact on people and the natural environment.

CMC OBJECTIVES

Colorado Mosquito Control, Inc. as the contractor for the Garfield County Cooperative Mosquito Control Program will use proven scientific integrated pest management (IPM) methods of survey, inspection, diagnosis, biological/biochemical controls, natural enemies and limited low-toxicity pesticide applications to professionally accomplish the objectives of the Program. All of the methods and materials used have been reviewed and registered by the U.S. EPA, Centers for Disease Control, the Colorado Department of Agriculture and the American Mosquito Control Association.

***Integrated Pest
Management:***

“A process consisting of the balanced use of cultural, biological, and least-toxic chemical procedures that are environmentally compatible and economically feasible to reduce pest and vector populations to a tolerable level”

Colorado Mosquito Control, Inc.

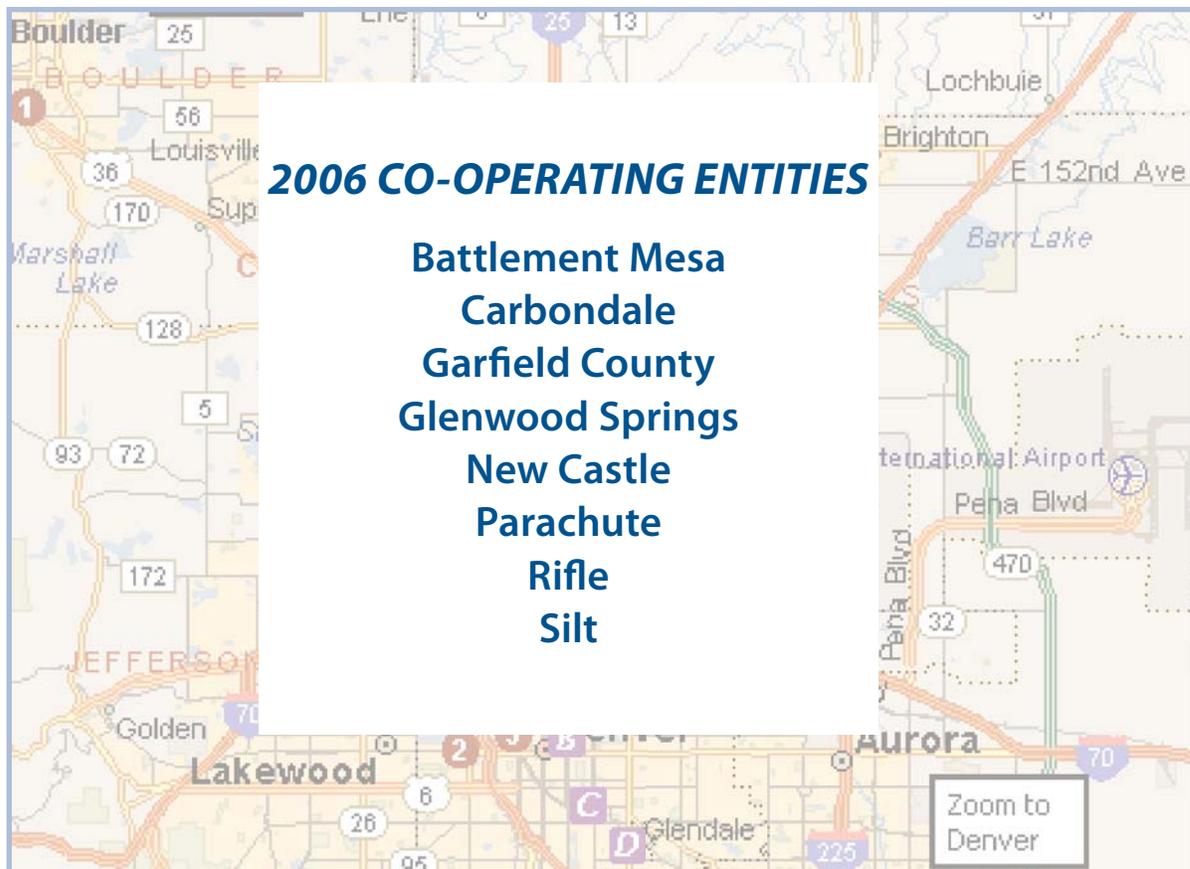
Colorado Mosquito Control, Inc. (CMC) is a large-scale contractor specializing in complete integrated mosquito control services. CMC utilizes an aggressive preemptive Integrated Pest Management (IPM) approach to controlling mosquito populations within contracted areas. CMC was established in 1986, is the largest private company specializing in mosquito control in Colorado, and is the only company in Colorado offering complete IPM mosquito control services.

CMC currently has programs across the state of Colorado including: Homeowners Associations, Incorporated Cities and Towns, Mosquito Control

Districts, Counties, Indian Reservations, and others. Geographically, CMC reaches from the Ute Mountain Ute Reservation in the southwest corner of the state to Fort Morgan in northeastern Colorado. CMC has programs in several mountain areas including the Gunnison Valley, the I-70 corridor, and parts of the upper Colorado River valley.

Cooperative Program

Throughout Colorado many counties and communities participated in cooperative mosquito control programs during 2006. Garfield and Pitkin Counties are prime examples of how a cooperative effort between the County, the municipalities and other entities can work together to provide a cohesive, cooperative mosquito control effort. CMC continues to provide top quality mosquito control programs in communities across the state and has for over 15 years. In addition, CMC has rapidly expanded to provide service to other municipalities as new mosquito control programs were initiated. CMC will maintain its commitment to provide top quality service, in an effort to minimize the threat of West Nile Virus to citizens throughout Garfield and Pitkin Counties and across Colorado and to reduce mosquito annoyance.



2006 SEASON PERSPECTIVE

At CMC we have come to expect each Colorado summer to present a unique set of temperature, precipitation, irrigation, and human interactions that combine to create new and different challenges in both mosquito control and mosquito-borne disease proliferation and control; 2006 was certainly typical in that respect.

The 2006 mosquito season can best be described as a "Tale of Two Seasons", with striking highs and dramatic lows in both temperatures and precipitation, all having profound effects on mosquito populations. Temperatures were hot early in the season and cooler but still slightly above normal late in the season. According to the NOAA web site, April through August were all above normal in temperature, but with June particularly hot with the average temperature for the month 5.2 degrees above normal. The season was also very dry early in the season with April, May and June all averaging more than 1.25 inches below normal rainfall. July and August saw significant mosquito producing rains but still came in slightly below the norm.

The vast majority of the mosquitoes (*Aedes/Ochleratattus*) with which we must contend are associated with newly applied floodwater via rain or irrigation or older standing stagnant water (*Culex*). Thus mosquito population trends along the northern Front Range are almost always dependent on either heavy rains (over 0.5 in.) or the agricultural flooding of fields for irrigation. In 2006, Garfield did not receive many heavy rains in April, May or June thus

keeping floodwater mosquito species well below normal in most areas. The only exceptions were those areas that saw heavy flood irrigation or over-filling of irrigation water retention basins. Most of the significant mosquito populations early in the season were *Culex* species since the only prominent source of water for breeding was existing standing more stagnant water in marshes or other wetlands. The early season prominence of *Culex* mosquitoes heightened the threat and likelihood of West Nile Virus human disease transmission later in season, which turned out to be a correct assumption.

More normal thunderstorm related rains finally began in the month of July, with many rainfalls over 0.5 inch triggering large hatches of floodwater *Aedes*. Also, flood irrigation did occur on a regular basis in many areas and resulted in several recognizable broods of floodwater mosquitoes and after-the-fact *Culex* standing water mosquitoes. Understanding and recognizing patterns of agricultural irrigation is still one of CMC's primary goals.

With the new rains and irrigation in July and August first came the floodwater mosquitoes but then many sites became stagnant and good producers of *Culex* mosquitoes. These *Culex* mosquitoes of course are the primary vectors of WNV and other mosquito-

borne diseases in Colorado. With the relatively early start and comparatively strong surge in August the situation was primed for a re-emergence of West Nile virus in Colorado. During this period numerous positive mosquito pools were identified, the public was notified and unfortunately human cases began

to show up. The following section on West Nile will cover this topic more in-depth.

Will 2006 Be Denvers Driest Year?

So far this year, each month January through September has been below normal in the precipitation category. Through September only 6.06 inches of moisture has been collected at DIA. That computes to 7.15 inches below the first 9 month normal. But even more significant is that the 6.06 inches is 0.64 inch below the 2002 total through the same period. 2002 was the driest year in Denver weather history since records began in 1872. The normal precipitation for the remaining months of 2006 is 2.60 inches. In 2002 these 3 months totaled 0.78 inch with December 2002 only recording 0.05 inch. So for the remaining 2006 months, the airport would have to record 1.42 inches of moisture to tie the driest ever Denver year. Anything less than 1.42 inches and 2006 would then be the driest Denver year ever!

The season quickly came to a close during the first weeks of September with the incursion of several strong cold fronts which dropped day time temperatures into the 60's and night time temperatures into the 40's.

2006 Field Activities

Field activities began in late March for the 2006 season. The earliest activity of the season was taking the GIS maps which were updated and revised over the fall and winter and site ground-checking them. In addition, new site identification and mapping were the priority in areas that had not previously been included in larval control operations. Mapping larval sites is an ongoing process, and in every program citizen reports of new larval sites result in many new sites being added to the existing larval inspection routes.

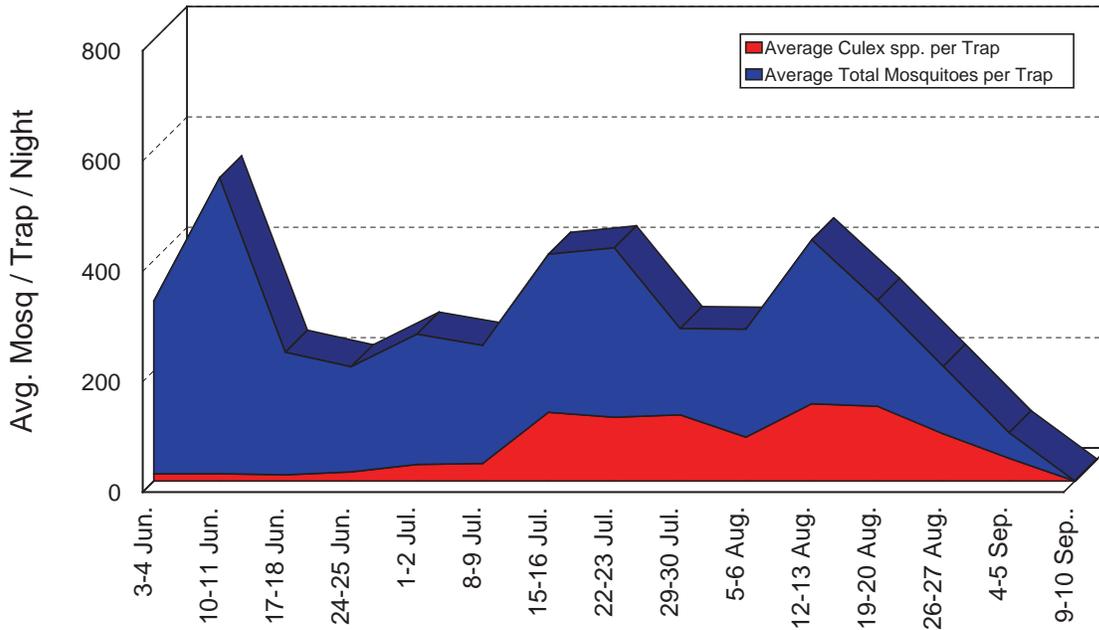
Hiring of seasonal technicians began in March, and

continued into late May. As the CMC service area continues to grow, hiring an adequate number of top quality field technicians has become a challenge. For the Brighton office, approximately 20 technicians were hired with nearly 100 being interviewed.

CMC's Annual Field Technician Classroom Training Day took place on Saturday April 23rd with over 75 new and returning field technicians in attendance. Field training by CMC management and veteran employees lasted throughout May, with a few late hires being trained during early June. By early June, CMC was fully staffed and had full daytime and evening shift crews fully trained and in the field. During the mid June to mid August time period, field mosquito control operations were in full swing. The final day for larval inspections and control was Friday, September 15th.

Mosquito trapping was planned through September 23, however windy, cold and wet weather conditions

CDC Trap Composite *Culex* vs. All Mosquitoes
2006 Garfield County Mosquito Control Program



2006 Colorado Mosquito Control, Inc.

This chart is the confidential work product of Colorado Mosquito Control, Inc and is protected by state and federal statutes.

effectively eliminated the final week of mosquito trapping and associated adult spraying operations. Although small populations of adult mosquitoes remained through the end of September, mosquito annoyance calls declined to zero during the last weeks of the month.

WEST NILE VIRUS 2006

Background

West Nile Virus (WNV) was first identified in Uganda in 1937. Since that time, activity has been documented throughout Africa, Europe, West and Central Asia, and areas of the Middle East. The virus made its first appearance to North America in 1999 when it was documented in New York City. WNV comes from a family of viruses known as Flaviviridae and is closely related to other viruses which can have severe effects on both humans and animals such as Japanese Encephalitis and St. Louis encephalitis.

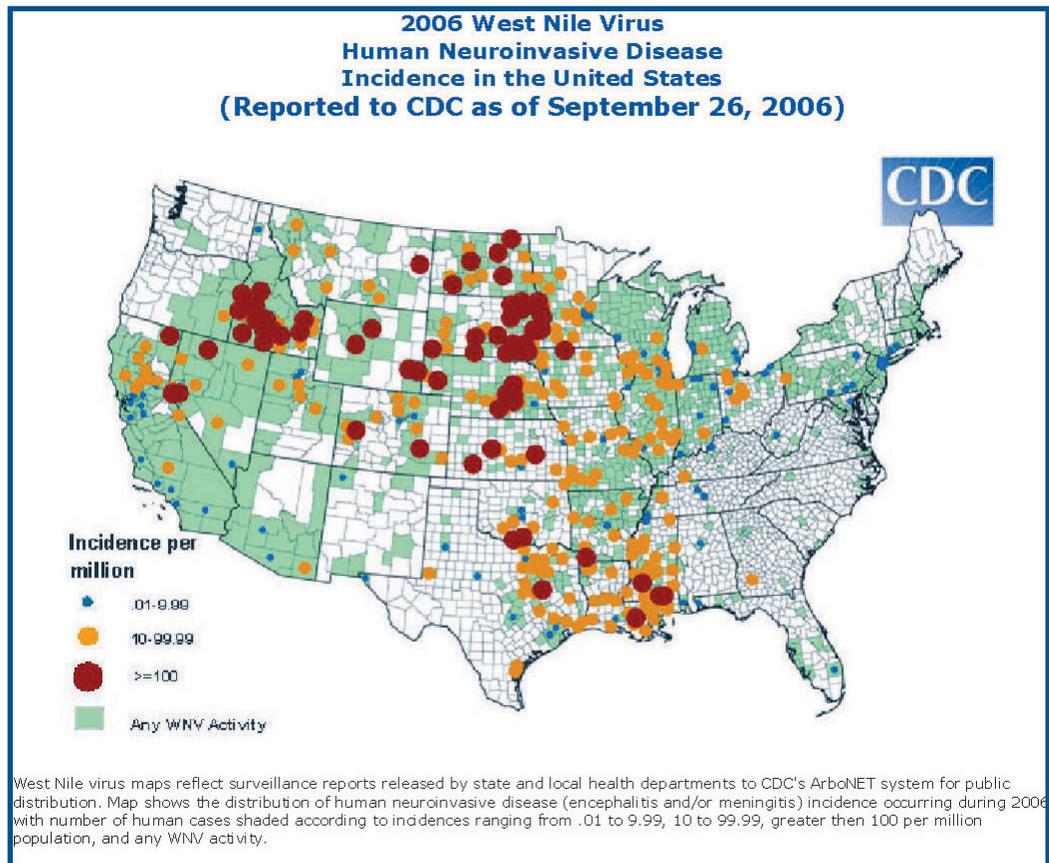
WNV has a wide range of symptoms which can range from mild flu like symptoms to death. Of humans affected, nearly 80% will show no symptoms at all. The majority of people who do show symptoms will usually suffer from flu like symptoms.

However, approximately 1% of people will develop much more severe symptoms including meningitis (inflammation of the linings surrounding the brain

and spinal cord), encephalitis (inflammation of the brain), or very rarely poliomyelitis which can cause paralysis in parts of the body.

Since the introduction of WNV to the United States in New York City in 1999, the virus has made a complete westward expansion to the West Coast. Starting in the Northeastern parts of the United States, the virus steadily progressed through the South, the Midwest, the Rocky Mountain region, and now the Western States. WNV activity has been documented in all US states except Alaska and Hawaii.

Colorado first saw activity of the virus late in the summer of 2002. In 2003 Colorado was the hardest hit state compiling 2947 human cases and 63 deaths most of which occurred along the Front Range. By



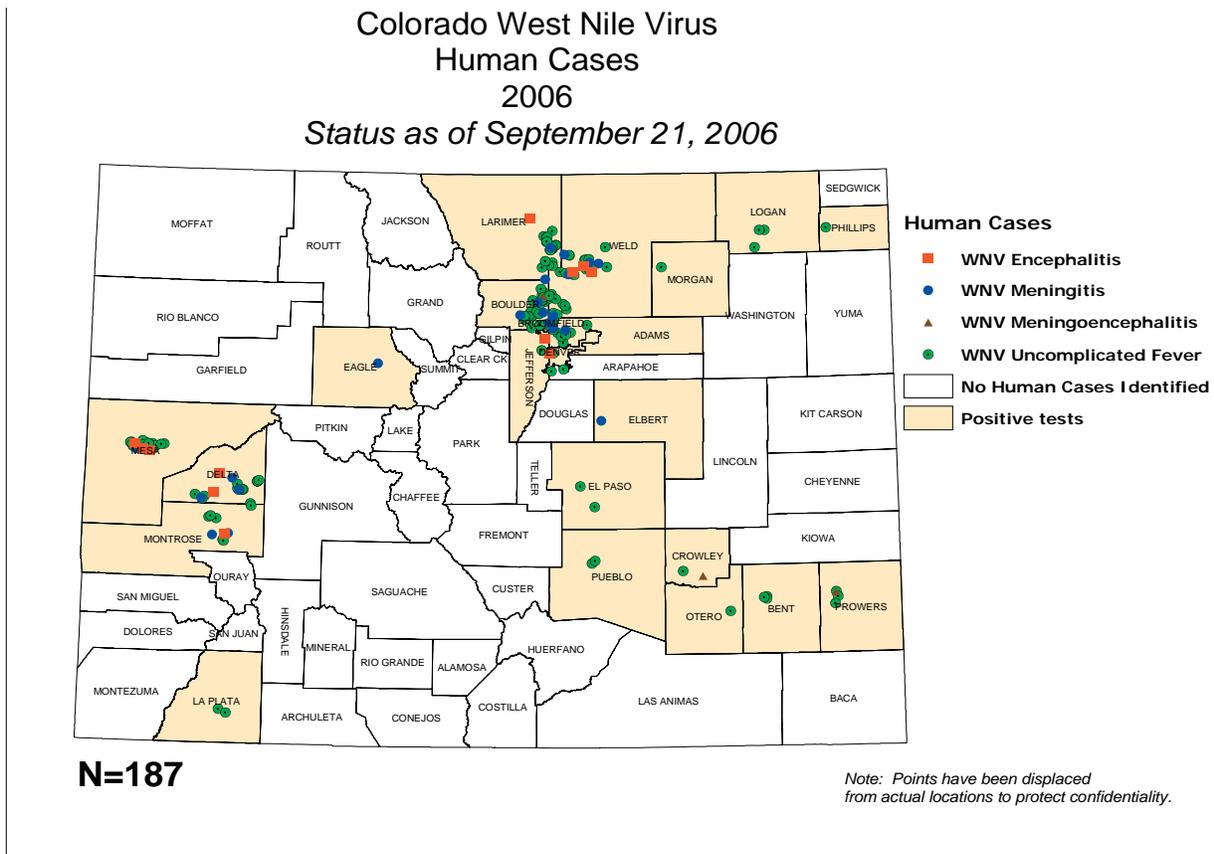
2004 the majority of the cases shifted to the Western Slope and the state totaled 291 cases with 4 deaths (Mesa County).

WNV Activity 2006

Cases of human WNV disease have been seen throughout a large part of the country with many states including Colorado, rebounding to near epidemic outbreaks of human disease.

In Colorado in 2004 and 2005 WNV activity was spread throughout the state with no particular clustering in any one region. However, in 2006 with early hot and dry conditions *Culex* mosquitoes had an early surge which increased early season viral amplification which showed up in August and September as hundreds of positive mosquito pools and then over 250 human WNV cases along the northern Front Range and in hot spot areas across the state. To date, three deaths have occurred, one each in Jefferson County, Mesa and Boulder Counties. Please see the accompanying table for a summary of human WNV disease in 2006.

In late August decisions were made by several counties and municipalities to implement emergency West Nile Virus control via large-scale adult mosquito spraying based on the high infection rates being seen in late season *Culex* populations. These difficult decisions were made via cooperative consultations between the municipalities, the county health departments, the Centers for Disease Control and CMC. In most areas



the *Culex* mosquito numbers were too low to implement spraying but in a few areas including the City of Longmont, surrounding Boulder and Weld counties and in the City of Loveland, CMC did perform single large scale adulticide applications. Excellent results were seen with over a 90% reduction in *Culex* mosquito populations being realized. Soon after these applications cold weather set in preventing the need for further measures.

Human West Nile Virus Infections: Colorado, 2006

Updated October 10, 2006

County of Residence	Clinical diagnosis			Total cases	Total deaths
	Fever	Meningitis	Encephalitis		
Adams	7	1	.	8	.
Arapahoe	.	.	1	1	.
Bent	3	.	.	3	.
Boulder	55	5	2	62	1
Broomfield	3	2	.	5	.
Crowley	1	.	1	2	.
Delta	27	3	4	34	.
Denver	3	.	.	3	.
Eagle	.	1	.	1	.
Elbert	.	1	.	1	.
El Paso	2	.	.	2	.
Garfield	1	.	.	1	.
Jefferson	2	2	3	7	1
La Plata	2	.	.	2	.
Larimer	31	5	2	38	.
Logan	7	.	.	7	.
Mesa	30	3	5	38	1
Montrose	7	2	1	10	.
Morgan	1	.	.	1	.
Otero	3	.	.	3	.
Phillips	1	.	.	1	.
Prowers	3	.	1	4	.
Pueblo	6	.	.	6	.
Weld	45	8	6	59	1
COLORADO	240	33	26	299	4

Counties not listed have no verified human cases of WNV

LARVAL MOSQUITO CONTROL



Years of research and practical experience have shown that the most effective way to control mosquito populations is through an aggressive Integrated Pest Management (IPM) approach. This approach aims at using a variety of concepts, tools, and products to reduce a pest population to a tolerable level. Translating these ideas to mosquito control, CMC has found the most environmentally and economically sound approach is through targeting the aquatic larval stage of the mosquito. Targeting this stage prevents the emergence of the adult mosquito and thus the inevitable result of disease and nuisance.

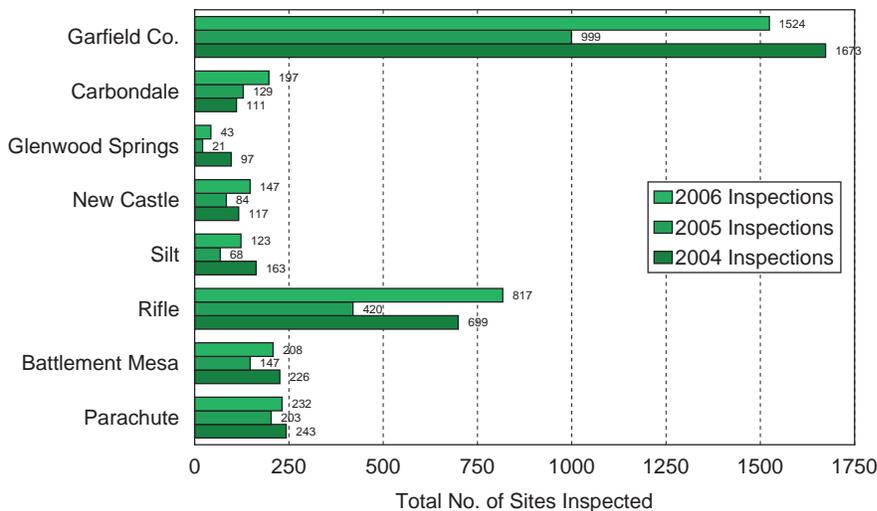


Over 93% of Colorado Mosquito Control, Inc. (CMC) operational efforts are focused on larval control.

Larval mosquito control can be achieved in several ways including biological, biochemical, chemical, and mechanical means. Although there are a variety of methods of reducing larval populations some may have greater consequence than benefit. Mechanical or habitat modification is a technique which may be used, but the area to be modified and the extent to which the work will affect the surrounding area must be carefully reviewed.

Permanent ecological damage may occur if extensive habitat change has taken place. True biological controls may, too, have costs which outweigh the benefits or competency of their control capacity. Predatory fish serve as a good example of this.

Larval Site Inspections by Service Area 2004-'06 Garfield County Mosquito Control Program



2006 Colorado Mosquito Control, Inc.

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The mosquito fish (*Gambusia affinis*), an introduced species, while an effective predator on mosquito larvae, may have much larger dangers to native fish of Colorado waters. A very aggressive eater and rapid reproducer, *Gambusia* often out-compete their native

counterparts. Due to these factors the Colorado Division of Wildlife (CDOW) has placed restrictions on the stocking and use of the fish. However, this

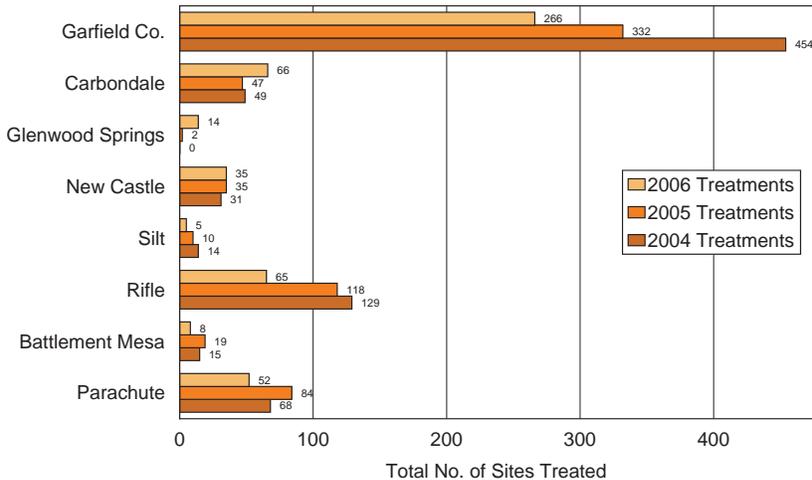
year CMC obtained, stocked and distributed a supply of fathead minnows (*Pimephales promelas*), a native Colorado species. Fish were made available to residents for placement in irrigation or ornamental ponds. In general however, predatory fish and other biological controls such as bird and bats do not provide sufficient control of mosquito populations to be used as the sole mechanism. Other methods must be used to gain adequate larval mosquito population reductions.

CMC's favored method of larval mosquito control is through bacterial bio-rational products. The main product used by CMC is a variety of bacteria (*Bacillus thuringiensis var. israeliensis*). *Bti* as it is known has become the cornerstone of mosquito control programs throughout the world. The benefits include its efficacy and lack of environmental impacts. When used properly successful control without impact to aquatic invertebrates, birds, mammals, fish, amphibians, reptiles, or humans can be achieved. A broad label allows for the use of the product in the majority of the habitats throughout the service area.

Another bacterial product closely related to *Bti* is *Bacillus sphaericus* (*Bs*). In addition to all of the benefits of *Bti*, *Bs* is by definition

a true biological control agent in that it remains in the system through multiple broods, or generations,

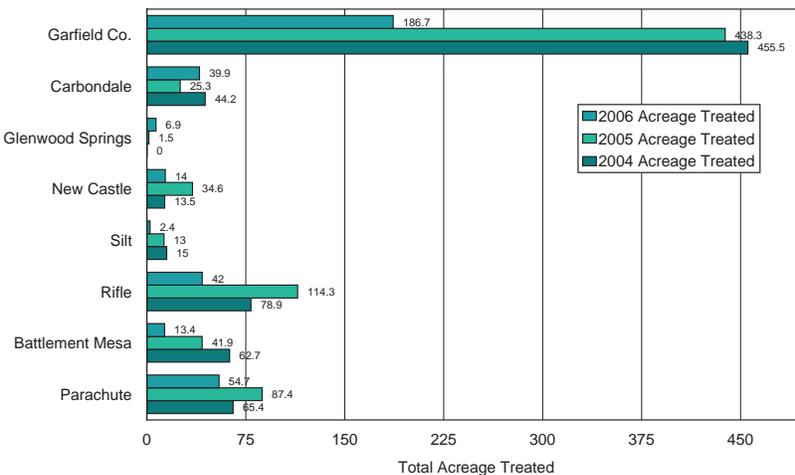
Larval Site Treatments by Service Area 2004-'06 Garfield County Mosquito Control Program



2006 Colorado Mosquito Control, Inc.

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Larval Acreage Treated by Service Area 2004-05 Garfield County Mosquito Control Program



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of mosquitoes. Unfortunately the residual benefit of the control comes at a cost in price of approximately three times that of Bti.

Other larval control products include a growth regulator (methoprene), a mineral oil, and an organophosphate (Abate). Methoprene is a synthetic copy of a juvenile growth hormone in larval mosquitoes. The hormone prevents normal development of the adult mosquito in the pupal stage eventually causing death. While a good control product, the cost is prohibitive to be the predominant product in a large scale program. Abate, the one chemical larval control product CMC uses, serves as an effective product, but label restrictions limit its use in many areas. CMC limits the use of chemical larvicides to areas with little biodiversity, such as road side ditches, or areas which chronically produce large amounts of mosquitoes and use them only as a last resort when other solutions



are not present. The benefits of these products are the availability of 30 and 150 day formulations. Mineral oil is the only product effective on the pupal stage and therefore is an essential tool when pupae are found.

All the fore mentioned methods and products represent the essential ingredients of Integrated Pest Management. Mosquitoes are very well adapted animals and can be found in many different habitat types from a cattail marsh to a cup littered on the side of the road. A variety of tools must be used to prevent resistance and ensure the best method will be available for any given situation.

Larval control began the first week of April and continued though September. Sporadic rain events and a surplus of irrigation water left more late season sites 'wet' this year than in previous years but cool weather reduced the need for extensive larval control operations.

CMC constantly strives to improve its operations. Most recently CMC has implemented several high tech solutions to what historically has been a particularly low tech operation. CMC's "CMMS" (Computerized Mosquito Management System) utilizes historical data to analyze and identify areas and sites of particular importance. Additionally, a sample of larvae from all sites found to be breeding is collected and brought back to the lab for identification purposes. This allows for a specific knowledge of each site especially in the event of a disease outbreak where a particular species has been found to be the vector. Targeted inspections then allow for resources to be allocated efficiently.

CMC SURVEILLANCE LABORATORY

Information about mosquito abundance and species identity is critical to a successful mosquito control program. Colorado Mosquito Control employs two kinds of traps to monitor mosquito populations. The CDC light trap uses carbon-dioxide from dry ice as bait to attract female mosquitoes seeking a blood meal from a breathing animal. Once attracted by the CO₂, the mosquitoes are lured by a small light to a fan that pulls them into a net for collection. The Gravid Trap uses a tub of highly-organic water as bait to attract female mosquitoes that are looking

is interpreted in the context of historical records for the same trap site, going back in time more than a decade. Individual traps are also compared to other traps from around the region that were set on the same night and therefore exposed to similar weather conditions. Technicians working in the Surveillance Laboratory at Colorado Mosquito Control, Inc. are trained to provide accurate species-level identification of mosquito specimens, for both adults and larvae. More than 50 mosquito species are believed to occur in Colorado, and 29 of those were identified from samples processed during the 2006 season from across the state.



Additionally, the CMC Surveillance Laboratory conducts an intensive larval identification program with over 8,000 larval mosquito samples collected by I&L technicians prior to larviciding being identified to species. This information is now invaluable in targeting mosquito control efforts as we gain a greater understanding of the habitat types preferred by Colorado mosquito species and the seasonality of these habitats as sites

for a place to lay their eggs. A fan placed close to the water surface forces mosquitoes that come to the water into a collection net. Once back in the laboratory, the contents of the trap nets are counted and identified by technicians trained to recognize the Colorado mosquito species.

In 2006, Colorado Mosquito Control monitored a statewide network of more than 250 weekly trap sites, collecting nearly 400,000 adult mosquitoes that were counted and identified to species by the CMC Surveillance Laboratory. While individual traps provide only limited information, trap data

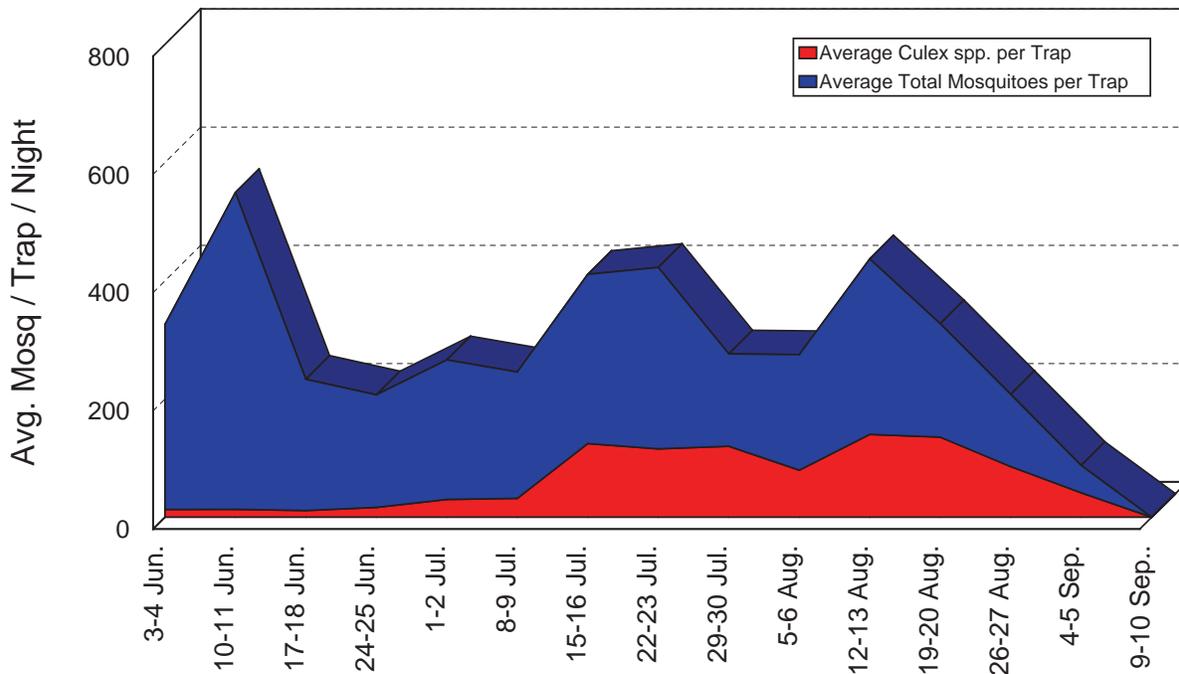
for mosquito development.

Specimens and data collected from these traps and larval identification are used in:

- Determining effectiveness of larval control efforts. Each mosquito species prefers specific kinds of habitats for larval development. If a trap includes large numbers, it could indicate the presence of an unknown larval habitat and, based on the species identification and known habitat preference for that species, direct field technicians as to possible sources

CDC Trap Composite *Culex* vs. All Mosquitoes

2006 Garfield County Mosquito Control Program



2006 Colorado Mosquito Control, Inc.

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of the mosquitoes collected.

- Determining larval and adult mosquito species which helps illustrate the threat of mosquito-borne disease amplification and transmission.
- Determining where adult control efforts were necessary. While mosquito eradication is impossible, significant population reduction is achievable. In



places where larval control was insufficient, especially in neighborhoods where adult mosquitoes migrated in from larval sources outside of the control area, it may be necessary to use adulticide methods such as ULV truck fogging or barrier sprays of nearby harborage areas. Trap counts that were in excess of an acceptable threshold for the area would trigger adult control measures.

- Surveillance for Mosquito-borne Disease. Historically, CMC efforts were targeted primarily at controlling mosquito nuisance problems with limited disease surveillance. However, since the arrival of the West Nile Virus in Colorado in August of 2002, the paradigm has shifted toward disease prevention and

control. Accurate species identification of the mosquitoes in the traps is important when monitoring species population trends. It also is necessary for evaluating whether a population spike represents an actual increase in disease transmission potential or only an increased nuisance level. Additionally, a majority of the *Culex* specimens collected in the CMC traps during the 2006 season were sent to the CO State Health Department laboratory or one of the regional county laboratories to be tested for West Nile Virus and other mosquito-borne diseases. The infection rates of West Nile Virus in *Culex* mosquitoes in 2006 was comparable to the unprecedented high rates in 2003 season, the only real difference between 2006 and 2003 seems to be in the actual overall number of *Culex* mosquitoes at the end of the season, not in the percentage of mosquitoes that were infected with the virus.



populations of mosquitoes are present in large numbers. Adult mosquitoes can come from unknown unidentified sites or may migrate in from uncontrolled areas. Adult mosquito surveillance efforts discussed above can help to pinpoint these unidentified larval sites and target both larval and adult control efforts. These large adult populations bring with them discomfort, concern, and the potential for disease transmission.

The Garfield County Cooperative Mosquito Control Program uses all available data from CDC light traps, gravid traps, Mosquito Hotline annoyance calls, and field technician reports to focus adult mosquito control efforts on specific, very limited

“targeted” areas. In parts of the community where high numbers of mosquito annoyance calls are received, “floater” CDC light traps are set to evaluate adult population levels and species make-up. In most cases, a direct correlation is evident between areas with high complaint calls and high trap counts. While this correlation allows us to focus adult control in these areas, the emphasis is placed on finding the source of breeding and continued larval control measures.

2006 has shown that it is critically important to continue mosquito surveillance and control operations in future years. The threat of West Nile Virus and other mosquito-borne diseases is here and is not going away.

2006 ADULT CONTROL

Controlling the adult mosquito is an essential component of a fully Integrated Mosquito Management Program. Although the primary focus of our programs is on larval control, adult control methods are used when data shows that adult

Colorado Mosquito Control uses state of the art technology, correct application timing, and least-toxic products to minimize all non-target impact. All adult mosquito control is accomplished using calibrated Ultra Low Volume (ULV) equipment and performed after dusk. This type of equipment produces droplets averaging 12 microns in diameter and allows for a minimal amount of product to be put into the environment. These treatments take place in the evening when mosquitoes are flying in greater numbers and non-target activity is greatly reduced.

Using this application technique, the overall goal of minimal environmental impact and effective adult control is achieved in the targeted area.

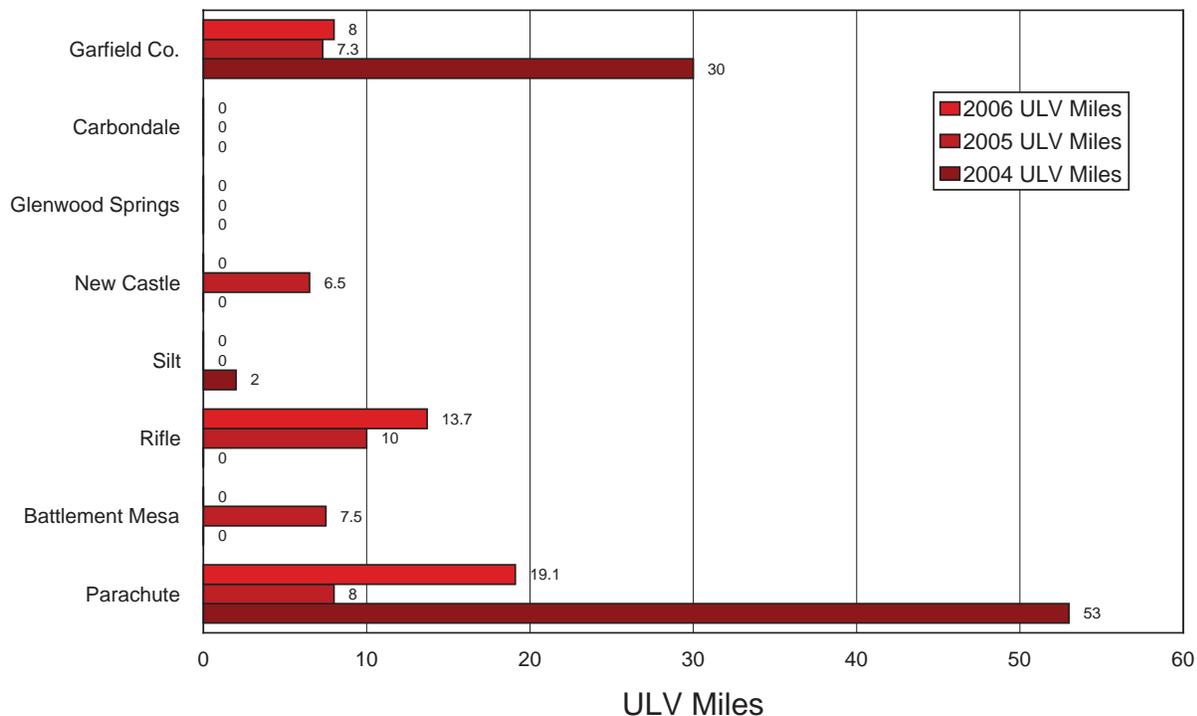
In 2006 we introduced the water-based product AquaLuer for ULV adult mosquito control. Its' active ingredient; permethrin is highly effective against mosquitoes, while the water-base provides a much more environmentally sound solution to traditional petroleum oil-based adulticides. Results this year have again proven that this is the right choice for the adulticide portion of the Integrated Mosquito Management Program.

Colorado Mosquito Control again offered short term residual backpack barrier treatments for special city and town events such as concerts in the park and festivals, as well as to areas such as walking and bike paths showing above average mosquito populations. If the adult mosquito population is

moderate, although more labor intensive, it is often more effective to spray a localized harborage area to provide control during an event or for outdoor activities. Barrier treatments are typically effective for a period of 2 to 4 days, and present a very low toxicity profile to humans and domestic animals. If the mosquito population is high or the area is too large, barrier treatments are complimented with ULV adulticiding previous to the event.

Our adult mosquito spray "notification and shutoff" program was again in place and updated throughout 2006. This service allows residents to request a notification of when adult mosquito control treatments will take place in their area, "shutting off" the sprayer in the vicinity of their address, or both. This service, along with daily schedule updates on our website; comosquitocontrol.com, provides residents with up to date information on when and where adult mosquito spraying will take place.

ULV Adulticide Comparison By Service Area 2004-05 Garfield County Mosquito Control Program



2006 Colorado Mosquito Control, Inc.

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As we look towards the 2007 season, we will continue to evaluate treatment areas, and any new control products coming to the market, and as always listen to the goals and needs of our customers so that we will again have an effective program with the least amount of impact to the environment.

2006 PUBLIC RELATIONS AND EDUCATION

Colorado Mosquito Control places a heavy emphasis on public relations, customer service, and community education. With the introduction and continued media coverage of West Nile Virus, residents have become increasingly more involved with mosquito control operations. In 2006 our staff focus was on providing area residents and visitors with information on the program, what they can do to help, and offer solutions to localized problems such as mosquito breeding habitats and localized annoyance.

Surveillance Trivia:

Aedes vexans, the common floodwater mosquito, accounted for more than 49% of the mosquitoes collected in CMC's light traps around Colorado during the 2006 season. While they are often a major nuisance, readily biting humans for their blood meals, this species is not believed to be a competent vector of the West Nile Virus. The main West Nile Virus vectors are the *Culex* mosquitoes, and they comprised only around 27% of the total mosquitoes trapped in 2006 by the CMC surveillance team.

Customer Service

Customer service was again a very high priority. We take pride in training each and every technician so that they have the confidence and information to provide residents with the correct answers to sometimes difficult questions. Each field technician spends part of their day responding to resident concerns in their work area. This in-field customer service personalizes each mosquito control program, provides us with local information on mosquito activity and provides the valuable opportunity to truly communicate face to face with the residents we serve. Residents are always encouraged to call the Mosquito Hotline to report areas with high mosquito annoyance and potential standing water breeding habitat. These calls compliment CDC light trap data, allow us to pinpoint problem areas, and ultimately provide another valuable resource for our control efforts.

Another important component of CMC's customer service is the notification and shutoff database. Providing residents with this option has proven to be an effective tool in community relations. Our database is updated throughout the year to ensure that the names, phone numbers, and addresses are correct before any spraying is planned within a given community. This service is also often seen as another way that their community officials place an importance on understanding and meeting the different needs of each resident.

Community Outreach and Education

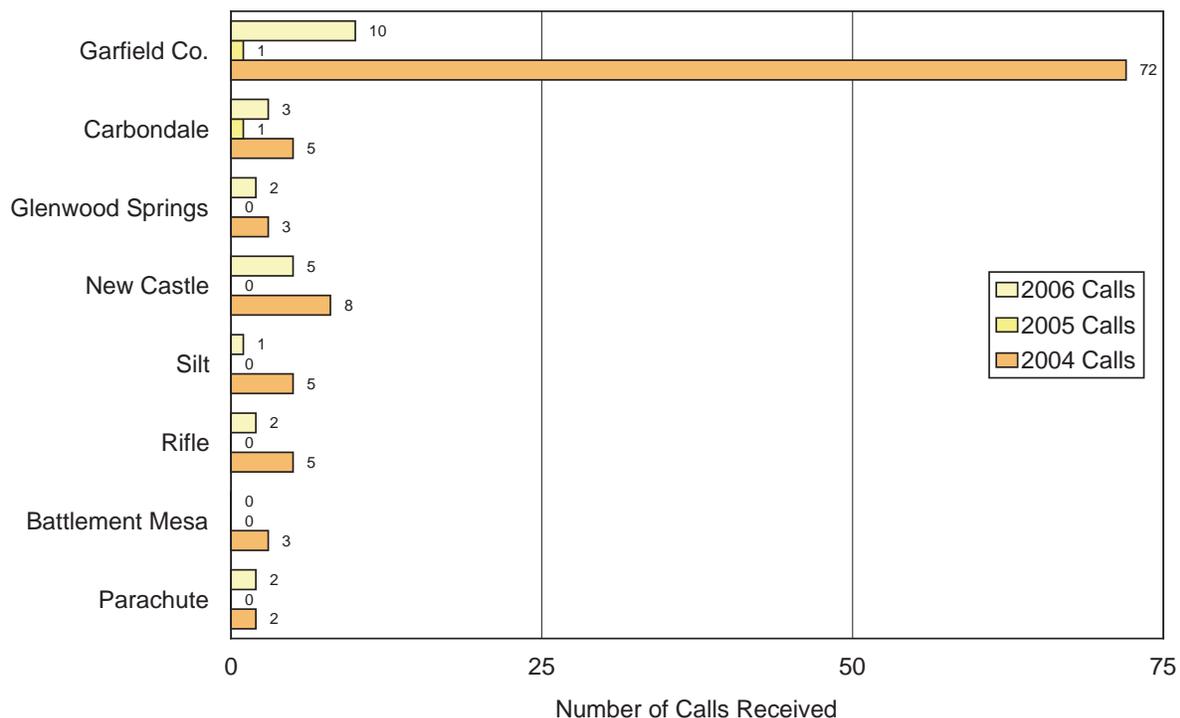
This year we further increased our community outreach programs to provide residents

and visitors with a better understanding of the value and scope of their mosquito control program. Outreach has proven to have a very positive impact on the community. Throughout the summer outreach events were attended such as Farmer's Markets, city council meetings, parades, concerts, and fairs. The feedback we received was extremely positive not only from residents, but from local government attendees as well. These outreach programs provided information and education on all areas of mosquito control. Individual program services were discussed, but an emphasis was also placed on what individuals can do to eliminate standing water on and around their property, how to reach us via phone and website, and even the proper application of mosquito repellents. However the one of the most

important messages conveyed was the importance and minimal environmental impact of larviciding. Many residents often see mosquito control as only a fog truck spraying down the street. Residents learned that 95% of what their program involves is larval control, and that this provides lower environmental impacts and highly successful mosquito population reduction. Because of the positive feedback of these educational outreach programs, we will continue these throughout the upcoming 2007 mosquito control season.

MosquitoLine Calls by Service Area

2004-05 Garfield County Mosquito Control Program



2006 Colorado Mosquito Control, Inc.

This chart is the confidential work product of Colorado Mosquito Control, Inc and is protected by state and federal statutes.

SUMMARY

The 2006 Garfield County Cooperative Mosquito Control Program again jumped back into the spot-light this year with the reemergence of West Nile Virus in Colorado. This was certainly different compared to the last two years which were relatively normal, particularly when compared to the 2003 "Perfect Storm" WNV Epidemic and the 2002 drought. Fortunately even 2006 with the strong resurgence of WNV across the state did not compare to the "Perfect Storm" WNV epidemic. Unfortunately we were correct in our prognostication that in some future year Colorado would see an increase in West Nile Virus activity, particularly human cases and associated deaths. This resurgence in mosquito-borne disease clearly illustrates the continued need for on-going mosquito control, mosquito surveillance and vigilance.

CMC's website continues to be successful, based on the number of "hits", favorable e-mails and requests for more information received from county residents and literally from around the world.

Colorado Mosquito Control, Inc. continues to effectively serve the residents of the Garfield County and the Garfield County Cooperative Mosquito Control Program using integrated mosquito management technology to reduce mosquito nuisance and the related potential for disease transmission including

West Nile Virus. Despite pressure by some to abandon larval control and IPM in favor of large scale spraying, CMC continued to promote a responsible IPM approach to mosquito management, fully utilizing all available biological control techniques while minimizing the use of chemical pesticides. CMC has been able to develop both a cost-effective and efficient program in Garfield County» over the past seasons and looks forward to continued service in 2007 and beyond. We also know that there is always room for improvement and have high expectations for program improvements and new successes in future years.

www.comosquitocontrol.com

is the leading internet web site in the State of Colorado when it comes to providing up-to-date, factual and comprehensive information on, and links to, mosquito biology and control, mosquito-borne disease, pesticides, and many other issues relating to mosquitoes.

CMC was one of the first mosquito control organizations anywhere to publish adult mosquito control spray schedules on the web.



Colorado Mosquito Control, Inc.

695 North 7th Ave., Brighton, CO 80601, (303) 558-8730, info@comosquitocontrol.com, www.comosquitocontrol.com



CMMS
Colorado Mosquito Control, Inc.

MosquitoLine Call Summary

by REPORT DATE: 1/1/2006 to 9/20/2006

by COUNTY: Garfield

County	Customer	
Garfield		
	Carbondale, Town of	3
	Garfield County Unincorporated	10
	Glenwood Springs, City of	2
	New Castle, Town of	5
	Parachute, Town of	2
	Rifle, Town of	2
	Silt, Town of	1
	Total Calls	25

CMMS - Comprehensive Mosquito Management System

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CMMS™
Colorado Mosquito Control, Inc.

ADULTICIDE - CUSTOMER

by REPORT DATE: 1/1/2006 to 9/28/2006
 by COUNTY: Garfield

Subdiv/Area	Material	Start Time	End Time	Miles
Garfield County Unincorporated				
Truck ULV				
8/3/2006 GARFIELD AIRPORT	AquaLuer ULV	11:11 PM	11:51 PM	4.0
			Truck ULV Sum	4.0
			Avg	4.0
			Min	4.0
			Max	4.0
Parachute Town of				
Truck ULV				
7/26/2006 PARACHUTE AVE	AquaLuer ULV	8:44 PM	8:52 PM	1.4
7/26/2006 COTTONWOOD PARK	AquaLuer ULV	8:59 PM	9:27 PM	3.7
7/26/2006 LAUREL AND MEADOW	AquaLuer ULV	8:53 PM	8:55 PM	0.1
8/3/2006 COTTONWOOD PARK	AquaLuer ULV	8:48 PM	10:43 PM	6.0
8/10/2006 COTTON	AquaLuer ULV	9:19 PM	9:51 PM	4.2
8/10/2006 TOWN HALL	AquaLuer ULV	9:14 PM	9:17 PM	0.7
8/10/2006 LEARNING CENTER	AquaLuer ULV	8:32 PM	8:40 PM	1.2
8/10/2006 DAISY CREEK	AquaLuer ULV	9:04 PM	9:08 PM	0.8
8/23/2006 COTTONWOOD PARK	AquaLuer ULV	12:16 AM	12:30 AM	1.0
			Truck ULV Sum	19.1
			Avg	2.1
			Min	0.1
			Max	6.0
Rifle Town of				
Truck ULV				
7/26/2006 DEERFIELD PARK	AquaLuer ULV	10:39 PM	10:57 PM	2.0
7/26/2006 WHITEWATER	AquaLuer ULV	10:31 PM	10:35 PM	0.8
7/26/2006 MILE POND	AquaLuer ULV	10:01 PM	10:22 PM	3.3
7/26/2006 LYONS REST AREA	AquaLuer ULV	9:46 PM	9:54 PM	1.1
8/3/2006 MILE POND	AquaLuer ULV	12:10 AM	12:21 AM	2.0
8/23/2006 MILE POND ROAD	AquaLuer ULV	12:57 AM	1:07 AM	1.6
8/23/2006 WHITE RIVER	AquaLuer ULV	1:16 PM	1:25 PM	1.3
			Truck ULV Sum	12.1
			Avg	1.7
			Min	0.8
			Max	3.3
Grand Total Miles				35.2



CMMS
Colorado Mosquito Control, Inc.

ADULT TRAP DATA - SPECIES SUMMARY

by REPORT DATE: 1/1/2006 to 10/6/2006
 by COUNTY: Garfield

Species	Total
Aedes (Oc.) dorsalis	763
Aedes (Oc.) increpitus	78
Aedes (Oc.) melanimon	2965
Aedes (Oc.) nigromaculis	46
Aedes (Oc.) trivittatus	5
Aedes cinereus	80
Aedes vexans	20985
Aedes-Ochlerotatus species	26
	24948
Anopheles hermsi	856
	856
Culiseta incidens	3
Culiseta inornata	521
	524
Culex erythrothorax	7642
Culex pipiens	167
Culex salinarius	2
Culex tarsalis	3019
	10830
Operational but empty	0
Trap malfunction	0
	0

CMMS - Comprehensive Mosquito Management System

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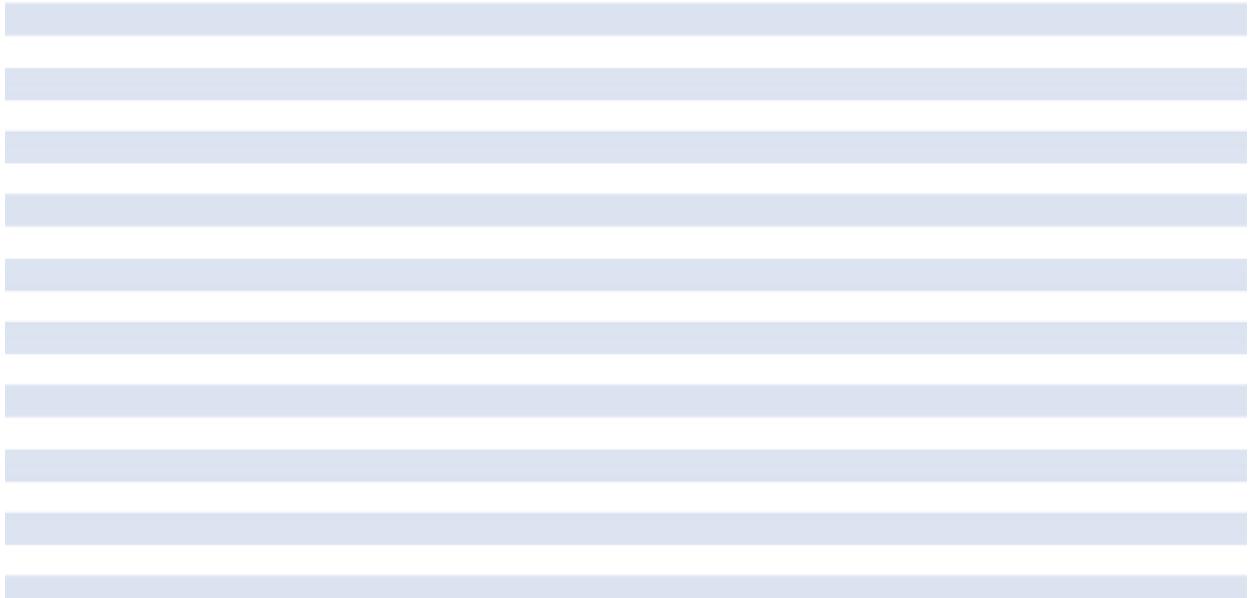
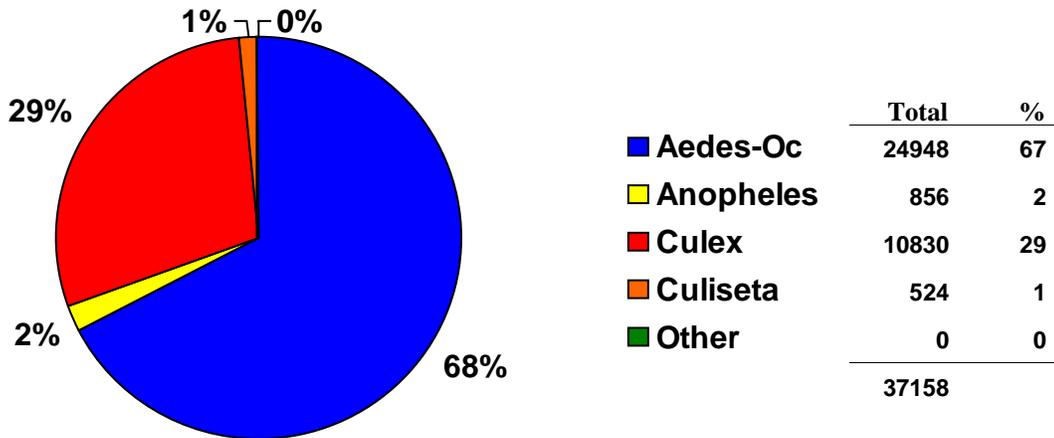


ADULT TRAP DATA - SPECIES SUMMARY

by REPORT DATE: 1/1/2006 to 10/6/2006
 by COUNTY: Garfield

Species

Total



CMMS - Comprehensive Mosquito Management System

This information is the confidential work product of Colorado Mosquito Control, Inc. and is protected by state and federal statutes. No part of this document or data contained herein may be reproduced, used to prepare derivative products, or distributed without the specific written approval of Colorado Mosquito Control, Inc.

2006 Garfield County CDC Light Trap Composite Data

Total number of trap/nights set: 156
 Total number of mosquitoes collected: 37,158
 Average mosquitoes per trap/night: 238

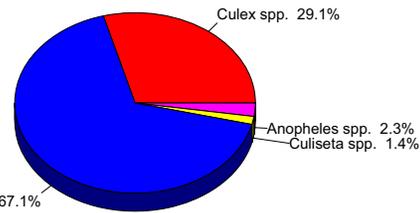
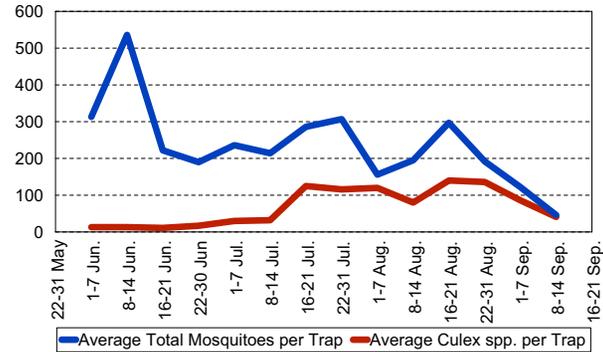
Trap sites included in this data: BM-01, CD-02, CD-11, GW-06, GW-08, NC-02, PR-01, RF-01, RF-02, RF-15, SI-01, plus individual floater traps.

Species collected:

Aedes cinereus
Aedes vexans
Aedes (Oc.) dorsalis
Aedes (Oc.) inepsitus
Aedes (Oc.) melaninon
Aedes (Oc.) nigromaculis
Aedes (Oc.) trivittatus
Anopheles hermsi
Culex erythrothorax
Culex pipiens
Culex salinarius
Culex tarsalis
Culiseta incidens
Culiseta inornata

Species abundance:

Species	Number	Percent of Total
<i>Aedes (Oc.) spp.</i>	24948	67.1%
<i>Anopheles spp.</i>	856	2.3%
<i>Coquillettidia spp.</i>	0	0.0%
<i>Culex spp.</i>	10830	29.1%
<i>Culiseta spp.</i>	524	1.4%



Season: 2006

Trap Type: Light/CO₂

Location: Carbondale, in Saint Finbar "neighborhood"

Behind Aspen Equestrian Center

GPS: N39° 24.229', W107° 9.512'

Total number of trap/nights set: 16
 Total number of mosquitoes collected: 247
 Average mosquitoes per trap/night: 15

Species collected:

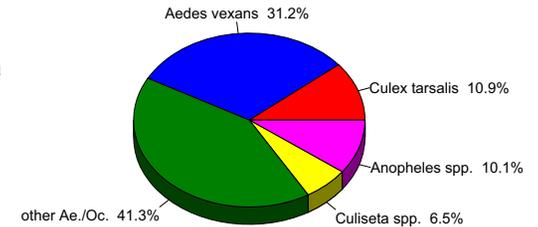
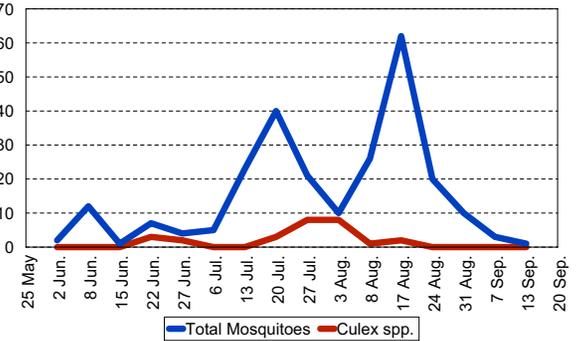
Aedes cinereus
Aedes vexans
Aedes (Oc.) dorsalis
Aedes (Oc.) inepsitus
Aedes (Oc.) melaninon
Anopheles hermsi
Culex tarsalis
Culiseta inornata

Species abundance:

Species	Number	Percent of Total
<i>Aedes vexans</i>	77	31.2%
Other <i>Aedes/Ochlerotatus</i>	102	41.3%
<i>Anopheles hermsi</i>	25	10.1%
<i>Culex tarsalis</i>	27	10.9%
Other <i>Culex</i>	0	0.0%
<i>Culiseta inornata</i>	16	6.5%

West Nile Virus Testing – No mosquito pools from this trap site tested positive for WNV.

CD-02: Carbondale Saint Finbar



BM-01: Battlement Mesa

Season: 2006
 Trap Type: Light/CO₂
 Location: Battlement Mesa, behind Crown Peak Baptist Church off West Battlement Parkway
 GPS: N39° 27.195', W108° 2.055'

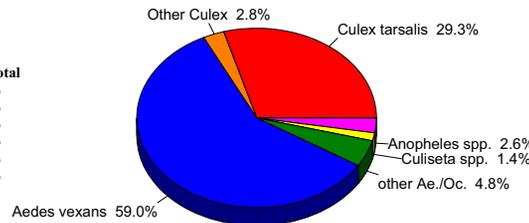
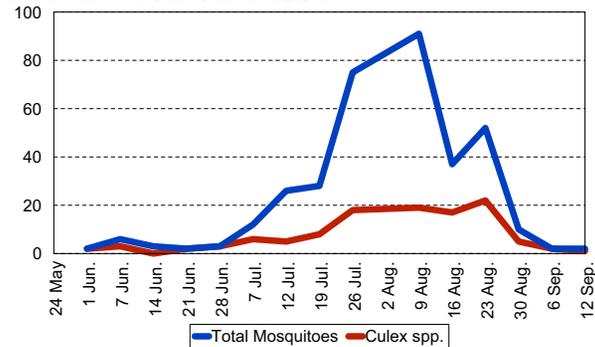
Total number of trap/nights set: 15
 Total number of mosquitoes collected: 351
 Average mosquitoes per trap/night: 23

Species collected:

Aedes vexans
Aedes (Oc.) dorsalis
Aedes (Oc.) melaninon
Aedes (Oc.) nigromaculis
Anopheles hermsi
Culex erythrothorax
Culex pipiens
Culex tarsalis
Culiseta inornata

Species abundance:

Species	Number	Percent of Total
<i>Aedes vexans</i>	207	59.0%
Other <i>Aedes/Ochlerotatus</i>	17	4.8%
<i>Anopheles hermsi</i>	9	2.6%
<i>Culex tarsalis</i>	103	29.3%
Other <i>Culex</i>	10	2.8%
<i>Culiseta inornata</i>	5	1.4%



West Nile Virus Testing – No mosquito pools from this trap site tested positive for WNV.

CD-11: Carbondale – CRMS

Season: 2006
 Trap Type: Light/CO₂
 Location: Carbondale, Colorado Rocky Mountain School campus
 GPS: N39° 24.470', W107° 13.637'

Total number of trap/nights set: 15
 Total number of mosquitoes collected: 148
 Average mosquitoes per trap/night: 10

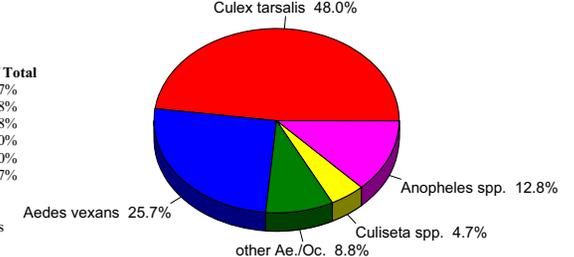
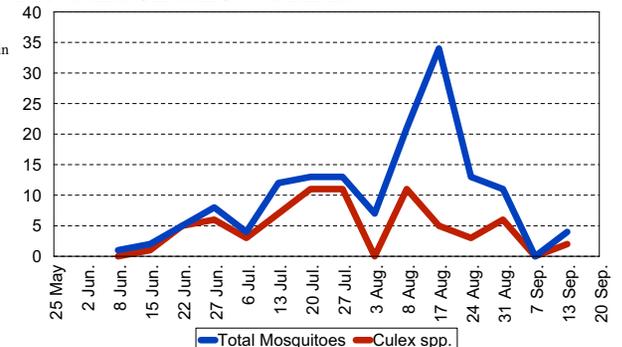
Species collected:

Aedes cinereus
Aedes vexans
Aedes (Oc.) dorsalis
Aedes (Oc.) inepsitus
Aedes (Oc.) melaninon
Anopheles hermsi
Culex tarsalis
Culiseta inornata

Species abundance:

Species	Number	Percent of Total
<i>Aedes vexans</i>	38	25.7%
Other <i>Aedes/Ochlerotatus</i>	13	8.8%
<i>Anopheles hermsi</i>	19	12.8%
<i>Culex tarsalis</i>	71	48.0%
Other <i>Culex</i>	0	0.0%
<i>Culiseta inornata</i>	7	4.7%

West Nile Virus Testing – No mosquito pools from this trap site tested positive for WNV.

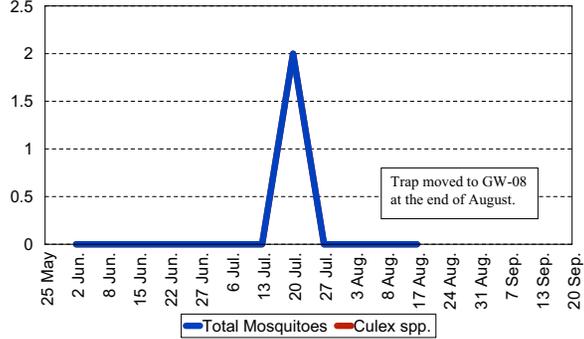


GW-06: Glenwood Springs above Yampa Caves

Season: 2006
 Trap Type: Light/CO₂
 Location: Glenwood Springs, above Yampa Caves
 GPS: unavailable

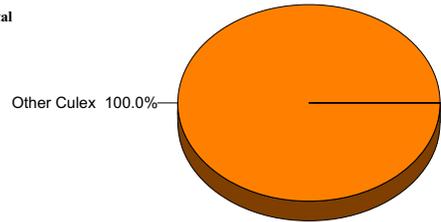
Total number of trap/nights set: 12
 Total number of mosquitoes collected: 2
 Average mosquitoes per trap/night: <1

Species collected:
Culex salinarius



Species abundance:

Species	Number	Percent of Total
<i>Aedes vexans</i>	0	0.0%
Other <i>Aedes/Ochlerotatus</i>	0	0.0%
<i>Anopheles hermsi</i>	0	0.0%
<i>Culex tarsalis</i>	0	0.0%
Other <i>Culex</i>	2	100.0%
<i>Culiseta</i> spp.	0	0.0%



West Nile Virus Testing – No mosquito pools from this trap site tested positive for WNV.

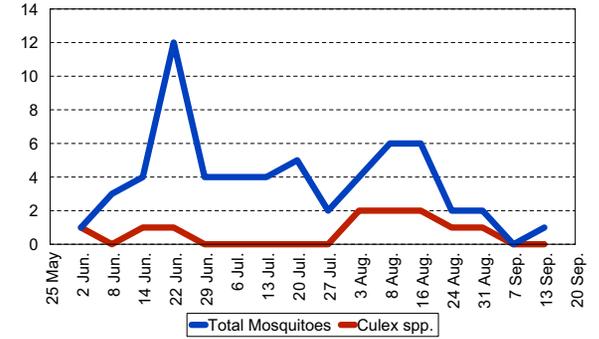
NC-02: New Castle – Mikala Lane

Season: 2006
 Trap Type: Light/CO₂
 Location: New Castle, next to 271 Mikala Lane
 GPS: N39° 34.504', W107° 32.439'

Total number of trap/nights set: 15
 Total number of mosquitoes collected: 56
 Average mosquitoes per trap/night: 4

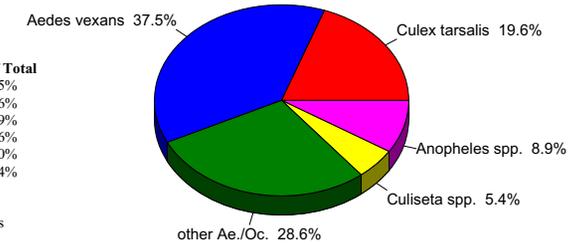
Species collected:

Aedes cinereus
Aedes vexans
Aedes (Oc.) inepreitus
Aedes (Oc.) melaninon
Anopheles hermsi
Culex tarsalis
Culiseta incidens
Culiseta inornata



Species abundance:

Species	Number	Percent of Total
<i>Aedes vexans</i>	21	37.5%
Other <i>Aedes/Ochlerotatus</i>	16	28.6%
<i>Anopheles hermsi</i>	5	8.9%
<i>Culex tarsalis</i>	11	19.6%
Other <i>Culex</i>	0	0.0%
<i>Culiseta</i> spp.	3	5.4%



West Nile Virus Testing – No mosquito pools from this trap site tested positive for WNV.

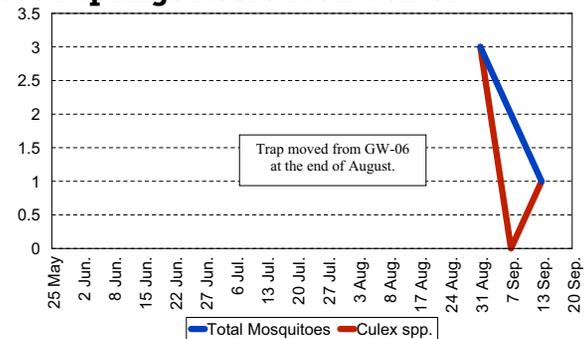
GW-08: Glenwood Springs Recreation Center

Season: 2006
 Trap Type: Light/CO₂
 Location: Glenwood Springs Recreation Center
 GPS: N39° 33.065', W107° 20.288'

Total number of trap/nights set: 3
 Total number of mosquitoes collected: 6
 Average mosquitoes per trap/night: 2

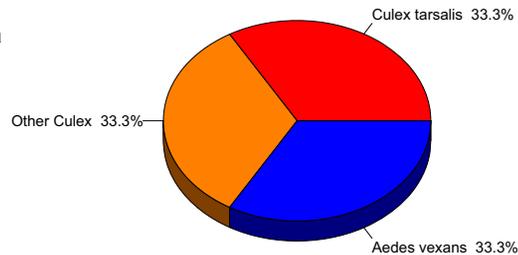
Species collected:

Aedes vexans
Culex pipiens
Culex tarsalis



Species abundance:

Species	Number	Percent of Total
<i>Aedes vexans</i>	2	33.3%
Other <i>Aedes/Ochlerotatus</i>	0	0.0%
<i>Anopheles hermsi</i>	0	0.0%
<i>Culex tarsalis</i>	2	33.3%
Other <i>Culex</i>	2	33.3%
<i>Culiseta</i> spp.	0	0.0%



West Nile Virus Testing – No mosquito pools from this trap site tested positive for WNV.

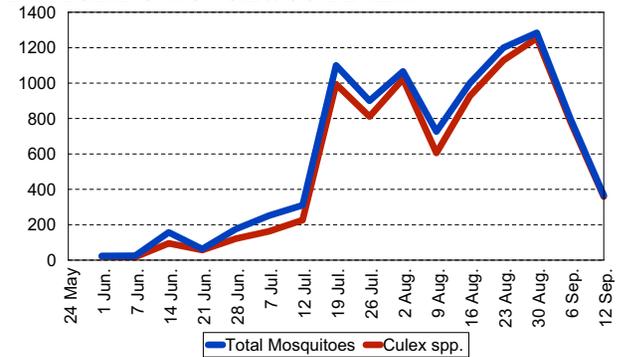
PR-01: Parachute Cottonwood Park

Season: 2006
 Trap Type: Light/CO₂
 Location: Parachute, west of Cottonwood Park next to fishing/wildlife-watching ponds
 GPS: N39° 26.603', W108° 2.901'

Total number of trap/nights set: 16
 Total number of mosquitoes collected: 9,448
 Average mosquitoes per trap/night: 591

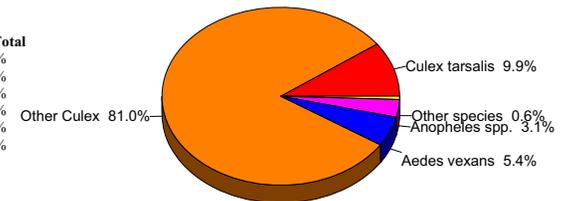
Species collected:

Aedes cinereus
Aedes vexans
Aedes (Oc.) dorsalis
Aedes (Oc.) melaninon
Anopheles hermsi
Culex erythrothorax
Culex pipiens
Culex tarsalis
Culiseta inornata



Species abundance:

Species	Number	Percent of Total
<i>Aedes vexans</i>	514	5.4%
Other <i>Aedes/Ochlerotatus</i>	21	0.2%
<i>Anopheles hermsi</i>	293	3.1%
<i>Culex tarsalis</i>	936	9.9%
Other <i>Culex</i>	7650	81.0%
<i>Culiseta inornata</i>	34	0.4%

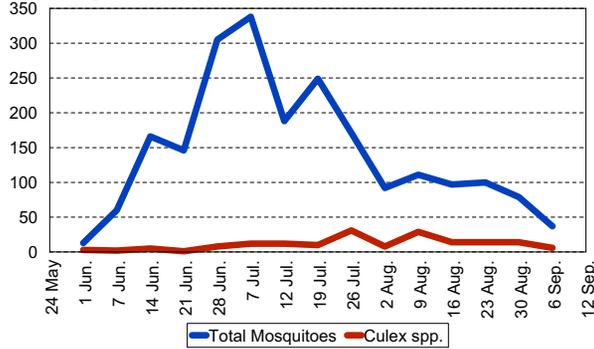


West Nile Virus Testing – A mosquito pool from this trap site tested positive for WNV on 23 August 2006.

RF-01: Rifle Lyons Park Rest Area

Season: 2006
 Trap Type: Light/CO₂
 Location: Rifle, next to marsh south of Lyons Park Rest Area
 GPS: N39° 31.509', W107° 47.137'

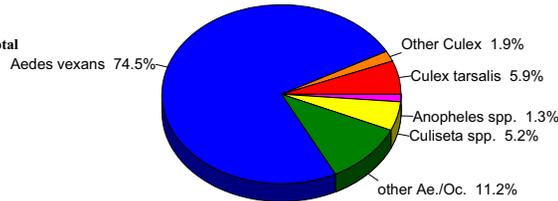
Total number of trap/nights set: 15
 Total number of mosquitoes collected: 2,152
 Average mosquitoes per trap/night: 143



Species collected:
Aedes cinereus
Aedes vexans
Aedes (Oc.) dorsalis
Aedes (Oc.) inerepitus
Aedes (Oc.) melanimon
Aedes (Oc.) nigromaculis
Anopheles hermsi
Culex erythrothorax
Culex pipiens
Culex tarsalis
Culiseta inornata

Species abundance:

Species	Number	Percent of Total
<i>Aedes vexans</i>	1603	74.5%
Other <i>Aedes/Ochlerotatus</i>	240	11.2%
<i>Anopheles hermsi</i>	28	1.3%
<i>Culex tarsalis</i>	128	5.9%
Other <i>Culex</i>	41	1.9%
<i>Culiseta inornata</i>	112	5.2%

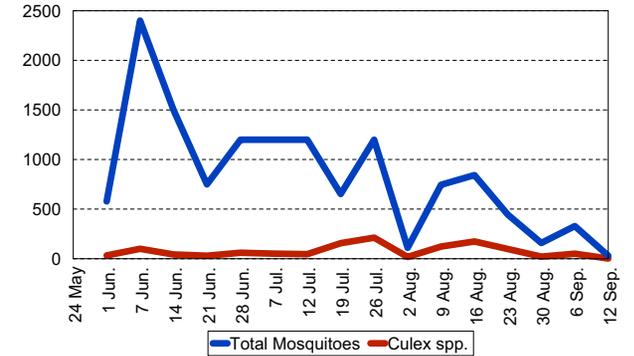


West Nile Virus Testing – No mosquito pools from this trap site tested positive for WNV.

RF-15: Rifle Mile Pond Road

Season: 2005
 Trap Type: Light/CO₂
 Location: Rifle, off Mile Pond Road 0.2 miles from Ardvark Storage
 GPS: N39° 32.071', W107° 45.279'

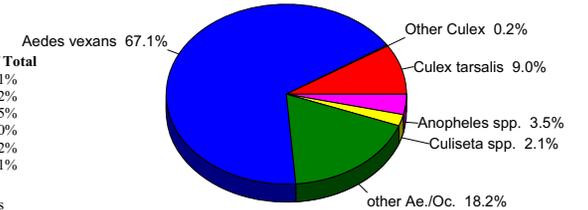
Total number of trap/nights set: 16
 Total number of mosquitoes collected: 13,340
 Average mosquitoes per trap/night: 834



Species collected:
Aedes vexans
Aedes (Oc.) dorsalis
Aedes (Oc.) inerepitus
Aedes (Oc.) melanimon
Aedes (Oc.) nigromaculis
Aedes (Oc.) trivittatus
Anopheles hermsi
Culex erythrothorax
Culex pipiens
Culex tarsalis
Culiseta inornata

Species abundance:

Species	Number	Percent of Total
<i>Aedes vexans</i>	8950	67.1%
Other <i>Aedes/Ochlerotatus</i>	2426	18.2%
<i>Anopheles hermsi</i>	473	3.5%
<i>Culex tarsalis</i>	1195	9.0%
Other <i>Culex</i>	22	0.2%
<i>Culiseta inornata</i>	274	2.1%

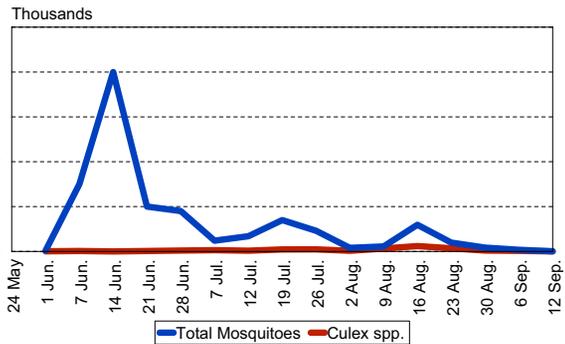


West Nile Virus Testing – No mosquito pools from this trap site tested positive for WNV.

RF-02: Rifle White River Avenue at Highway 13

Season: 2006
 Trap Type: Light/CO₂
 Location: Rifle, next to marsh at White River Avenue and Colorado Highway 13
 GPS: N39° 33.041', W107° 46.818'

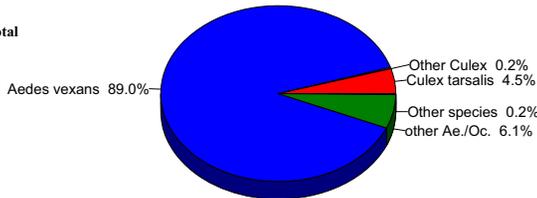
Total number of trap/nights set: 16
 Total number of mosquitoes collected: 10,268
 Average mosquitoes per trap/night: 642



Species collected:
Aedes vexans
Aedes (Oc.) dorsalis
Aedes (Oc.) inerepitus
Aedes (Oc.) melanimon
Anopheles hermsi
Culex pipiens
Culex tarsalis
Culiseta incidens
Culiseta inornata

Species abundance:

Species	Number	Percent of Total
<i>Aedes vexans</i>	9140	89.0%
Other <i>Aedes/Ochlerotatus</i>	628	6.1%
<i>Anopheles hermsi</i>	3	0.0%
<i>Culex tarsalis</i>	460	4.5%
Other <i>Culex</i>	24	0.2%
<i>Culiseta spp.</i>	13	0.1%

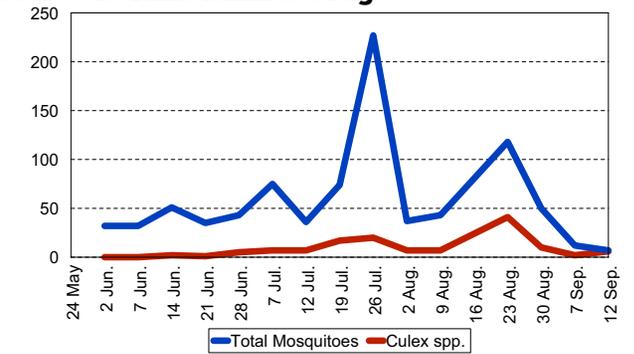


West Nile Virus Testing – No mosquito pools from this trap site tested positive for WNV.

SI-01: Silt – Bekins Mini-Storage

Season: 2006
 Trap Type: Light/CO₂
 Location: Silt, along marsh west of Bekins Mini-Storage off U.S. Hwy. 6
 GPS: N39° 32.756', W107° 38.950'

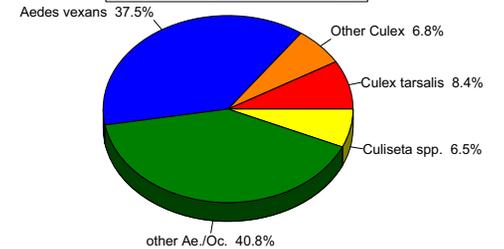
Total number of trap/nights set: 15
 Total number of mosquitoes collected: 872
 Average mosquitoes per trap/night: 58



Species collected:
Aedes vexans
Aedes (Oc.) dorsalis
Aedes (Oc.) melanimon
Aedes (Oc.) nigromaculis
Culex erythrothorax
Culex pipiens
Culex tarsalis
Culiseta inornata

Species abundance:

Species	Number	Percent of Total
<i>Aedes vexans</i>	327	37.5%
Other <i>Aedes/Ochlerotatus</i>	356	40.8%
<i>Anopheles hermsi</i>	0	0.0%
<i>Culex tarsalis</i>	73	8.4%
Other <i>Culex</i>	59	6.8%
<i>Culiseta inornata</i>	57	6.5%



West Nile Virus Testing – No mosquito pools from this trap site tested positive for WNV.



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