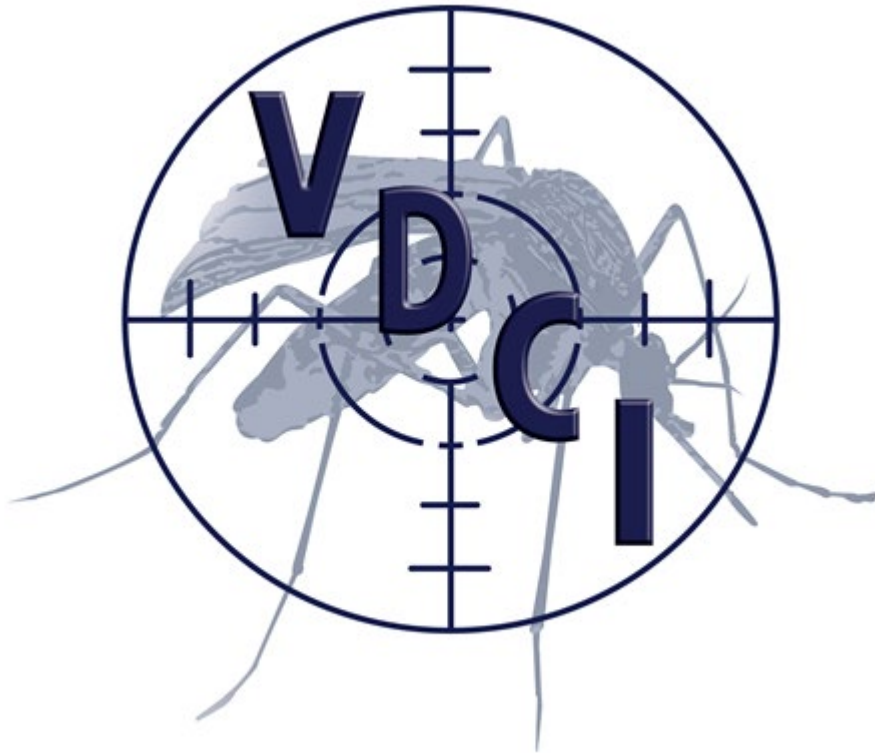


# CENTENNIAL

## MOSQUITO CONTROL PROGRAM

### 2020 ANNUAL REPORT



VECTOR DISEASE CONTROL INTERNATIONAL LLC  
7000 NORTH BROADWAY, SUITE 108  
DENVER, CO 80211

OCTOBER 2020

EMAIL: [NBATES@VDCI.NET](mailto:NBATES@VDCI.NET)  
WEBSITE: [WWW.VDCI.NET](http://WWW.VDCI.NET)

**CENTENNIAL MOSQUITO CONTROL PROGRAM**

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### 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 Centennial 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.

The focus of VDCI's Mosquito Management Program is to employ trained field technicians to suppress populations of larval mosquitoes in aquatic habitats. VDCI technicians utilize bacterial larvicides that reduce mosquitoes without harming non-target organisms. Additionally, monitoring of adult mosquito populations is an essential component of an Integrated Mosquito Management (IMM) program. Surveillance trapping performed provides data to assess West Nile Virus (WNV) infection rates, as well as the need for adult mosquito control measures. Data driven response can reduce the threat of disease transmission and annoyance associated with mosquitoes, while reducing the necessity for large amounts of products to be applied.

### VDCI OBJECTIVES

VDCI's Mosquito Management Program has developed into one of the foremost environmentally sensitive and technologically advanced IMM programs in the United States. Additionally, VDCI has fostered cooperative efforts for mosquito control and epizootic response between surrounding municipalities, counties and homeowners associations, as well as the Center for Disease Control Vector-Borne disease unit in Fort Collins (CDC), the Colorado Department of Public Health (CDPHE), the Tri-County Health Department and Colorado State University (CSU) to respond to mosquito-borne disease and annoyance. Data obtained from VDCI is utilized by these entities when evaluating disease risk, a public-private data sharing partnership in the interest of public health which is unrivaled elsewhere in the country.

### VDCI IN COLORADO

Although new to Colorado in 2014, VDCI's partnerships with Colorado Mosquito Control and Ottertail Environmental brought together the biggest and most experienced mosquito control companies in the state. VDCI now manages mosquito control programs throughout Colorado including Homeowners Associations, Cities and Towns, Mosquito Control Districts, Counties, Indian Reservations, and more. VDCI currently has seven year-round offices in Colorado with programs that range from the southwest corner of the state to northeastern Colorado.

Since the inception of the Centennial Mosquito Control Program, efficacy of the established program has been improved through additional mosquito larval site mapping and continued

adaptation to ever changing environmental conditions. VDCI has continued to provide top quality mosquito control programs to the front range areas of Colorado. In addition, VDCI has expanded to provide service to other municipalities as new mosquito control programs were initiated. VDCI will maintain its commitment to provide top quality service to minimize the threat of West Nile Virus to citizens and to reduce mosquito annoyance in all the areas we serve.

### SEASON PERSPECTIVE

At VDCI we know each Colorado summer will 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.

The average temperature for May was 59.6 degrees F, which is 2.5 degrees above normal. There were two days in the month in which the temperature reached or exceeded the 90-degree mark. There were 1.65 inches of precipitation, 0.47 inches below the monthly average of 2.12 inches.

The average temperature for June was 71.2 degrees F, which is 3.6 degrees above normal. There were 17 days during the month in which the temperature reached or exceeded the 90-degree mark. The warmest temperature of 96 degrees occurred 4 times. Precipitation was at 0.71 inches, which is 1.27 inches below the normal. There were 7 days with measurable precipitation.

The monsoon moisture that the region often sees in July arrived later than normal and was not well established. Severe weather during the month was limited. There were only 9 days of measurable precipitation, with 22 out of the 31 days having above normal temperatures.

The average temp for the month was 77.2 °F, which is 4.2° above normal. This ties 2011 for the warmest Colorado August on record. Precipitation for the month was 0.35 inches, which is 1.34 inches below the normal of 1.69 inches.

September ended the season with mostly hot and dry weather. There were 8 days of 90 degree temperatures, with only five days of measurable precipitation.

### FIELD ACTIVITIES

Field activities began in March for the 2020 season. The earliest activity of the season involved updating and finalizing GIS maps. Mapping larval sites is an ongoing process, every year reports of standing water, new construction and site destruction result in many new sites being added or removed from the existing larval inspection routes.

VDCI's Annual Field Technician Classroom Training Day took place remotely this May, with new and returning field technicians in attendance. Field training by VDCI management and

veteran employees lasted through late May. By the end of May, VDCI was fully staffed and had full daytime and evening shift crews fully trained and in the field. During the late May through early September time period, field mosquito control operations were in full swing.

## WEST NILE VIRUS

### ***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 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. Many 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 in the country, compiling 2,947 human cases and 63 deaths, most of which occurred along the Front Range. By 2004 most of the cases shifted to the Western Slope and the state totaled 291 cases with 4 deaths (Mesa County).

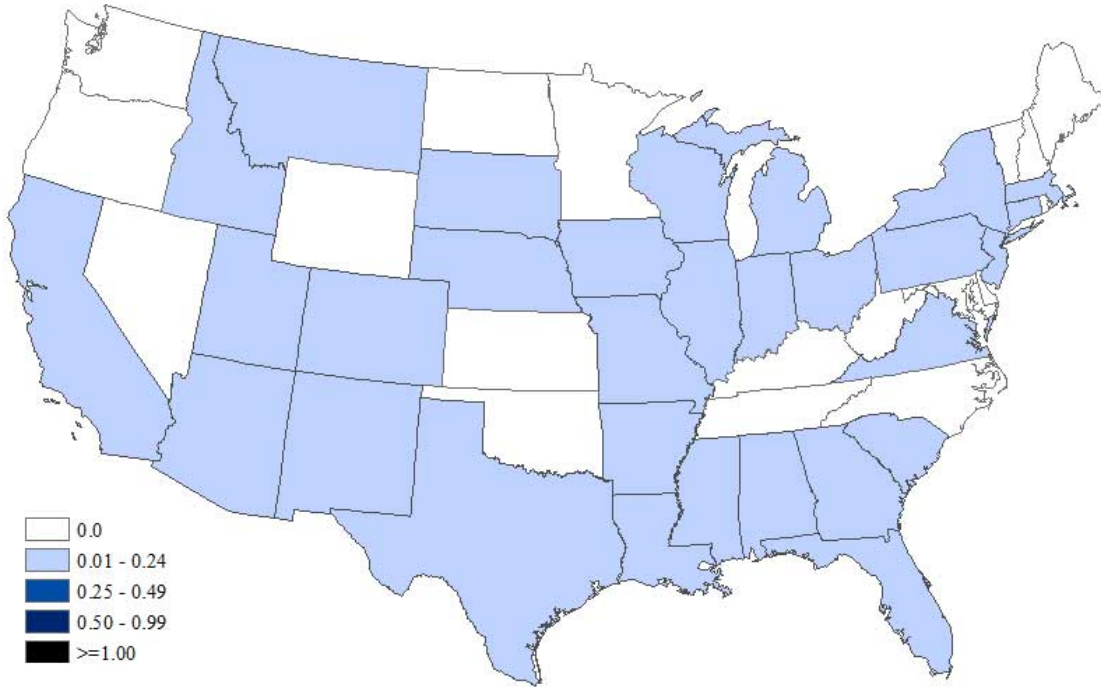
### ***West Nile Virus 2020***

West Nile Virus was once again seen throughout the United States in 2020, with the most cases in California (46), Texas (46), Florida (32), and Colorado (29). As of October 6<sup>th</sup>, the CDC's preliminary data reports 279 total cases and 14 total deaths, compared to 958 total cases and 54 total deaths last year.

As of October 6<sup>th</sup>, there were 32 reported cases and 0 reported deaths in Colorado. Delta County saw the most activity at 15 cases. Denver (5), Boulder (3), and Larimer (3) counties were close behind. For comparison, there were 149 cases and 8 deaths in 2016, 68 cases and 4 deaths in 2017, and 96 cases and 5 deaths in 2018, and 122 cases and 8 deaths in 2019.

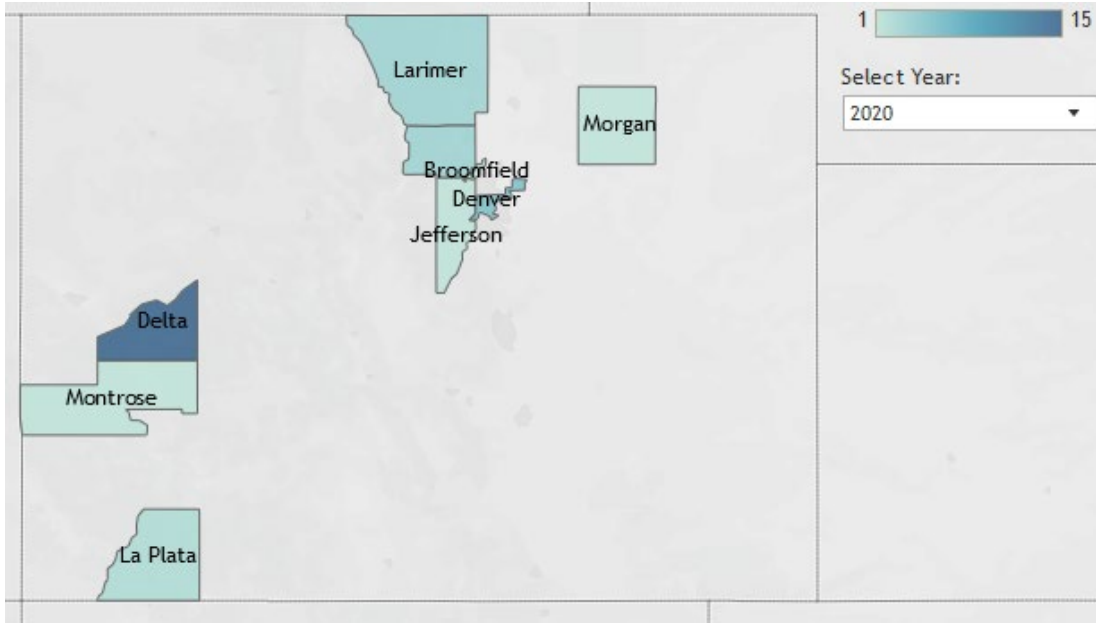
# WEST NILE VIRUS NEUROINVASIVE DISEASE INCIDENCE BY STATE – UNITED STATES, 2020 (AS OF OCTOBER 6, 2020)

Incidence per 100,000 Population

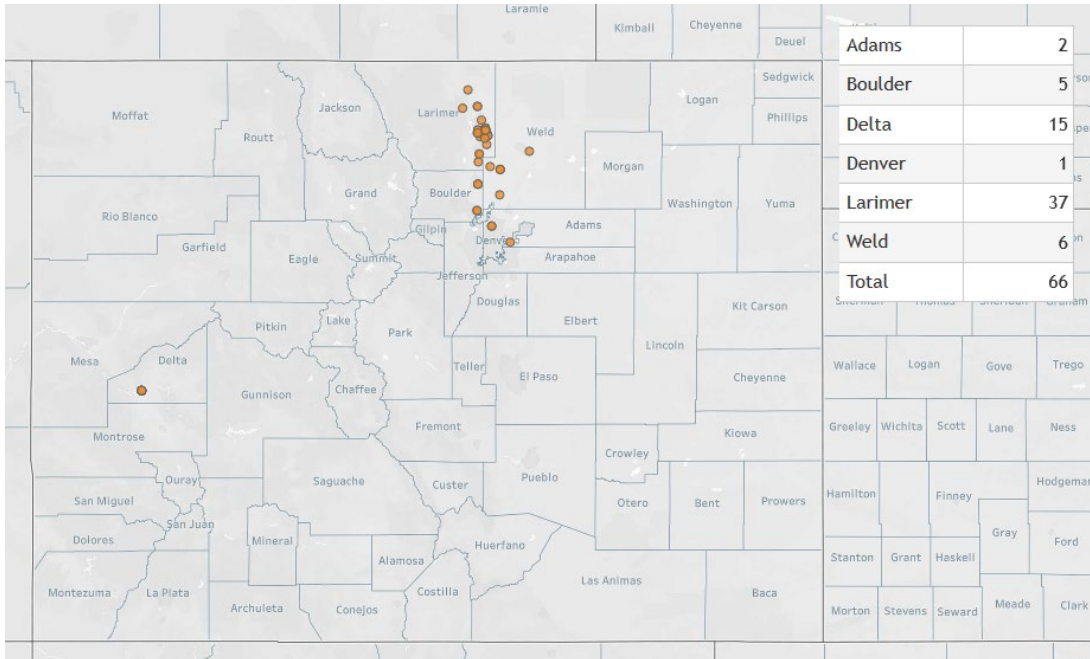


Source: <https://www.cdc.gov/westnile/statsmaps/preliminarymapsdata2020/incidencestate-2020.html>

## COLORADO HUMAN WEST NILE VIRUS INFECTIONS BY COUNTY, 2020 (OCTOBER 2020)

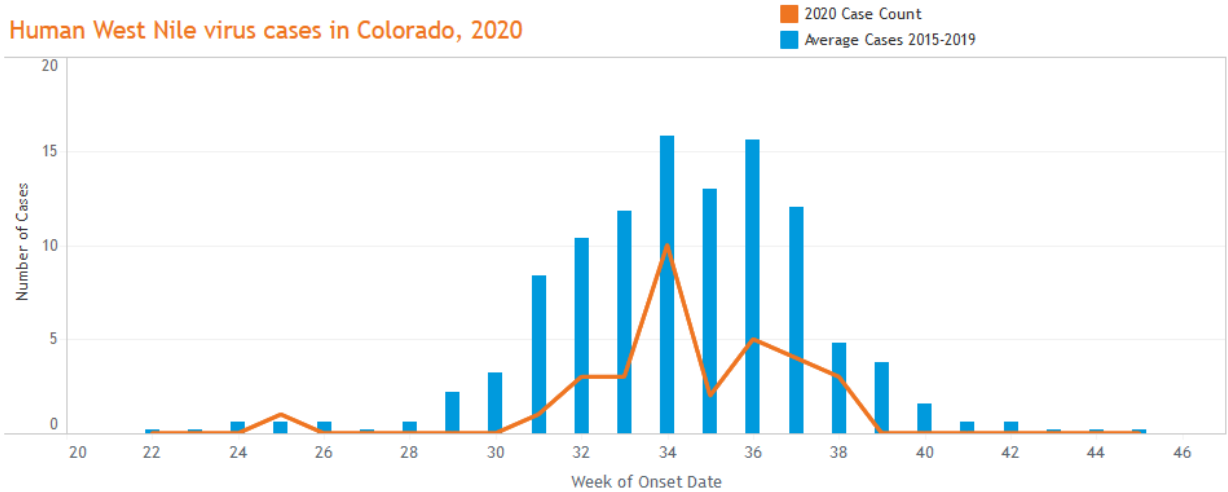


## COLORADO WEST NILE VIRUS SURVEILLANCE AND TESTING, 2020 (OCTOBER 2020)



I WNV Positive Mosquito Specimens

Human Cases: 32      Deaths: 0      Neuroinvasive Cases: 15      Hospitalized Cases: 17



## 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 tolerable levels. Translating these ideas to mosquito control, VDCI 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. In Colorado over 90% of VDCI 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 for reducing larval populations, some options may have greater consequences than benefits. 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 assessed. Permanent ecological damage may occur if extensive habitat change has taken place. True biological controls may also have non-target effects that outweigh the benefits of their control capacity. The biological control agent, if not carefully selected and evaluated may cause an imbalance in the natural ecological community, as well as threaten population levels of other organisms.



This was the case with the introduced mosquito fish (*Gambusia affinis*), an introduced species, while an effective predator on mosquito larvae it may have much larger dangers to native fish of Colorado waters. The *Gambusia* fish are very aggressive eaters and rapidly reproduce and often out-compete their native counterparts. For these reasons the Colorado Parks and Wildlife has placed restrictions on the stocking and use of *Gambusia*. However, on the Front Range VDCI has made fathead minnows (*Pimephales promelas*), a native Colorado species, available to the public to stock in irrigation and retention ponds. In general, however, predatory fish and other biological controls such as birds and bats do not provide sufficient control of mosquito populations to be used as the sole mechanism. Other measures need to be used to gain adequate mosquito population reductions.

VDCI's favored method of larval mosquito control is through bacterial biological larvicide products. The main product used by VDCI has an active ingredient that 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 many natural and manmade habitats. Another bacterial product closely related to *Bti* is *Bacillus sphaericus* (*Bs*). In addition to the benefits of *Bti*, *Bs* is a true biological control agent in that it remains in the water column through multiple broods, or generations, of mosquitoes. Unfortunately, the residual benefit of the control comes at a cost in price and is only effective under very specific conditions and mosquito species.

Other larval control products include an insect growth regulator (methoprene) and a special mineral oil blend. 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 high cost makes it poor candidate to be the predominant product in a large-scale program.

All the forementioned methods and products represent the essential ingredients of Integrated Pest Management. Mosquitoes are very well adapted 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.

VDCI constantly strives to improve its operations. Over the years VDCI has implemented high-tech solutions to what historically has been a particularly low-tech industry. VDCI's "CMMS" (Computerized Mosquito Management System) utilizes historical data to analyze and identify areas and sites of importance. Additionally, a sample of larvae from 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 species has been found to be the vector. Targeted inspections then allow for resources to be allocated efficiently.

Centennial saw a total of 393 site inspections in 2020. Of those inspections 75 required subsequent treatment. A total of 8.4 acres were treated in 2020.

#### VDCI SURVEILLANCE LABORATORY

Information on mosquito abundance and species identity is critical in the operation of a successful mosquito management program. Over the past few years identifying, packaging and sending *Culex* mosquito pool samples to the CDPHE or CSU labs for West Nile Virus testing has also become critically important in the battle against WNV and other mosquito-borne diseases. The VDCI Surveillance Laboratory, managed by Dr. Michael "Doc" Weissmann, has become the largest single source of adult and larval mosquito surveillance data in the state of Colorado. Specifically, in Colorado VDCI has 4 stereo zoom binocular microscopes, Over 100 CDC dry ice baited Light Traps, 21 Reiter Gravid Traps and all associated equipment and hardware.



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 CO<sub>2</sub>, 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 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.

Every season VDCI monitors a statewide network of CO<sub>2</sub> baited light traps in which all adult mosquitoes are counted and identified to species by the VDCI Surveillance Laboratory. While individual traps provide only limited information, trap data is interpreted in the context of historical records for the same trap site, going back in time more than a decade in many cases.



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 VDCI 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, with VDCI routinely collecting more than 30 each season.

Additionally, the VDCI Surveillance Laboratory conducts an intensive larval identification program with over 8,000 larval mosquito samples collected by 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 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 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, VDCI 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.

During the 2020 season, traps in Centennial collected a total of 1,321 mosquitoes. The percent composition of mosquitoes collected included 82.6% Aedes and 14.7% Culex.

### ADULT CONTROL

The goal of VDCI is to provide all residents with the best options for safe, effective, modern mosquito management. The primary emphasis of our mosquito management program is to control mosquitoes in the larval stage. This environmentally focused program maintains adulticiding as a final resort when adult mosquito populations surpass nuisance or risk thresholds. Mosquito surveillance results are used to make data driven decisions regarding areas that need to be sprayed for adult mosquito control. Such spraying is targeted to specific sectors determined by said data thereby reducing the size and frequency of spraying a given area.

VDCI uses all available data from CDC light 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.

VDCI uses state of the art technology, calibrated 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.

VDCI utilizes the water-based product AquaKontrol 30-30 for ULV adult mosquito control. This uses the highly effective pyrethroid Permethrin as the active ingredient, while the water-base

provides a much more environmentally sound solution to traditional oil-based adulticides. Daytime backpack barrier applications using the product Talstar Pro and utilizing the pyrethroid Bifenthrin are also effective in controlling adult mosquitoes.

During the 2020 season, no adulticide applications took place in Centennial.

### TECHNOLOGY

VDCI strives to improve the programs offered to its customers with novel and progressive advancements, continually evaluating and implementing new products and new technologies, not only regarding control efforts but also for data processing and information reporting. VDCI shares the belief that timely information should be accessible to customers and residents, so that the people who fund the programs can access the work that is being performed. VDCI also believes that the ability to access the data will improve both the resident's and municipality's ability to stay informed about West Nile Virus risk in their community.

### VDCI WEBSITE

Our website, [www.vdci.net/colorado](http://www.vdci.net/colorado) is the leading website 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 diseases, pesticide information and a wealth of topics relating to mosquitoes. Our website continues to be an integral tool for the dissemination of operational data to the citizens we serve, minimizing the resource and time required by the city and its employees for answering or fielding public inquiries.



## PUBLIC OUTREACH & DATA DISSEMINATION

For 25 years, VDCI has demonstrated that Public Outreach programs, quality Data Dissemination and outstanding Customer Service standards are the keys to success in providing large-scale municipal mosquito control programs. Citizen feedback, inquiry and satisfaction surveys aid in evaluating the effectiveness of our program. VDCI constantly looks for ways to better serve the communities we work with and appreciates the citizen involvement in improving the programs we offer.

### *CALL NOTIFICATION & SHUTOFF SYSTEM*

VDCI maintains a comprehensive Call Notification & Shutoff database and will notify residents on this list whenever ULV adulticide spray applications will be conducted within 2 blocks of their property or within the effective ULV spray drift distance (300-500 ft depending on wind speed and direction). All Shutoff locations are mapped in ArcView GIS and updated annually. Call & Shutoff forms are available online and may be submitted via the VDCI website.

### *FLOATER TRAP PLACEMENT*

These traps are deployed for annoyance reports at resident homes in locations a significant distance from standard trapping sites, to determine adult population levels and species composition.

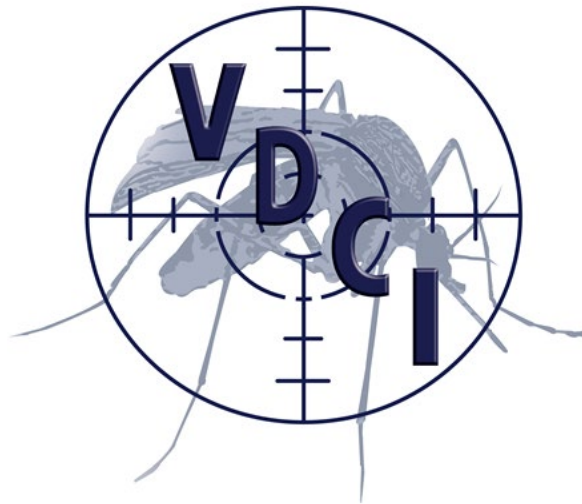


## SUMMARY

The 2020 mosquito season started off warm and dry and stayed that way throughout, resulting in an exceptionally mild mosquito season. Drought conditions were reflected in the surveillance numbers, which were down significantly, with VDCI traps collecting roughly half of what they did in 2019. 4th of July and other special events were almost non-existent due to the pandemic, with only a few municipalities finally resuming them on a limited basis in August. Despite all of this, VDCI did not see a significant decrease in workload, as a well-implemented Integrated Mosquito Management program already focuses on areas known to be problematic. Treatment is applied when thresholds are exceeded, regardless of by how much, and those numbers remained mostly the same. Even in a drought year, a quality mosquito control program remains essential to communities throughout Colorado to ensure residents remain healthy and able to enjoy their summer.

Vector Disease Control International, LLC continues to effectively serve the residents of Centennial using Integrated Mosquito Management technology to reduce mosquito nuisance and the related potential for disease transmission including West Nile Virus. VDCI continues to promote a responsible IPM approach to mosquito management, while maintaining a cost effective and efficient program.

VDCI wishes to thank all Centennial staff, officials and residents for their continuing support and we look forward to providing Centennial with mosquito control services in 2021 and beyond.



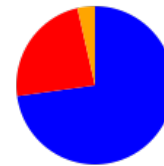


# Adult Trap Data - Detail

Start Date: 05/01/2020 End Date: 09/30/2020

Centennial, CO

Trap #	Date	Species	Count	Percent
CN-01 CDC Light Trap	Arapahoe	Centennial Piney Creek		
	06/05/2020	<i>Aedes trivittatus</i>	19	9.7%
	06/05/2020	<i>Aedes vexans</i>	24	12.3%
	06/12/2020	<i>Aedes increpitus</i>	4	2.1%
	06/12/2020	<i>Aedes trivittatus</i>	8	4.1%
	06/12/2020	<i>Aedes vexans</i>	56	28.7%
	06/12/2020	<i>Culiseta inornata</i>	2	1.0%
	06/19/2020	<i>Aedes vexans</i>	2	1.0%
	06/19/2020	<i>Culiseta inornata</i>	1	0.5%
	06/26/2020	<i>Aedes trivittatus</i>	1	0.5%
	06/26/2020	<i>Aedes vexans</i>	10	5.1%
	06/26/2020	<i>Culiseta inornata</i>	1	0.5%
	07/03/2020	<i>Aedes vexans</i>	3	1.5%
	07/10/2020	<i>Culex pipiens</i>	1	0.5%
	07/10/2020	<i>Culex tarsalis</i>	1	0.5%
	07/17/2020	<i>Aedes vexans</i>	1	0.5%
	07/17/2020	<i>Culex pipiens</i>	1	0.5%
	07/24/2020	<i>Aedes vexans</i>	2	1.0%
	07/24/2020	<i>Culex pipiens</i>	1	0.5%
	07/24/2020	<i>Culex tarsalis</i>	7	3.6%
	07/24/2020	<i>Culiseta inornata</i>	2	1.0%
	07/31/2020	<i>Aedes trivittatus</i>	1	0.5%
	07/31/2020	<i>Aedes vexans</i>	1	0.5%
	07/31/2020	<i>Culex pipiens</i>	2	1.0%
	07/31/2020	<i>Culex tarsalis</i>	3	1.5%
	08/07/2020	<i>Aedes dorsalis</i>	2	1.0%
	08/07/2020	<i>Aedes increpitus</i>	1	0.5%
	08/07/2020	<i>Aedes vexans</i>	4	2.1%
	08/07/2020	<i>Culex pipiens</i>	4	2.1%
	08/07/2020	<i>Culex tarsalis</i>	9	4.6%
	08/14/2020	<i>Aedes vexans</i>	2	1.0%
	08/14/2020	<i>Culex pipiens</i>	2	1.0%
	08/14/2020	<i>Culex tarsalis</i>	8	4.1%
08/14/2020	<i>Culiseta inornata</i>	1	0.5%	
08/21/2020	<i>Aedes vexans</i>	1	0.5%	
08/21/2020	<i>Culex pipiens</i>	1	0.5%	
08/21/2020	<i>Culex tarsalis</i>	3	1.5%	



- *Aedes-Oc*
- *Anopheles*
- *Culex*
- *Culiseta*
- *Other*

Trap #	Date	Species	Count	Percent
	08/28/2020	<i>Culex tarsalis</i>	3	1.5%
		<b>Total</b>	<b>195</b>	

CN-02	CDC Light Trap	Arapahoe	Centennial Airport Center		
		06/05/2020	No Mosquitoes	0	0.0%
		06/12/2020	<i>Aedes trivittatus</i>	1	0.7%
		06/12/2020	<i>Aedes vexans</i>	1	0.7%
		06/19/2020	<i>Aedes vexans</i>	2	1.4%
		06/19/2020	<i>Culex pipiens</i>	2	1.4%
		06/26/2020	<i>Aedes trivittatus</i>	2	1.4%
		06/26/2020	<i>Aedes vexans</i>	33	23.4%
		06/26/2020	<i>Culex tarsalis</i>	1	0.7%
		06/26/2020	<i>Culiseta inornata</i>	1	0.7%
		07/03/2020	<i>Aedes vexans</i>	20	14.2%
		07/10/2020	<i>Aedes vexans</i>	1	0.7%
		07/10/2020	<i>Culex tarsalis</i>	2	1.4%
		07/17/2020	<i>Culex tarsalis</i>	2	1.4%
		07/24/2020	<i>Culex pipiens</i>	2	1.4%
		07/24/2020	<i>Culex tarsalis</i>	20	14.2%
		07/31/2020	<i>Aedes vexans</i>	6	4.3%
		07/31/2020	<i>Culex pipiens</i>	3	2.1%
		07/31/2020	<i>Culex tarsalis</i>	3	2.1%
		08/07/2020	<i>Aedes vexans</i>	2	1.4%
		08/07/2020	<i>Culex pipiens</i>	2	1.4%
		08/07/2020	<i>Culex tarsalis</i>	4	2.8%
		08/14/2020	<i>Aedes vexans</i>	2	1.4%
		08/14/2020	<i>Culex pipiens</i>	1	0.7%
		08/14/2020	<i>Culex tarsalis</i>	7	5.0%
		08/21/2020	<i>Aedes vexans</i>	2	1.4%
		08/21/2020	<i>Culex tarsalis</i>	9	6.4%
		08/28/2020	<i>Culex salinarius</i>	4	2.8%
		08/28/2020	<i>Culex tarsalis</i>	6	4.3%
			<b>Total</b>	<b>141</b>	



- *Aedes-Oc*
- *Anopheles*
- *Culex*
- *Culiseta*
- *Other*

CN-03	CDC Light Trap	Arapahoe	Centennial Quebec at Little Dry Creek
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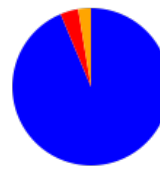
Trap #	Date	Species	Count	Percent
	06/05/2020	<i>Culex tarsalis</i>	1	1.5%
	06/12/2020	<i>Aedes trivittatus</i>	1	1.5%
	06/12/2020	<i>Aedes vexans</i>	2	3.1%
	06/12/2020	<i>Culex pipiens</i>	1	1.5%
	06/12/2020	<i>Culiseta inornata</i>	1	1.5%
	06/19/2020	<i>Aedes vexans</i>	1	1.5%
	06/19/2020	<i>Culex pipiens</i>	1	1.5%
	06/19/2020	<i>Culex tarsalis</i>	1	1.5%
	06/26/2020	<i>Aedes vexans</i>	4	6.2%
	06/26/2020	<i>Culex salinarius</i>	1	1.5%
	06/26/2020	<i>Culiseta inornata</i>	1	1.5%
	07/03/2020	<i>Aedes vexans</i>	2	3.1%
	07/03/2020	<i>Culex pipiens</i>	1	1.5%
	07/03/2020	<i>Culex tarsalis</i>	1	1.5%
	07/10/2020	<i>Culex tarsalis</i>	1	1.5%
	07/17/2020	<i>Culex pipiens</i>	1	1.5%
	07/24/2020	<i>Culex salinarius</i>	4	6.2%
	07/24/2020	<i>Culex tarsalis</i>	3	4.6%
	07/31/2020	<i>Aedes vexans</i>	2	3.1%
	07/31/2020	<i>Culex pipiens</i>	2	3.1%
	07/31/2020	<i>Culex tarsalis</i>	2	3.1%
	08/07/2020	<i>Aedes hendersoni</i>	1	1.5%
	08/07/2020	<i>Aedes vexans</i>	1	1.5%
	08/07/2020	<i>Culex pipiens</i>	2	3.1%
	08/07/2020	<i>Culex tarsalis</i>	2	3.1%
	08/14/2020	<i>Culex pipiens</i>	2	3.1%
	08/14/2020	<i>Culex tarsalis</i>	5	7.7%
	08/21/2020	<i>Aedes vexans</i>	1	1.5%
	08/21/2020	<i>Culex pipiens</i>	5	7.7%
	08/21/2020	<i>Culex tarsalis</i>	7	10.8%
	08/21/2020	<i>Culiseta inornata</i>	1	1.5%
	08/28/2020	<i>Culex salinarius</i>	2	3.1%
	08/28/2020	<i>Culex tarsalis</i>	1	1.5%
	08/28/2020	<i>Culiseta inornata</i>	1	1.5%
		<b>Total</b>	<b>65</b>	



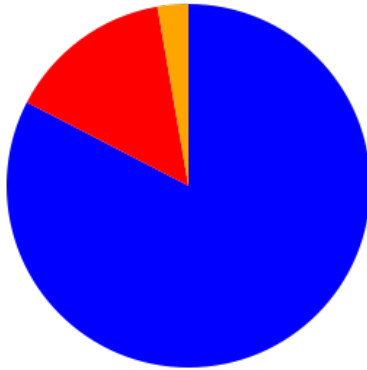
- Aedes-Oc
- Anopheles
- Culex
- Culiseta
- Other

CN-04    CDC Light Trap    Arapahoe    Centennial - DeKoevend Park

Trap #	Date	Species	Count	Percent
	06/05/2020	<i>Aedes increpitus</i>	2	0.2%
	06/05/2020	<i>Aedes trivittatus</i>	1	0.1%
	06/05/2020	<i>Aedes vexans</i>	4	0.4%
	06/05/2020	<i>Culex tarsalis</i>	1	0.1%
	06/05/2020	<i>Culiseta inornata</i>	5	0.5%
	06/12/2020	<i>Aedes hendersoni</i>	1	0.1%
	06/12/2020	<i>Aedes increpitus</i>	1	0.1%
	06/12/2020	<i>Aedes trivittatus</i>	8	0.9%
	06/12/2020	<i>Aedes vexans</i>	133	14.5%
	06/12/2020	<i>Culex pipiens</i>	1	0.1%
	06/12/2020	<i>Culiseta inornata</i>	5	0.5%
	06/19/2020	<i>Aedes vexans</i>	10	1.1%
	06/19/2020	<i>Culiseta inornata</i>	3	0.3%
	06/26/2020	<i>Aedes increpitus</i>	1	0.1%
	06/26/2020	<i>Aedes trivittatus</i>	44	4.8%
	06/26/2020	<i>Aedes vexans</i>	258	28.0%
	06/26/2020	<i>Culex pipiens</i>	2	0.2%
	06/26/2020	<i>Culex tarsalis</i>	2	0.2%
	06/26/2020	<i>Culiseta inornata</i>	5	0.5%
	07/03/2020	<i>Aedes trivittatus</i>	8	0.9%
	07/03/2020	<i>Aedes vexans</i>	202	22.0%
	07/03/2020	<i>Culex pipiens</i>	1	0.1%
	07/03/2020	<i>Culex tarsalis</i>	2	0.2%
	07/03/2020	<i>Culiseta inornata</i>	1	0.1%
	07/10/2020	<i>Aedes trivittatus</i>	7	0.8%
	07/10/2020	<i>Aedes vexans</i>	58	6.3%
	07/10/2020	<i>Culex pipiens</i>	1	0.1%
	07/17/2020	<i>Aedes vexans</i>	22	2.4%
	07/17/2020	<i>Culex tarsalis</i>	2	0.2%
	07/24/2020	<i>Aedes vexans</i>	7	0.8%
	07/24/2020	<i>Culex pipiens</i>	1	0.1%
	07/24/2020	<i>Culex tarsalis</i>	4	0.4%
	07/24/2020	<i>Culiseta inornata</i>	1	0.1%
	07/31/2020	<i>Aedes vexans</i>	5	0.5%
	07/31/2020	<i>Culex pipiens</i>	6	0.7%
	07/31/2020	<i>Culiseta inornata</i>	1	0.1%
	08/07/2020	<i>Aedes trivittatus</i>	4	0.4%
	08/07/2020	<i>Aedes vexans</i>	59	6.4%
	08/07/2020	<i>Culex pipiens</i>	1	0.1%
	08/07/2020	<i>Culex tarsalis</i>	3	0.3%
	08/07/2020	<i>Culiseta inornata</i>	1	0.1%
	08/14/2020	<i>Aedes vexans</i>	24	2.6%



Trap #	Date	Species	Count	Percent
	08/14/2020	<i>Culex tarsalis</i>	1	0.1%
	08/21/2020	<i>Aedes vexans</i>	2	0.2%
	08/21/2020	<i>Culex pipiens</i>	2	0.2%
	08/21/2020	<i>Culex tarsalis</i>	3	0.3%
	08/21/2020	<i>Culiseta inornata</i>	1	0.1%
	08/28/2020	<i>Aedes hendersoni</i>	1	0.1%
	08/28/2020	<i>Culex pipiens</i>	1	0.1%
	08/28/2020	<i>Culiseta inornata</i>	1	0.1%
<b>Total</b>			<b>920</b>	



		TOTAL	%
	<i>Aedes-Oc</i>	1,091	82.6%
	<i>Anopheles</i>	0	0.0%
	<i>Culex</i>	194	14.7%
	<i>Culiseta</i>	36	2.7%
	<i>Other</i>	0	0.0%

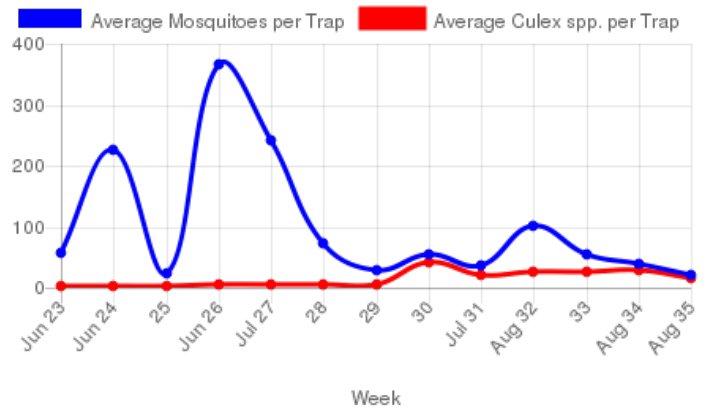
# 2020 Centennial, CO Trap Composite Data

Total number of trap/nights set: 52  
 Total number of mosquitoes collected: 1,321.0  
 Average mosquitoes per trap/night: 25.4  
 Average Culex per trap/night: 3.7

## Species collected and abundance:

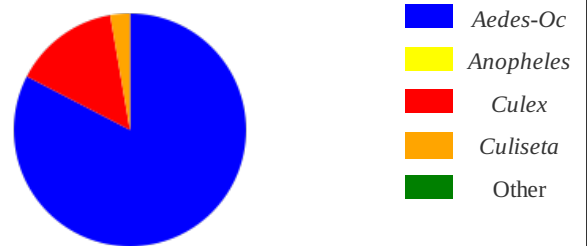
<i>Aedes dorsalis</i>	2.0	0.2%
<i>Aedes hendersoni</i>	3.0	0.2%
<i>Aedes increpitus</i>	9.0	0.7%
<i>Aedes trivittatus</i>	105.0	7.9%
<i>Aedes vexans</i>	972.0	73.6%
<i>Culex pipiens</i>	53.0	4.0%
<i>Culex salinarius</i>	11.0	0.8%
<i>Culex tarsalis</i>	130.0	9.8%
<i>Culiseta inornata</i>	36.0	2.7%

## Seasonality



## Genus Proportions:

Genus	Number	Percent of Total
<i>Aedes/Ochlerotatus</i>	1,091	82.6%
<i>Anopheles</i>	0	0.0%
<i>Culex</i>	194	14.7%
<i>Culiseta</i>	36	2.7%
Other	0	0.0%





# Larval Data - Summary

**Start Date:** 05/01/2020    **End Date:** 09/30/2020

**Centennial, CO**

	Total Site Inspections	Wet Sites	% Wet	Sites Treated	Acres Treated
CN 0001 Copper Terrace Detention	9.0	3.0	33.3%	2.0	0.2
CN 0002 Otero Detention	12.0	3.0	25.0%	7.0	0.8
CN 0003 Xfinity Detention	12.0	3.0	25.0%	5.0	0.6
CN 0006 Piney Creek Trail Retention	8.0	2.0	25.0%	4.0	0.4
CN 0008 S Himalaya Parking Detention	8.0	2.0	25.0%	3.0	0.3
CN 0009 Peakview/Peoria Open Space Basin	10.0	3.0	30.0%	2.0	0.2
CN 0011 Arapahoe Water Marsh South	9.0	3.0	33.3%	2.0	0.3
CN 0012 Arapahoe Water Detention North	9.0	3.0	33.3%	0.0	0.0
CN 0013 S Worchester Basin Continuation	10.0	3.0	30.0%	4.0	0.3
CN 0014 S Jordan Detention	10.0	2.0	20.0%	3.0	1.0
CN 0015 Jordan/Briarwood Detention	10.0	2.0	20.0%	2.0	0.3
CN 0016 Centennial Medical Detention	10.0	2.0	20.0%	1.0	0.1
CN 0019 S Eagle Business Detention	7.0	2.0	28.6%	1.0	0.1
CN 0021 E Geddes Detention	7.0	2.0	28.6%	4.0	0.6
CN 0023 Hinsdale Marsh	7.0	1.0	14.3%	1.0	0.0

	Total Site Inspections	Wet Sites	% Wet	Sites Treated	Acres Treated
CN 0024 E Fremont Marsh	7.0	1.0	14.3%	0.0	0.0
CN 0025 S Yampa St Marsh	7.0	1.0	14.3%	1.0	0.0
CN 0026 Arapahoe Sheriff Detention+	4.0	2.0	50.0%	1.0	0.1
CN 0028 Lima/Caley Marsh	9.0	3.0	33.3%	2.0	0.1
CN 0029 AutoNation Dodge Marsh	10.0	4.0	40.0%	3.0	0.2
CN 0031 Peoria/Caley NW Detention	11.0	2.0	18.2%	1.0	0.1
CN 0032 AutoNation Dodge Detention North	10.0	2.0	20.0%	0.0	0.0
CN 0033 Easter / Elizabeth Pond	9.0	2.0	22.2%	1.0	0.3
CN 0034 Willows Water District Marsh	7.0	1.0	14.3%	1.0	0.1
CN 0035 Willow Creek Trail Marsh	7.0	1.0	14.3%	0.0	0.0
CN 0039 Small Safeway Detention	10.0	3.0	30.0%	2.0	0.1
CN 0040 S Yosemite/ Xenia Marsh	10.0	3.0	30.0%	0.0	0.0
CN 0041 Arrow Electronics Lot Retention	10.0	2.0	20.0%	0.0	0.0
CN 0042 S Yosemite / Xenia Basin	9.0	1.0	11.1%	0.0	0.0
CN 0043 Davita Lot Retention	9.0	3.0	33.3%	0.0	0.0
CN 0047 Briarwood / Havana Marsh	10.0	3.0	30.0%	1.0	0.1
CN 0048 Wal-Mart Retention	10.0	3.0	30.0%	4.0	0.6
CN 0050 Puma Park Ditch+	9.0	3.0	33.3%	1.0	0.0

	Total Site Inspections	Wet Sites	% Wet	Sites Treated	Acres Treated
CN 0054 LDS Church/Golf Course Detention	6.0	0.0	0.0%	1.0	0.0
CN 0055 Panorama Detention	12.0	3.0	25.0%	2.0	0.4
CN 0057 S Worchester Basin	8.0	3.0	37.5%	0.0	0.0
CN 0058 S Abilene Absurdly Long Ditch	9.0	3.0	33.3%	5.0	0.5
CN 0062 Larger Piney Creek Detention	8.0	2.0	25.0%	3.0	0.2
CN 0063 E Caley Marsh	7.0	2.0	28.6%	0.0	0.0
CN 0065 S Jericho Ditch	7.0	2.0	28.6%	0.0	0.0
CN 0066 E Arapahoe Detention	7.0	1.0	14.3%	0.0	0.0
CN 0069 Fremont / Potomac Detention	8.0	2.0	25.0%	0.0	0.0
CN 0070 Parker And Jamison Retention	7.0	0.0	0.0%	0.0	0.0
CN 0073 Long Ave Ditch	7.0	0.0	0.0%	0.0	0.0
CN 0074 Centura Health Detention	11.0	2.0	18.2%	5.0	0.5
	<b>393.0</b>	<b>96.0</b>	<b>24.4%</b>	<b>75.0</b>	<b>8.4</b>



# Service Request Report

**Start Date:** 05/01/2020    **End Date:** 09/30/2020

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Date	Contract	Locality	Contact Info
2020-08-10	Centennial, CO		Martin Lesica 3621 E. Orchard Rd. Centennial

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