2018 Annual Report Stapleton MCA Mosquito Control Program

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STAPLETON MCA
MOSQUITO CONTROL PROGRAM
ANNUAL REPORT 2018

TABLE OF CONTENTS

THE STAPLETON MCA 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 Stapleton MCA 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 the Stapleton MCA 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

The Stapleton MCA Mosquito Management Program, operated by VDCI, 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.

CONTRACTOR COMMITMENT

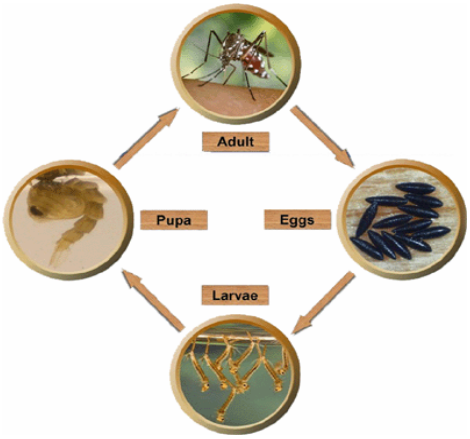
Vector Disease Control International (VDCI) is a large-scale contractor specializing in complete integrated mosquito control services. VDCI utilizes an aggressive preemptive Integrated Pest Management (IPM) approach to controlling mosquito populations within contracted areas. VDCI, established in 1992, is the largest private company specializing in mosquito control in Colorado.

VDCI currently has programs throughout the state of Colorado including municipalities, counties, HOA's, Indian Reservations, and numerous others. Geographically, VDCI reaches from the Ute Mountain Ute Reservation in the southwest corner of the state to the northeast. VDCI has programs in several mountain areas including the Gunnison Valley, the I-70 corridor, and parts of the upper Colorado River valley.

With well over a decade of experience monitoring WNV in Colorado, it is clear that limiting mosquito exposure is the best way to reduce the risk of disease. A well-developed mosquito management program is only part of the picture, and VDCI also emphasis the need for personal action and educational outreach programs. *Culex tarsalis*, our primary WNV vector in the state, is more abundant today than in the past, due to current land use practices. VDCI is committed to providing top quality service via data driven management and education outreach in an effort to minimize WNV and reduce mosquito annoyance in communities where we live and work.

VDCI, as the contractor for Stapleton MCA, uses demonstrated scientific IPM methods of survey, inspection, diagnosis, biological/biochemical controls, and limited low-toxicity pesticide applications to professionally accomplish desired control results. All of the methods and materials used by VDCI have been sanctioned and registered by the Environmental Protection Agency (EPA), the CDC, the Colorado Department of Agriculture (CDA), and the American Mosquito Association (AMA).

2018 SEASON PERSPECTIVE



At VDCI 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.

According to the National Weather Service May 2018 was the 8th warmest May on record with below average precipitation. 1.86 inches of rain fell in May, which is 0.26 inches below the monthly average of 2.12. No snowfall was recorded. The average temperature for the month was 61.4 degrees, 4.3 degrees above normal. Four days reached or exceeded temperatures of 90 degrees or more, a new record for the month.

June witnessed below average rainfall and warmer than average temperatures. The month's average temperature was 72.4 degrees, 5.0 degrees above normal, with sixteen days reaching or exceeding 90 degrees, making June 2018 the 7th warmest June on record. 105 degrees was recorded on June 28th, which tied Denver metro's all time highest temperature. Precipitation for June was just 0.43 inches, 1.55 inches below the average of 1.98 inches. 0.25 inches of that total fell on June 17th.

July witnessed significant below average rainfall and slightly warmer than average temperatures. The month's average temperature was 75.3 degrees, 1.1 degrees above normal, with nineteen days reaching or exceeding 90 degrees. 99 degrees was recorded on the 3rd. Precipitation for July was just 1.03 inches, 1.13 inches below the monthly average of 2.16 inches. Most of that fell in the final seven to ten days of the month in the form of seasonal monsoonal precipitation. 0.43 inches of rain occurred on the 23rd alone.

August again witnessed below average rainfall and near normal temperatures. The month's average temperature was 72.4 degrees, 0.1 degrees below the normal of 72.5 degrees, with eleven days reaching or exceeding 90 degrees. 95 degrees was recorded on the 4th, the warmest day of the month. Precipitation for August was 0.93, 0.76 inches below the monthly average of 1.69 inches. 0.38 inches of rain fell on the 14th, the most for any single day of the month.

The 2018 season ended with a September that saw above average temperatures and below average precipitation. An average of 67.8 degrees was recorded for the month, 4.4 degrees above normal. Lows of 36 degrees was recorded on the 25th and 29th. 0.18 inches of rain fell, 0.78 inches below normal.

2018 Field Activities

Hiring of seasonal technicians began in March and continued into May. VDCI's Annual Field Technician Classroom Training Day took place on Monday May 21st with dozens of new and returning field technicians in attendance. Field training by VDCI management and veteran employees began afterwards and within a week VDCI was fully staffed and in the field. Larval operations began winding down as weekly traps counts diminished throughout August and ended altogether by mid-September.

Stapleton MCA saw a total of 403 site inspections in 2018 of which 328 or 81% were wet. Of those, 113 sites, or 34%, were subsequently treated for breeding. A total of 24.6 acres were treated in 2018.

WEST NILE VIRUS 2018

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 the rest of the nation

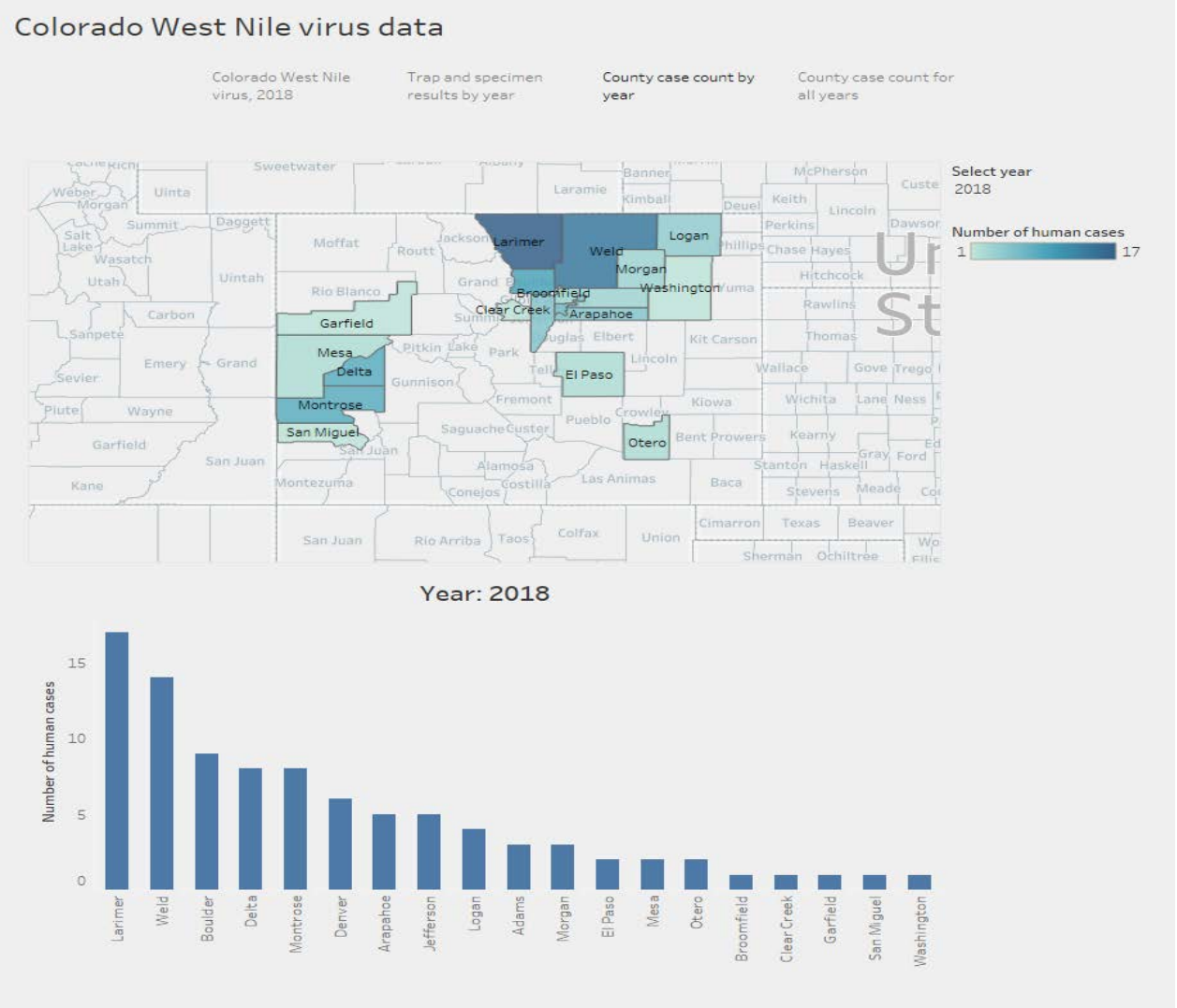
Colorado first saw activity of the virus late in the summer of 2002. In 2003 Colorado was the hardest hit state in the country compiling 2,947 human cases and 63 deaths most of which occurred along the Front Range. Totals since then have differed from year to year with no single year surpassing 2003's totals thus far.

WNV Activity 2018

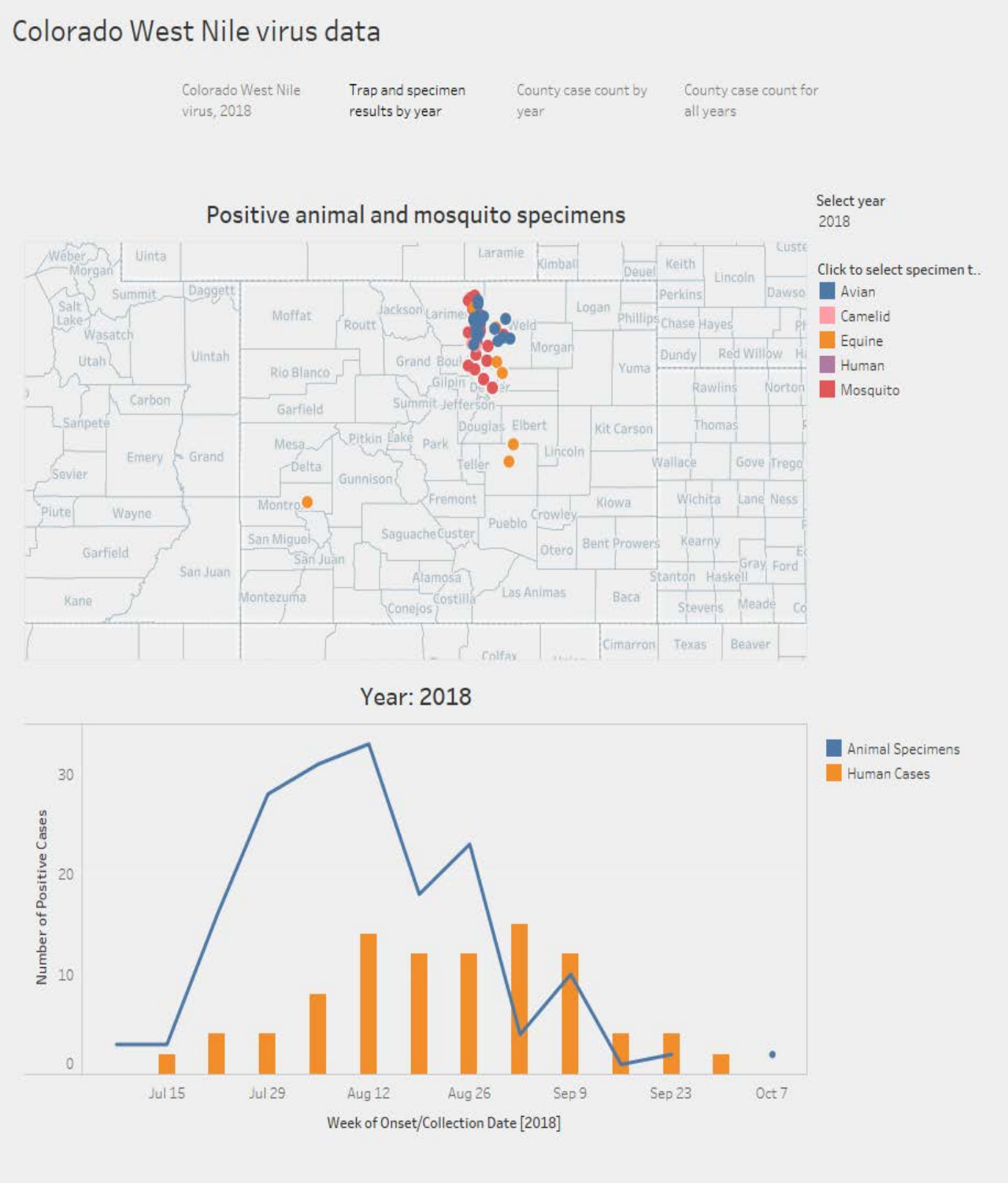
According to the latest report by the CDPHE there are 93 human WNV cases in Colorado as of this November 9th writing. At this time last year there were 66 cases. Larimer County and Weld County lead the state with seventeen and fourteen cases each respectively while Boulder County has nine. Denver County currently has six. There have been two fatalities related to WNV thus far statewide. Four were reported in 2017. By contrast Colorado had 149 human WNV cases in 2016, 101 in 2015, 118 in 2014 and 322 in 2013.

According to the CDC the U.S has approximately 2,200 human cases of this writing. 1,700 were reported this time in 2017. Nebraska has the highest number of human cases with 234 with North Dakota the second highest at 200 cases and South Dakota third at 168. 102 deaths have thus far been reported nationwide. Last year the country saw 2,149 human cases resulting in 106 deaths at this time.

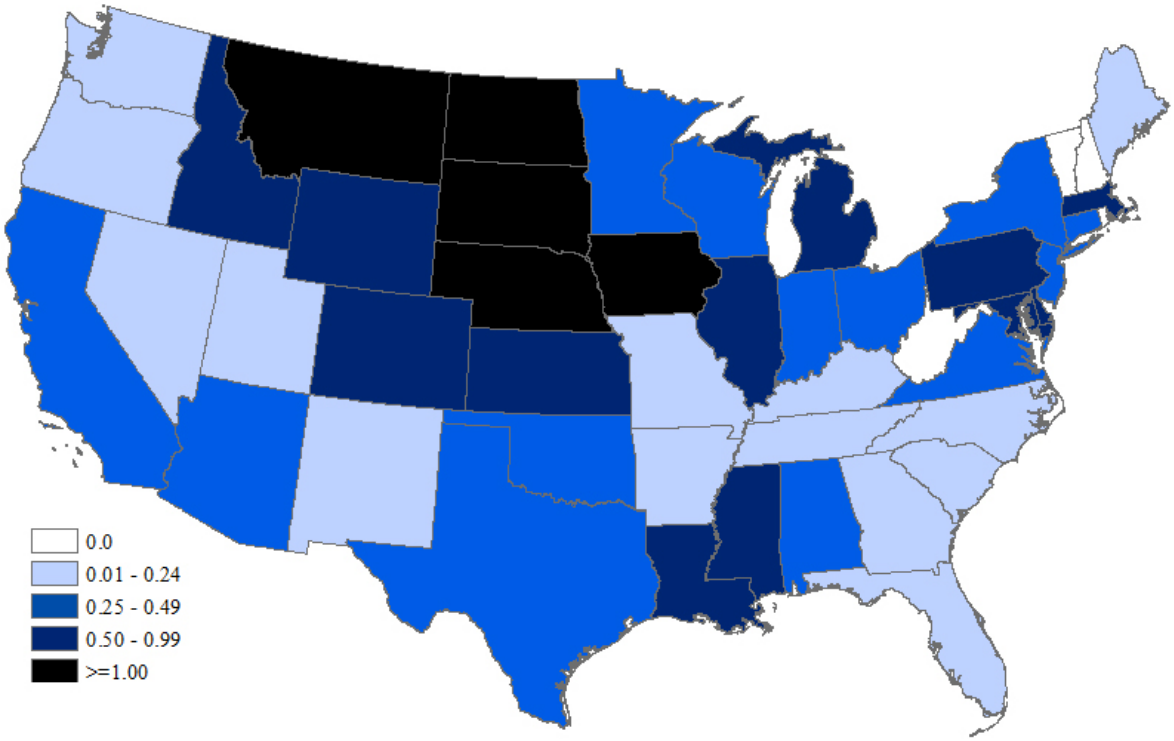
Human Cases By Colorado County As Counted By The CDPHE



Colorado West Nile Virus Specimen and Incidence Data as of 11/08/2018 CDPHE



West Nile Neuroinvasive Incidence by State as of 11/08/2018 CDC



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, 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. Over 93% of VDCI's 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.

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 VDCI 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.

VDCI's favored method of larval mosquito control is through bacterial bio-rational products. The main product used by VDCI 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.

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, 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 regulators (methoprene, in the form of the product Altosid), mineral oils (Bonide, BVA), 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 VDCI uses, serves as an effective product, but label restrictions limit its use in many areas. VDCI 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.

VDCI constantly strives to improve its operations. We utilize "CMMS" (Computerized Mosquito Management System) utilizes historical data to analyze and identify areas and sites of particular importance. Targeted inspections then allow for resources to be allocated efficiently.

VDCI SURVEILLANCE LABORATORY

Information about mosquito abundance and species identity is critical to a successful mosquito control program. VDCI employs two kinds of traps to monitor mosquito populations. The most commonly used is the CDC light trap which 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_2, 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.

In 2018, VDCI monitored a statewide network of hundreds of weekly trap sites, collecting adult mosquitoes that were then 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. 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 dozens identified from samples processed during the 2018 season from across the state.

Additionally, the VDCI Surveillance Laboratory conducts an intensive larval identification program with 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 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.

CDC Surveillance Light Trap Data Comparison

Traps in Stapleton MCA (including the trap at Greenway Park set by the City of Denver) collected a total of 16,687 mosquitoes in 2018. The percent composition of mosquitoes collected included 22.9% (3,815) *Culex* spp., 76.7% (12,807) *Aedes/Ochlerotatus* spp., and 0.4% (63) *Culiseta* spp. mosquitoes.

2018 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 were 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.

In 2018 VDCI utilized the water-based product AquaKontrol 30-30 for ULV adult mosquito control. This uses the highly effective pyrethroid Permethrin as their 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.

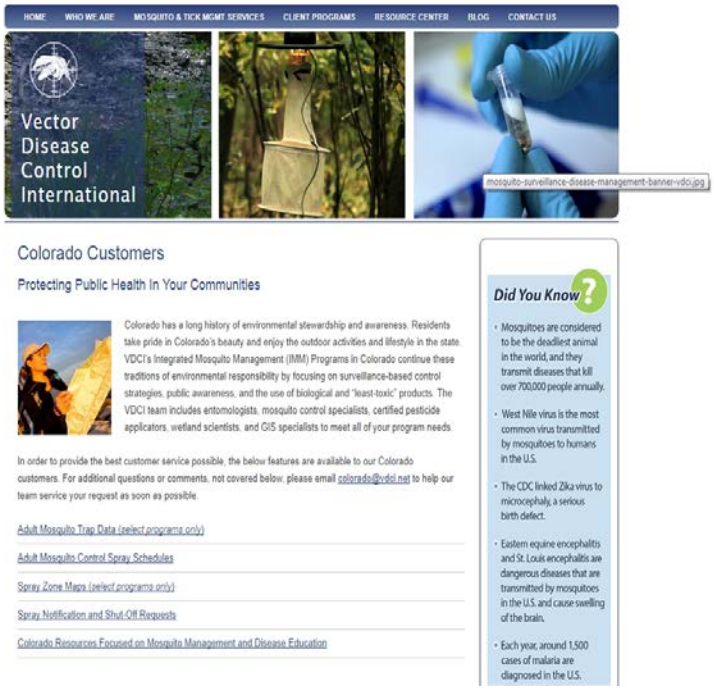
A total of 4.2 miles of adulticide applications took place in Stapleton MCA in 2018 all in the form of daytime barrier backpack applications.

TECHNOLOGY

VDCI has strived to improve the programs offered to its customers with novel and progressive advancements, continually evaluating and implementing new products and new technologies, not only with regard to 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, is the leading website in 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 toxicology information, and a wealth of topics relating to mosquitoes. Our website continues to be an integral tool for dissemination of operational data to the citizens we serve, minimizing the resources and time required by the city and its employees for answering for fielding public inquiries.



PUBLIC OUTREACH & DATA DISSEMINATION

VDCI strongly believes that strong 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 that we offer. We have clearly demonstrated this commitment by proactively incorporating numerous innovative programs, activities and services into our programs. No inquiries were reported from Stapleton MCA in 2018.

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 updated annually. Call & Shutoff forms are available online and may be submitted via the VDCI website or by mail and fax.

SUMMARY

The summer of 2018 proved to be a generally mild one with no dramatic swings in either temperatures or precipitation. Overall adult mosquito activity for each of those months corresponded with their respective weather trends with short lived, often geographically isolated spikes in adult mosquito populations following brief periods of heavy precipitation. As is often the case mosquitoes from nearby areas without mosquito control can and do affect local human populations.

Human West Nile Virus counts in 2018 have already exceeded 2017 totals in Colorado although as of this writing deaths are down 50% from last year and 2018 totals are still far below those of most years prior to 2017. It should also be noted that much of this increase comes from areas of the state with little if any mosquito control on either a county or localized basis. It is therefore extremely important for customers who already have Integrated Mosquito Management programs the likes of which VDCI strives to implement to the utmost of our capabilities to maintain these going forward into the future.

VDCI wishes to thank all Stapleton MCA staff, officials and residents for their continuing support and we look forward to providing Stapleton MCA with mosquito control services in 2019 and beyond.

Vector Disease Control International

Larvicide Data Summary

by REPORT DATE: 1/8/2018 to 11/8/2018

by ACCOUNT: SA

	Total Site Inspections	No. Wet Sites	Percentage Wet Sites	No Sites Treated	Percentage Breeding*	Total Acres Treated
Stapleton MCA	403	328	81 %	113	34 %	24.6

** (Sites Treated/Wet Sites)*

Vector Disease Control International

Visit Analysis - Summary

by REPORT DATE: 1/8/2018 to 11/8/2018

by ACCOUNT: SA

Site ID	Visits	Wet Sites		Dips w/ Larvae		Acres	Vectobac	Vectolex	Altosid	Oil
sa 0002	1	1	100.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0002	4	4	100.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0003	1	1	100.0 %	1	100.0 %	**1.0**	5.0	0.0	0.0	0.0
sa 0003	4	4	100.0 %	1	25.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0005	6	1	16.7 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0006	6	6	100.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0007	6	3	50.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0008	6	5	83.3 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0009	3	3	100.0 %	2	66.7 %	**2.0**	10.0	0.0	0.0	0.0
sa 0009	7	7	100.0 %	1	14.3 %	**0.1**	0.5	0.0	0.0	0.2
sa 0010	6	6	100.0 %	4	66.7 %	**2.0**	10.0	0.0	0.0	0.0
sa 0010	5	5	100.0 %	2	40.0 %	**0.1**	0.5	0.0	0.0	0.2
sa 0011	1	1	100.0 %	1	100.0 %	**1.0**	5.0	0.0	0.0	0.0
sa 0011	5	5	100.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0012	6	6	100.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0013	5	5	100.0 %	5	100.0 %	**0.1**	0.6	0.0	0.0	0.0
sa 0013	6	6	100.0 %	5	83.3 %	**0.1**	0.3	0.0	0.0	0.2
sa 0014	7	7	100.0 %	7	100.0 %	**0.2**	0.9	0.0	0.0	0.2
sa 0014	4	4	100.0 %	4	100.0 %	**0.4**	0.0	0.0	0.0	0.4
sa 0015	7	3	42.9 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0016	2	2	100.0 %	1	50.0 %	**1.0**	5.0	0.0	0.0	0.0
sa 0016	10	10	100.0 %	3	30.0 %	**0.6**	6.2	0.0	0.0	0.0
sa 0017	2	1	50.0 %	1	50.0 %	**0.1**	0.3	0.0	0.0	0.1
sa 0017	9	0	0.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0018	3	2	66.7 %	1	33.3 %	**0.1**	0.3	0.0	0.0	0.1
sa 0018	9	0	0.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
SA 0019	1	0	0.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0019	10	1	10.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0020	2	2	100.0 %	1	50.0 %	**1.0**	2.5	0.0	0.0	0.0
sa 0020	9	9	100.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
SA 0021	1	1	100.0 %	1	100.0 %	**0.1**	0.5	0.0	0.0	0.0
sa 0021	10	9	90.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0022	3	3	100.0 %	3	100.0 %	**0.4**	2.2	0.0	0.0	0.2
sa 0022	8	8	100.0 %	3	37.5 %	**2.0**	5.1	0.0	0.0	0.0
SA 0023	1	1	100.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0023	8	7	87.5 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0024	2	2	100.0 %	1	50.0 %	**0.5**	2.5	0.0	0.0	0.0
sa 0024	7	6	85.7 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0025	5	5	100.0 %	4	80.0 %	**0.1**	0.4	0.0	0.0	0.0
SA 0025	5	5	100.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0026	4	4	100.0 %	4	100.0 %	**1.6**	9.2	0.0	0.0	0.4

Vector Disease Control International

Visit Analysis - Summary

by REPORT DATE: 1/8/2018 to 11/8/2018

by ACCOUNT: SA

Site ID	Visits	Wet Sites		Dips w/ Larvae		Acres	Vectobac	Vectolex	Altosid	Oil
SA 0026	6	6	100.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0027	5	5	100.0 %	5	100.0 %	**0.8**	5.4	1.0	0.0	0.0
sa 0027	7	2	28.6 %	2	28.6 %	**0.0**	0.1	0.0	0.0	0.0
SA 0028	2	2	100.0 %	1	50.0 %	**0.3**	0.0	1.3	0.0	0.0
sa 0028	10	9	90.0 %	1	10.0 %	**0.1**	0.0	0.0	0.0	0.1
SA 0029	2	2	100.0 %	2	100.0 %	**1.1**	5.0	1.5	0.0	0.0
sa 0029	10	10	100.0 %	1	10.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0030	5	5	100.0 %	4	80.0 %	**0.3**	0.6	1.0	0.0	0.0
sa 0030	7	7	100.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0031	5	5	100.0 %	4	80.0 %	**1.5**	5.1	2.5	0.0	0.0
sa 0031	7	6	85.7 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0032	7	2	28.6 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0033	5	5	100.0 %	4	80.0 %	**1.0**	0.1	5.0	0.0	0.0
sa 0033	8	8	100.0 %	2	25.0 %	**1.5**	7.1	0.0	0.0	0.0
sa 0034	1	1	100.0 %	1	100.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0034	6	2	33.3 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0035	3	3	100.0 %	2	66.7 %	**0.1**	0.2	0.0	0.0	0.1
sa 0035	7	6	85.7 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0036	7	2	28.6 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0037	5	5	100.0 %	4	80.0 %	**1.3**	5.7	0.0	0.0	0.0
sa 0037	8	8	100.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0038	3	3	100.0 %	2	66.7 %	**0.5**	2.5	0.0	0.0	0.0
sa 0038	9	9	100.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
SA 0039	4	4	100.0 %	3	75.0 %	**0.1**	0.7	0.5	0.0	0.0
sa 0039	9	4	44.4 %	1	11.1 %	**0.0**	0.0	0.0	0.0	0.0
sa 0040	6	6	100.0 %	4	66.7 %	**0.1**	1.1	0.0	0.0	0.0
sa 0040	6	6	100.0 %	2	33.3 %	**0.1**	0.3	0.0	0.0	0.1
sa 0041	3	3	100.0 %	2	66.7 %	**0.5**	0.0	2.5	0.0	0.0
sa 0041	10	8	80.0 %	2	20.0 %	**0.1**	0.3	0.0	0.0	0.1
sa 0042	5	5	100.0 %	3	60.0 %	**0.1**	0.2	0.0	0.0	0.0
sa 0042	6	6	100.0 %	1	16.7 %	**0.9**	2.5	0.0	0.0	0.0
SA 0043	2	2	100.0 %	0	0.0 %	**0.0**	0.0	0.0	0.0	0.0
sa 0043	10	10	100.0 %	2	20.0 %	**0.0**	0.1	0.0	0.0	0.0
	403	**328**	**81.4 %**	**111**	**27.5 %**	**24.6**	**103.7**	**15.3**	**0.0**	**2.6**

2018 Stapleton Light Trap Composite Data

Total number of trap/nights set: 52

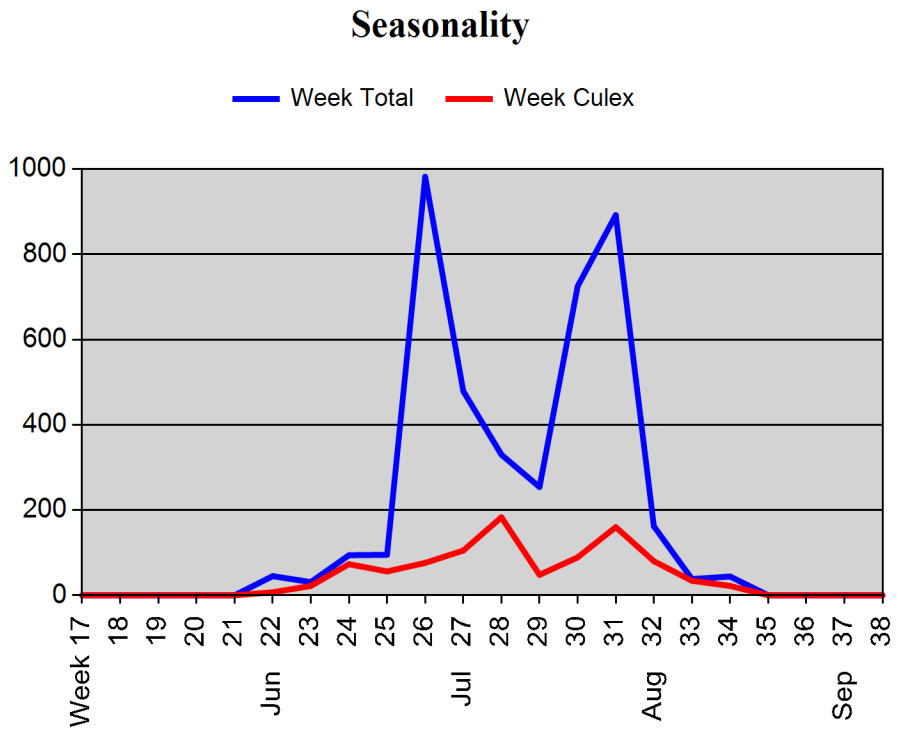
Total number of mosquitoes collected: 16,687

Average mosquitoes per trap/night: 321

Average Culex per trap/night: 73

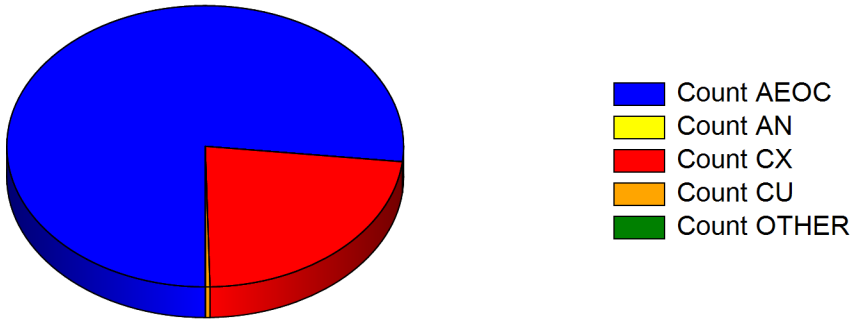
Species collected and abundance:

Aedes (Oc.) dorsalis	36	0.2 %
Aedes (Oc.) increpitus	7	0.0 %
Aedes (Oc.) melanimon	322	1.9 %
Aedes (Oc.) nigromaculis	6	0.0 %
Aedes (Oc.) trivittatus	18	0.1 %
Aedes cinereus	16	0.1 %
Aedes vexans	12402	74.3 %
Anopheles punctipennis	1	0.0 %
Coquillettidia perturbans	1	0.0 %
Culex erythrothorax	51	0.3 %
Culex pipiens	941	5.6 %
Culex salinarius	828	5.0 %
Culex tarsalis	1995	12.0 %
Culiseta inornata	63	0.4 %



Genus proportions:

Genus	Number	Percent of Total
Aedes/Ochlerotatus	12,807	76.7 %
Anopheles	1	0.0 %
Culex	3,815	22.9 %
Culiseta	63	0.4 %
Other	1	0.0 %



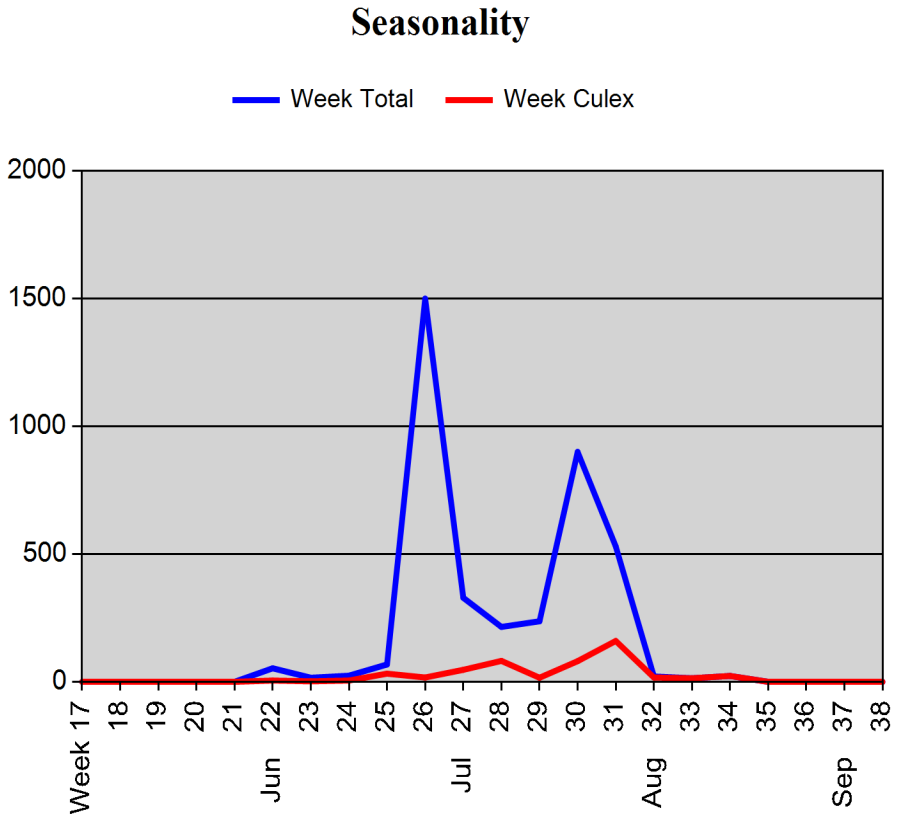
DE-03: Denver Stapleton Greenway Park

Season: 2018
Trap Type: Light/CO2
Location: WNW of 25th Drive and Central Park Blvd.
GPS: N39° 45.250', W104° 53.510'

Total number of trap/nights set:	13
Total number of mosquitoes collected:	3,930
Average mosquitoes per trap/night:	302
Average Culex per trap/night:	39

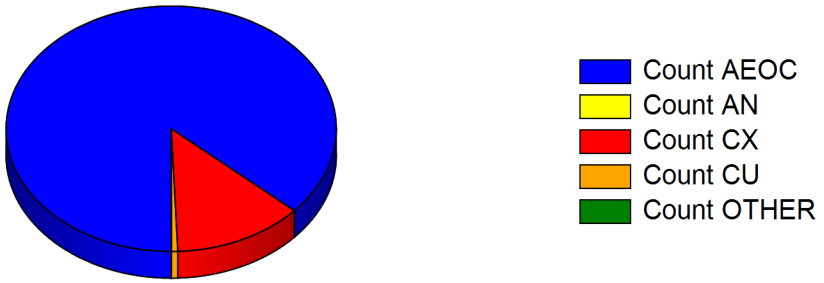
Species collected and abundance:

Aedes (Oc.) dorsalis	12	0.3 %
Aedes (Oc.) increpitus	5	0.1 %
Aedes (Oc.) melanimon	33	0.8 %
Aedes (Oc.) nigromaculis	5	0.1 %
Aedes (Oc.) trivittatus	3	0.1 %
Aedes cinereus	14	0.4 %
Aedes vexans	3332	84.8 %
Culex pipiens	227	5.8 %
Culex salinarius	80	2.0 %
Culex tarsalis	194	4.9 %
Culiseta inornata	25	0.6 %



Genus Proportions:

Genus	Number	Percent of Total
Aedes/Ochlerotatus	3,404	86.6 %
Anopheles	0	0.0 %
Culex	501	12.7 %
Culiseta	25	0.6 %
Other	0	0.0 %



SA-06: Stapleton Northfield Ponds

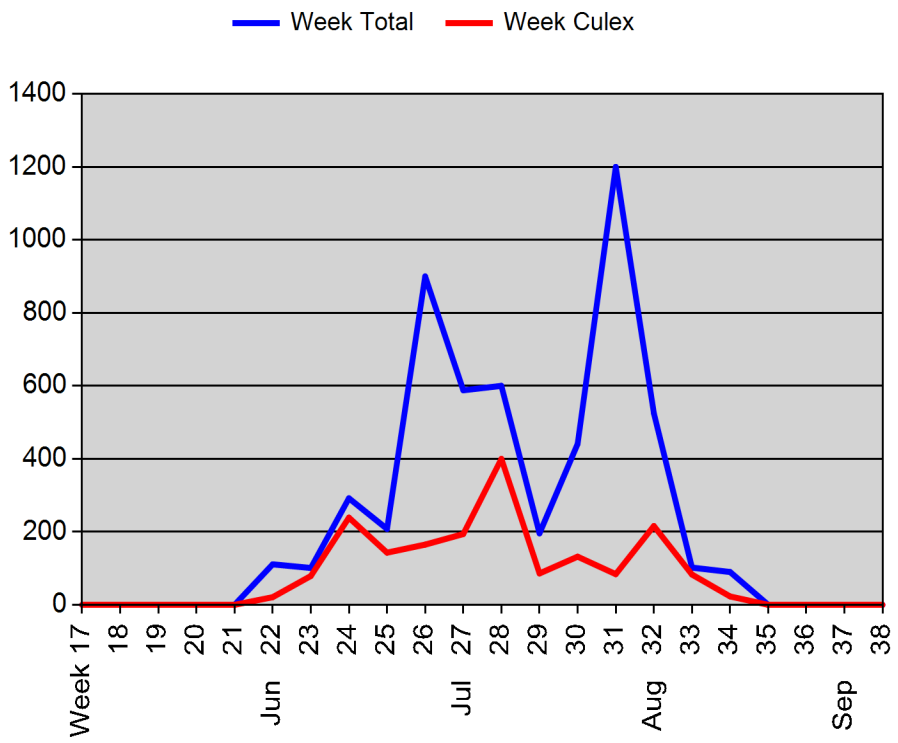
Season: 2018
Trap Type: Light/CO2
Location: ponds west of Trenton St. at 47th Ave.
GPS: N39° 46.990', W104° 53.805'

Total number of trap/nights set:	13
Total number of mosquitoes collected:	5,354
Average mosquitoes per trap/night:	412
Average Culex per trap/night:	143

Species collected and abundance:

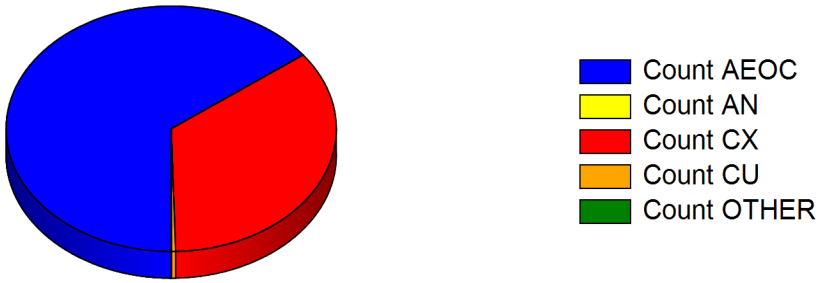
Aedes (Oc.) dorsalis	6	0.1 %
Aedes (Oc.) increpitus	1	0.0 %
Aedes (Oc.) melanimon	1	0.0 %
Aedes (Oc.) nigromaculis	1	0.0 %
Aedes (Oc.) trivittatus	10	0.2 %
Aedes vexans	3446	64.4 %
Anopheles punctipennis	1	0.0 %
Coquillettidia perturbans	1	0.0 %
Culex erythrothorax	4	0.1 %
Culex pipiens	460	8.6 %
Culex salinarius	378	7.1 %
Culex tarsalis	1023	19.1 %
Culiseta inornata	22	0.4 %

Seasonality



Genus Proportions:

Genus	Number	Percent of Total
Aedes/Ochlerotatus	3,465	64.7 %
Anopheles	1	0.0 %
Culex	1,865	34.8 %
Culiseta	22	0.4 %
Other	1	0.0 %



SA-07: Stapleton F-18 Park

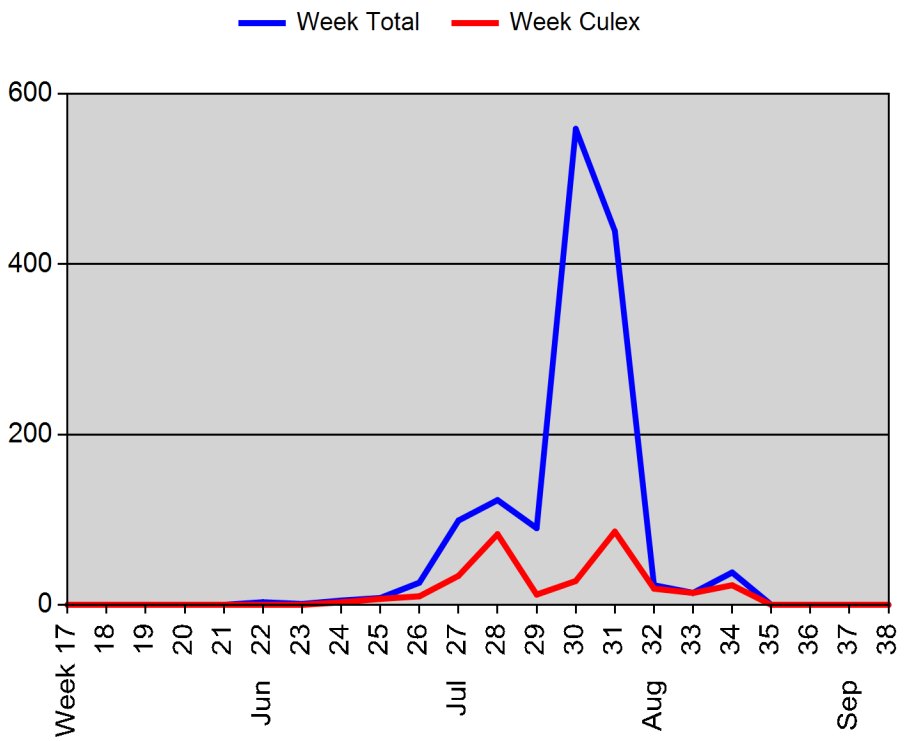
Season: 2018
Trap Type: Light/CO2
Location: north of 37th Ave. at Willow St.
GPS: N39° 46.125', W104° 53.310'

Total number of trap/nights set:	13
Total number of mosquitoes collected:	1,428
Average mosquitoes per trap/night:	110
Average Culex per trap/night:	25

Species collected and abundance:

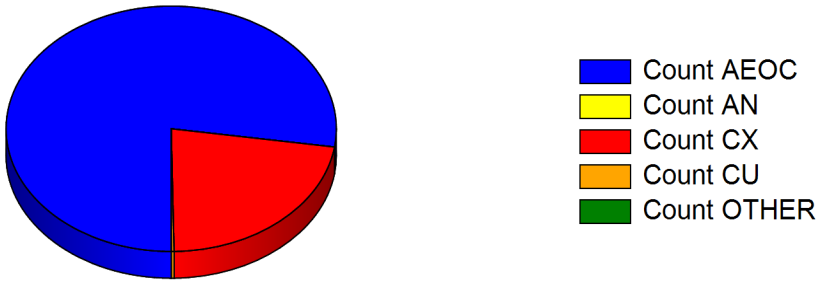
Aedes (Oc.) dorsalis	16	1.1 %
Aedes (Oc.) increpitus	1	0.1 %
Aedes (Oc.) melanimon	42	2.9 %
Aedes vexans	1046	73.2 %
Culex pipiens	130	9.1 %
Culex salinarius	7	0.5 %
Culex tarsalis	182	12.7 %
Culiseta inornata	4	0.3 %

Seasonality



Genus Proportions:

Genus	Number	Percent of Total
Aedes/Ochlerotatus	1,105	77.4 %
Anopheles	0	0.0 %
Culex	319	22.3 %
Culiseta	4	0.3 %
Other	0	0.0 %



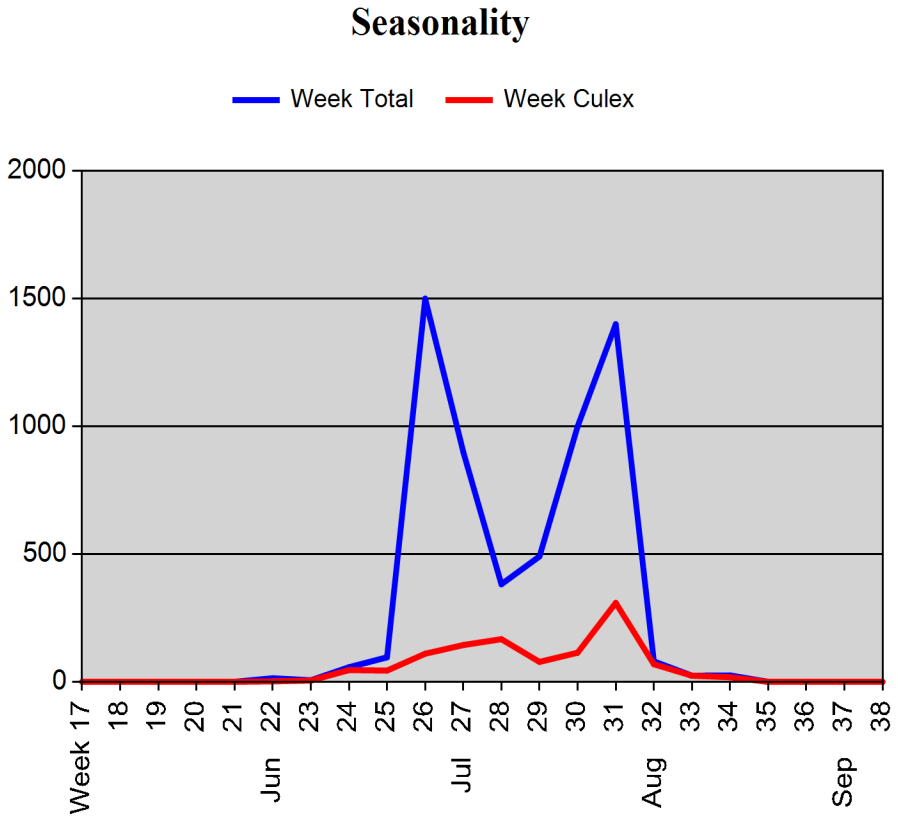
SA-08: Stapleton Westerly Creek

Season: 2018
Trap Type: Light/CO2
Location: Westerly Creek south of MLK Blvd.
GPS: N39° 45.565', W104° 52.540'

Total number of trap/nights set:	13
Total number of mosquitoes collected:	5,975
Average mosquitoes per trap/night:	460
Average Culex per trap/night:	87

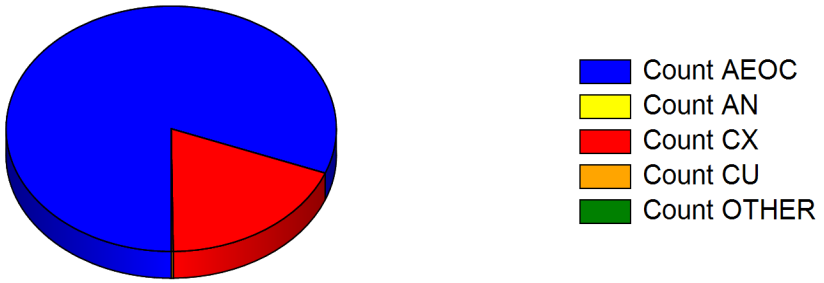
Species collected and abundance:

Aedes (Oc.) dorsalis	2	0.0 %
Aedes (Oc.) melanimon	246	4.1 %
Aedes (Oc.) trivittatus	5	0.1 %
Aedes cinereus	2	0.0 %
Aedes vexans	4578	76.6 %
Culex erythrothorax	47	0.8 %
Culex pipiens	124	2.1 %
Culex salinarius	363	6.1 %
Culex tarsalis	596	10.0 %
Culiseta inornata	12	0.2 %



Genus Proportions:

Genus	Number	Percent of Total
Aedes/Ochlerotatus	4,833	80.9 %
Anopheles	0	0.0 %
Culex	1,130	18.9 %
Culiseta	12	0.2 %
Other	0	0.0 %



Vector Disease Control International

Adulticide Data

Customer	Subdiv/Area	Material	Start Time	End Time	Miles
Stapleton MCA					
Backpack					
08/09/2018	WESTERLY CREEK	Talstar	10:45:00	11:05:00	0.5
08/09/2018	GREENWAY	Talstar	11:20:00	11:45:00	0.5
08/09/2018	F18	Talstar	12:00:00	12:15:00	0.5
08/17/2018	WESTERLY CREEK	Talstar	23:25:00	23:40:00	0.4
08/17/2018	NORTHFIELD	Talstar	12:00:00	12:25:00	0.4
08/17/2018	GREENWAY	Talstar	10:50:00	11:18:00	0.4
08/24/2018	WESTERLY CREEK	Talstar	10:50:00	11:15:00	0.5
08/24/2018	NORTHFIELD	Talstar	11:55:00	12:15:00	0.5
08/24/2018	GREENWAY	Talstar	11:20:00	11:40:00	0.5
		Backpack		**Sum**	**4.2**
				Avg	**0.5**
				Min	**0.4**
				Max	**0.5**
				Grand Total	**4.2**