City of Louisville
Integrated Mosquito Management Program
2019 Annual Report

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Integrated Mosquito Management Program

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Program Objectives

City of Louisville (Louisville) contracted Vector Disease Control International, LLC (VDCI) to operate an Integrated Mosquito Management (IMM) program in 2019. The primary objective of Louisville's IMM Program is to monitor and reduce mosquito populations through the use of environmentally sound control techniques in order to protect its residents from the threat of mosquito-borne diseases and suppress local populations of nuisance mosquitoes. VDCI prioritizes the detection and elimination of larval mosquitoes in aquatic habitats, in conjunction with the monitoring of adult mosquito populations through routine surveillance, in order to assess West Nile virus vector species abundance in the area.

Open communication is maintained by VDCI between Louisville, residents, HOAs, Property Management Companies, County and State Departments of Health & Environment, and surrounding municipalities in order to ensure that the highest level of mosquito control and epizootic response is achieved. This diligent and cooperative communication is important to the City of Louisville mosquito management program and provides significant benefit to public health throughout the entire area.

VDCI's Commitment

Vector Disease Control International is a company built on the foundations of public health, ethics, professionalism, and technical expertise. VDCI is committed to providing our customers with scientifically based, environmentally sensitive and technologically advanced Integrated Mosquito Management (IMM) programs of the highest quality. All of our employees are committed to excellence in vector control and public health and strive to improve the quality of human life in communities through public education and the control of mosquitoes and the diseases they can transmit. VDCI currently has programs across the state of Colorado, providing services for towns, cities, counties, homeowners associations, and encephalitis surveillance monitoring programs for county health departments.

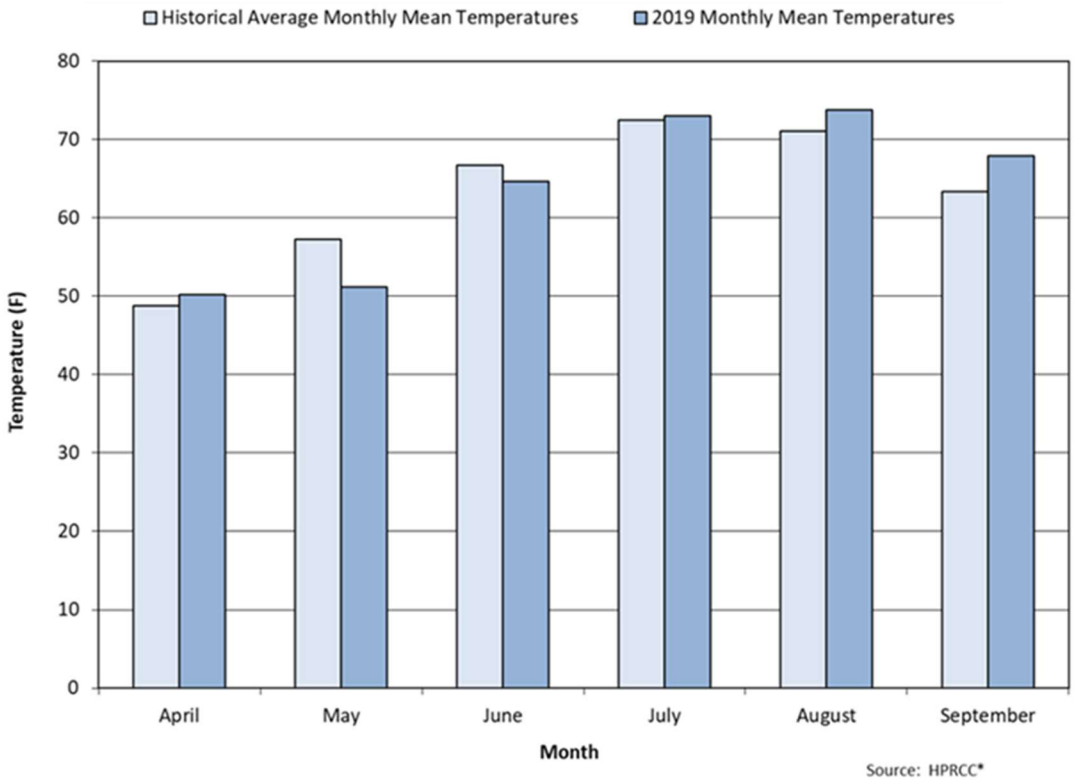
Vector Disease Control International, as the contractor for the City of Louisville, will continue to use proven scientific Integrated Mosquito Management techniques to survey and control local mosquito populations using biorational larval controls and limited low-toxicity insecticide applications. All of the methods and materials used have been reviewed and registered by the US Environmental Protection Agency, the Centers for Disease Control, the Colorado Department of Agriculture and the American Mosquito Control Association.

2019 Season Perspective and Climate Data

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. The City of Louisville is located in a semi-arid environment with elevation in the project area approximately 5,335 feet above sea level. The typical mosquito season for Louisville is from late May to September. Current and historical climate data from the National Oceanic Atmospheric Administration's (NOAA) High Plains Regional Climate Center's (HPRCC) Boulder, Colorado weather station was used to monitor regional temperature and precipitation patterns throughout the season.

In 2019, every month of the mosquito season, except May and June, had temperatures at or above normal **(Figure 1)**. The months of April, August and September experienced the highest deviation from average, +1.4, +2.7 and +4.6 degrees respectively. July had a mean monthly temperature that was near normal at only +0.5 degrees higher than average, while May and June were far below average at -6.1 and -2.1 degrees respectively. Overall, the 2019 season was approximately 0.3% warmer than the previous year.

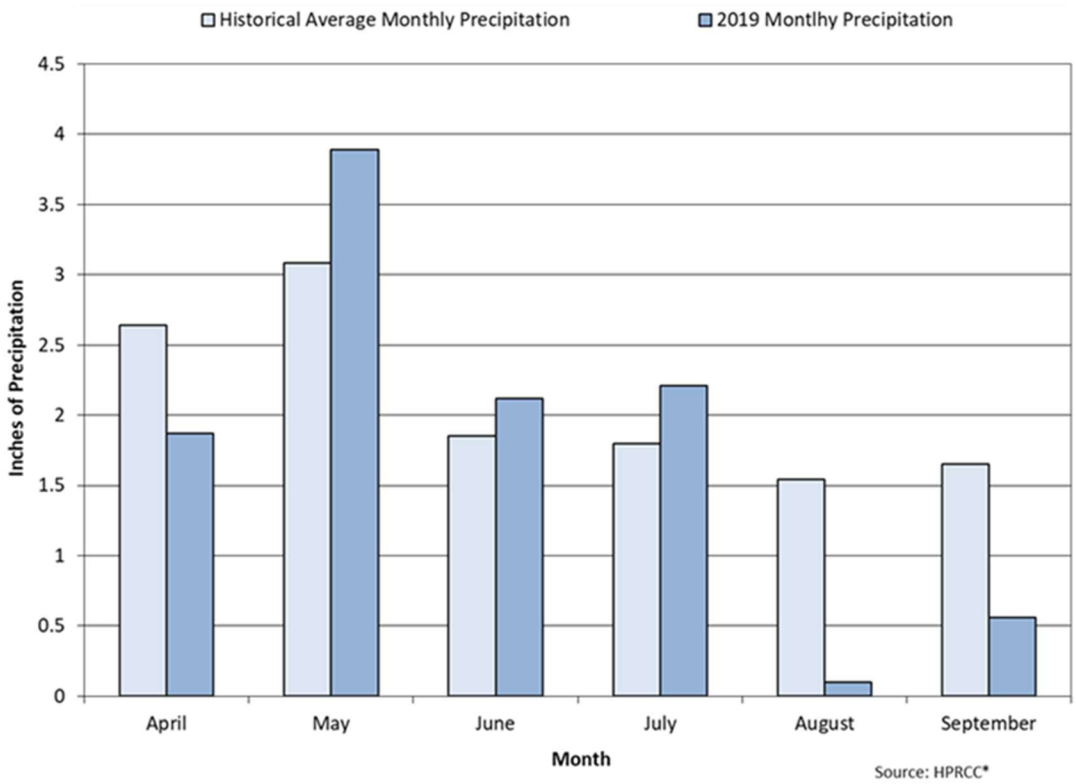
Figure 1 2019 Monthly Mean Air Temperature and Historical Averages



The historical averages for monthly mean precipitation indicate that April, May and June are usually the wettest months of the year. For the second year in a row, the most significant variation during the mosquito season was the month of May, which received 26.3 percent more precipitation (3.89") than the average amount (3.08"), making it the wettest month of 2019. During 2019, the accumulated precipitation from April through September was lower than the historical average for the same period with a total of 10.75 inches **(Figure 2)**. This is approximately 14.4 percent less precipitation than the

historical average of 12.56 inches. By contrast, and for the second year in a row, August received approximately 6.5 percent of its normal precipitation, making it the driest month of the mosquito season in 2019.

Figure 2 2019 Monthly Total Precipitation Data and Historical Averages*



The higher precipitation in the first half of the season and above normal temperatures likely influenced the higher than average nuisance mosquito populations during 2019 mosquito season. While a wetter July coupled with a warmer and drier August, presumably caused the elevated abundance of *Culex* species mosquitoes experienced throughout the later months of the mosquito season. An unusually longer wet and cold spring could have also contributed to lower than average levels of West Nile virus to be detected about three (3) weeks later than normal throughout the area.

West Nile Virus Season

Since the introduction of West Nile virus to the United States 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 spread through the South, the Midwest, the Rocky Mountain region and to the Western States. This extensive distribution is due to the ability of WNv to establish and persist in the wide variety of ecosystems present across the country. WNv has been detected in 65 different mosquito species in the U.S., though it appears that only a few *Culex* species drive epizootic and epidemic transmission (WNv Guidelines CDC 2013). Although West Nile virus has been endemic to the United States since 1999, researchers continue to seek an understanding for some of the factors which contribute to region specific spikes in vector abundance and human risk. We still do not understand why some humans develop West Nile fever while other infections develop into more serious West Nile encephalitis or West Nile meningitis cases. Additionally, physicians and researchers continue to seek answers to the variable

recovery times and occurrence of deaths that result with some infections. WNV has expanded to the point that it can now be found in all 48 contiguous states and has produced two additional, large nationwide epidemics in 2003 and 2012 (WNv Guidelines CDC 2013).

As of October 22nd, 2019, a total of 46 states and the District of Columbia have reported West Nile virus infections in people, birds, or mosquitoes in 2019 **(Figure 3)**. Overall, 777 cases of West Nile virus disease in humans have been reported to CDC. This is approximately half the number of cases reported in 2018 at this time last year. Of these, 504 (65%) were classified as neuroinvasive disease (such as meningitis or encephalitis) and 273 (35%) were classified as non-neuroinvasive disease **(Figure 4)** and a total of 39 deaths have resulted from these infections.

Figure 3 West Nile Virus Activity by State – United States, 2019 (as of October 22nd, 2019)*
*CDC image https://www.cdc.gov/westnile/statsmaps/preliminarymapsdata2019/activitybystate2019.html

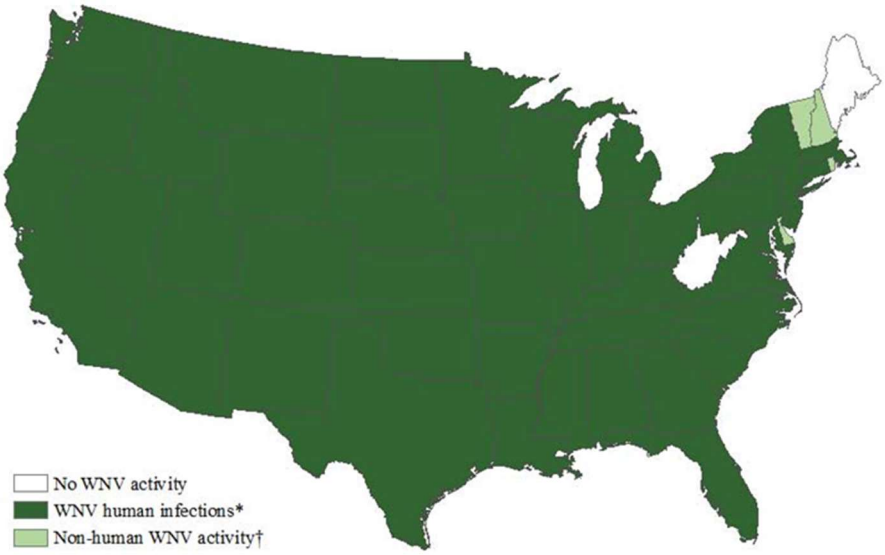
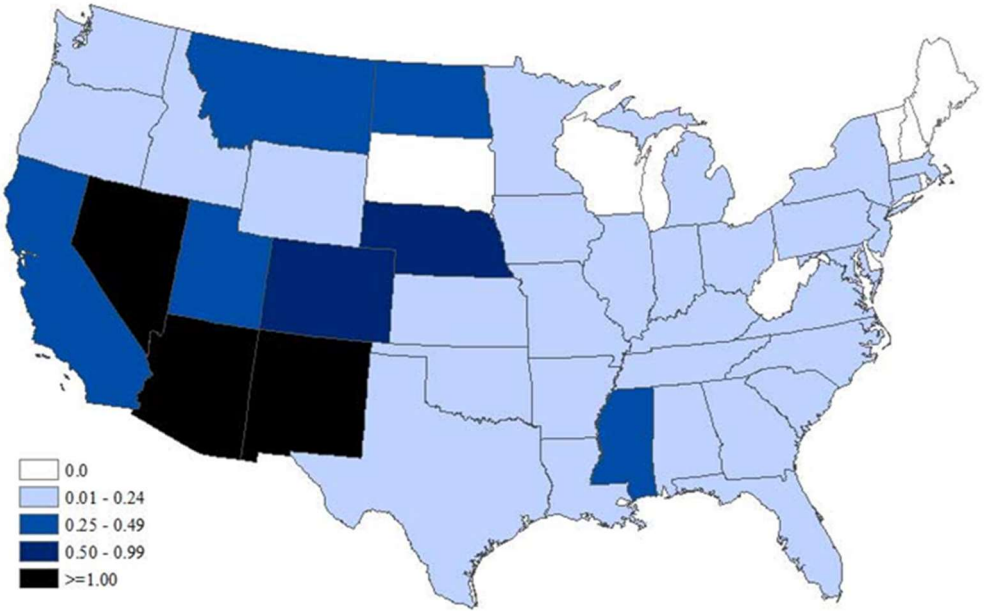


Figure 4 West Nile Virus Neuroinvasive Disease Incidence by State – United States, 2019 (as of October 22nd, 2019)* *CDC image https://www.cdc.gov/westnile/statsmaps/preliminarymapsdata2019/incidencestate-2019.html



Colorado 2019

As of October 23rd, 2019, the Colorado Department of Health and Environment (CDPHE) has identified 113 cases of human West Nile virus (WNv) infections in Colorado **(Figure 5)**. The CDC reports only 104 cases as of October 22nd, 2019 with 11 (10%) asymptomatic blood donor, 44 (38%) neuroinvasive cases including symptoms of meningitis or encephalitis (including meningoencephalitis), and 60 (52%) non-neuroinvasive which includes cases where individuals are non-symptomatic or present with fever and other minor symptoms **(Figure 6)**. There have been 6 deaths **(Figure 6)** associated with West Nile virus infections from an undisclosed location in Colorado during the 2019 season. The discrepancy between CDPHE data and CDC data is likely due to lag time in the communication between these entities.

Figure 5 Weekly WNV Human Case Count2019 (2014-2018 Average)*

*CDPHE image https://www.colorado.gov/pacific/cdphe/west-nile-virus-data

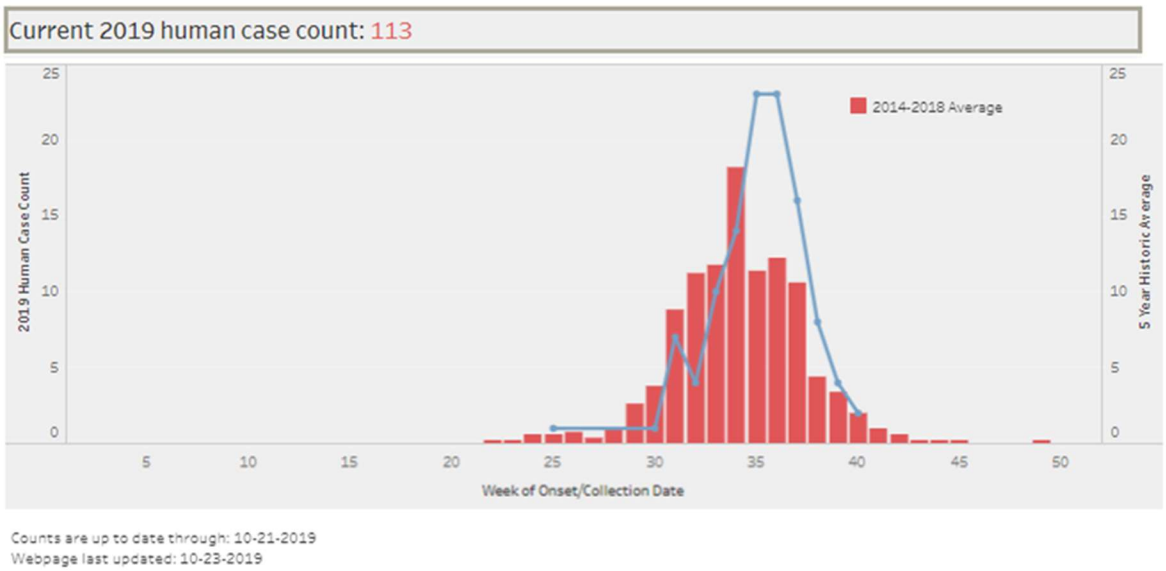


Figure 6 West Nile Virus Disease Cases and Presumptive Viremic Blood Donors by State – United States, 2019 (as of October 22nd, 2019)*

State	Neuroinvasive Disease Cases†	Non-neuroinvasive Disease Cases	Total cases	Deaths	Presumptive viremic blood donors‡
Colorado	44	60	104	6	11

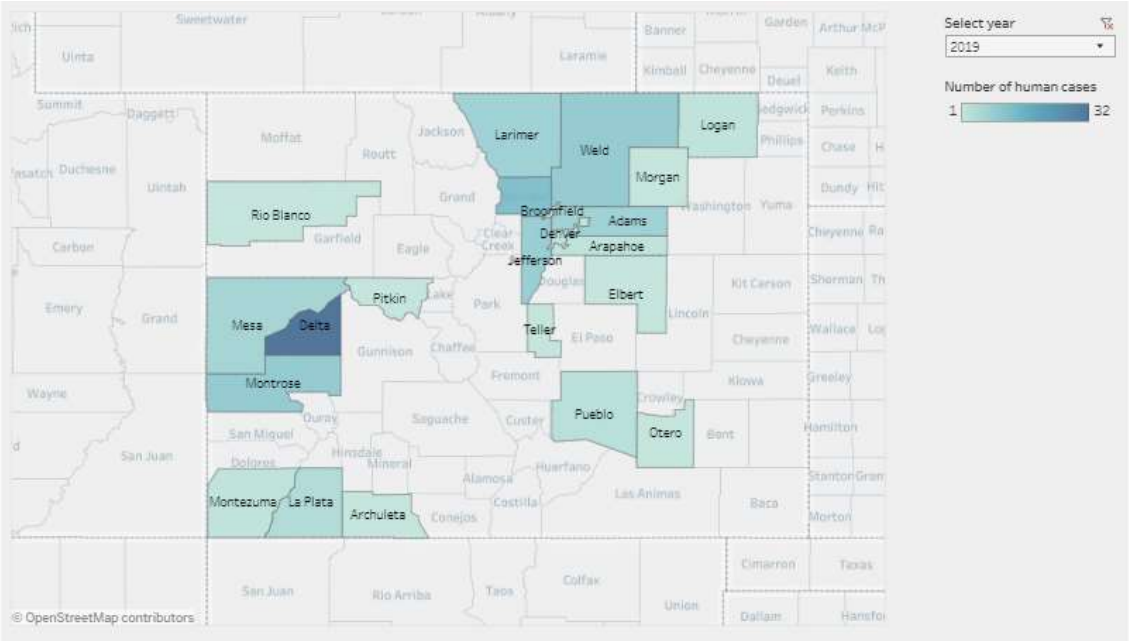
*CDC image https://www.cdc.gov/westnile/statsmaps/preliminarymapsdata2019/disease-cases-state-2019.html

Boulder County 2019

CDPHE data currently shows Delta County with the most West Nile virus human cases (32) while Boulder County ranks 2nd with 12 human cases followed by Weld County with 9 human cases **(Figure 7)**.

Figure 7 Colorado WNV Human Cases by County, 2019*

*CDPHE image https://www.colorado.gov/pacific/cdphe/west-nile-virus-data



Adult mosquito surveillance data, submitted mosquito pools, and the resulting WNV infection rates were used by Boulder County Public Health (BCPH) throughout the season to calculate Vector Index (VI) levels in order to help Louisville officials determine local areas of concern for public awareness and safety. The VI is a tool used by health officials that takes into account the presence and density of *Culex* mosquitoes and their WNV infection rates, resulting in an early indicator for the risk of human WNV infection. Once the VI reaches levels above 0.75, state and local health departments typically recommend communities take additional action to control both larval and adult mosquitoes, increase public awareness, and encourage personal protection measures.

The actual 2019 weekly Vector Index rates, as calculated by BCPH, for sentinel zones 1, 2 and 3 are illustrated below **(Table 1)**. Due to below average WNV activity in 2019, no emergency spraying was conducted in Louisville during the 2019 mosquito season.

Table 1 Vector Index, Boulder County Sentinel Zones 1 - 3, 2019

Boulder County Vector Index 2019[1]			
	Sentinel Zone 1[2]	Sentinel Zone 2[3]	Sentinel Zone 3[4]
Season Week	Vector Index	Vector Index	Vector Index
Week 23 (June 2-8)	----	----	----
Week 24 (June 9-15)	0.00	0.00	0.00
Week 25 (June 16-22)	0.00	0.00	0.00
Week 26 (June 23-29)	0.00	0.00	0.00
Week 27 (June 30-July 6)	0.00	0.00	0.00
Week 28 (July 7-13)	0.00	0.00	0.00
Week 29 (July 14-20)	0.00	0.00	0.00
Week 30 (July 21-27)	0.00	0.00	0.00
Week 31 (July 28 -Aug 3)	0.00	0.00	0.00
Week 32 (August 4-10)	0.00	0.32	0.00
Week 33 (August 11-17)	0.23	0.71	0.00
Week 34 (August 18-24)	0.24	0.00	0.27
Week 35 (August 25-31)	0.00	0.30	0.20
Week 36 (September 1-7)	----	----	----
1. Reported by BCPH as of September 9, 2019			
2. City of Boulder; 3. Longmont; 4. Erie, Lafayette, Louisville, Superior			

Larval Mosquito Control

Larval mosquito control is the foundation of the City of Louisville's Mosquito Control program and can be an extremely effective way to manage mosquitoes, thereby reducing the number of potential disease vectors and annoyances associated with biting adults. Years of research and practical experience have shown that the most effective way to control mosquito populations is through an aggressive Integrated Mosquito Management (IMM) approach. This approach aims at using a variety of concepts, tools, and products to reduce mosquito populations to a tolerable level.

Pre-season larval control work involved ground truthing GIS maps, remapping areas where new development and altered landscapes occurred. VDCI began larval site inspections in many areas in May. Hiring of seasonal field technicians began in March and continued into May. VDCI's Annual Field Technician Classroom Training Day took place on May 20th with over 60 new and returning field technicians in attendance. Field training by VDCI management and veteran employees lasted through May and full time field activities were in force by early June.

In 2019 Vector Disease Control International performed 276 larval site inspections at 80 documented breeding sites throughout the City. Of these individual inspections, 201 sites (72.8%) were wet upon inspection and 69 (33.8%) were producing mosquito larvae in the City of Louisville. These inspections resulted in 68 applications in which VDCI applied 46.8 lbs. of VectoBac G *(Bti)*, 16.0 lbs. of Vectolex FG *(Bs)* and 0.6 gallons of BVA 2 larvicide oil **(Table 2; Figures 8 and 9)** to 9.4 acres of land within the City of Louisville.

By comparison, in 2018 VDCI performed 357 larval site inspections at 80 documented breeding sites throughout the City. Of these individual inspections, 241 sites (67.5%) were wet upon inspection and 88 (36.5%) were producing mosquito larvae in the City of Louisville. These inspections resulted in 86 applications in which VDCI applied 46.8 lbs. of VectoBac G *(Bti)* and 0.5 gallons of BVA 2 larvicide oil **(Table 2 and Figure 9)** to 8.1 acres of land within the City of Louisville.

Larval mosquito control can be achieved in several ways including biological, biochemical, chemical, and mechanical means. No single larvicide product will work effectively in every habitat where mosquito larvae are found, so a variety of products and methods should be employed. Additionally, although there are a variety of methods for reducing larval populations, some may have negative consequences that outweigh their benefits. Mechanical or physical habitat modification is a technique which VDCI uses on relatively small scale projects, as the area to be modified must be carefully reviewed.

VDCI's favored method of larval mosquito control is through the use of 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 in accordance with its label, successful control of mosquito larvae can be achieved without impact to non-target species such as other aquatic

invertebrates, birds, mammals, fish, amphibians, reptiles, or humans. The 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)*. *Bs* provides similar benefits to *Bti* while also providing residual control of certain species of mosquitoes. It is used specifically in difficult to treat areas where *Culex* larvae are the predominant species due to its limitations and high cost.

Other larval control products include the insect growth regulator methoprene (Altosid), and light mineral oils (BVA 2 larvicide oil). Methoprene is a synthetic version of a juvenile growth hormone in larval mosquitoes. The hormone prevents the normal development of larval mosquitoes into pupae and adults, eventually causing death. VDCI limits the use of chemical larvicides to areas with little biodiversity, such as road side ditches, or areas that chronically produce high mosquito populations. They are only used after a thorough assessment has been made of any habitat where their use is being considered. Mineral oil is the only product effective in controlling mosquito pupae and therefore is an essential tool when pupae are present.

Table 2 2019 Summary of Larval Control Product Applications by Type

Larval Control Product Types	2017	2018	2019
Bacillus thuringiensis israelensis (Bti)			
Vectobac G (lbs) EPA Reg. #73049-10	17.9	46.8	58.3
Bacillus sphaericus (Bs)			
Vectolex FG (lbs) EPA Reg. #73049-20	1.7	0.0	16.0
S-Methoprene			
Altosid Briquet (oz) EPA Reg. #2724-375	0.0	0.0	0.0
Altosid XRG (oz) EPA Reg. #2724-451	0.0	0.0	0.0
Mineral Oil			
BVA 2 Larvicide Oil (gal) EPA Reg. #70589-1	1.8	0.5	0.6

Figure 8 2019 Larval Site Inspections and Applications by Month

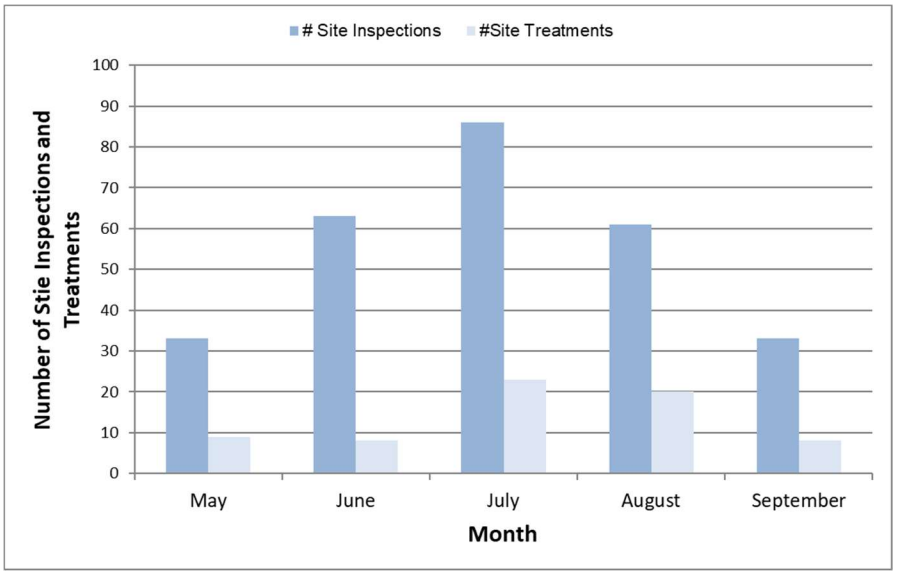
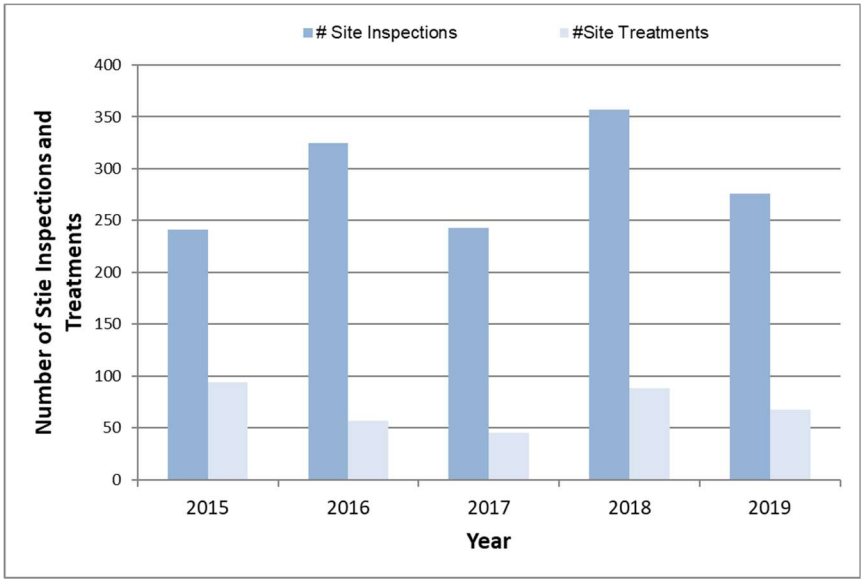


Figure 9 Comparison of Larval Site Inspections and Applications by Year



VDCI Adult Mosquito Surveillance and Laboratory

Information about mosquito abundance and species diversity is essential to any IMM program. Vector Disease Control International's most commonly used adult mosquito surveillance tool 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. Traps are set overnight at carefully selected sites with abundant harborage. They are collected the following morning and returned to VDCI's laboratory, where the contents of the trap nets are counted and speciated by trained technicians.

In 2019, Vector Disease Control International monitored a statewide network of hundreds of weekly trap sites, collecting 873,309 adult mosquitoes that were counted and identified to species by the VDCI Surveillance Laboratories. While individual traps provide current seasonal information, trap data can be interpreted in the context of historical records for the same trap site if such data is available. 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 Laboratories at Vector Disease Control International are trained to provide accurate species-level identification of both larval and adult mosquitoes.

Additionally, the VDCI Surveillance Laboratory conducts an intensive larval identification program with larval mosquito samples collected by field technicians. 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 the effect of larval control efforts. Each mosquito species prefers specific types 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. This helps to illustrate the threat of mosquito-borne disease amplification and transmission because different mosquito species can vector different diseases to people and animals.

- Determining where adult control efforts were necessary. While mosquito eradication is impossible, significant population reduction is achievable. In places where larval control is insufficient, such as neighborhoods where adult mosquitoes have migrated in from outside of the control area, it may be necessary to use adulticide methods, such as ULV truck fogging or barrier sprays of harborage areas. Trap counts that exceed an acceptable threshold for an area may 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.

CITY OF LOUISVILLE ADULT SURVEILLANCE LIGHT TRAP DATA

In 2019, an average of three (3) surveillance light traps monitored adult mosquito populations within the City of Louisville on a weekly basis. Early season surveillance began at select sites (1 trap) for only one week, May 17th, due to unseasonably cold nights. VDCI was able to begin full surveillance trapping (3 traps) began the week of June 3rd and concluded on August 29th per the City of Louisville's contract and corresponding low adult mosquito activity.

There were 41 CDC light surveillance trap nights set within City of Louisville during the 2019 season. These traps collected a total of 3,634 mosquitoes. There was an average of 88.6 mosquitoes caught per trap per night and an average 44.1 *Culex spp.* mosquitoes per trap per night. The composition of mosquitoes collected was 47.6% (1,731) *Aedes/Ochlerotatus spp*., 0.1% (3) *Anopheles spp*., 0.1% (2) *Coquillettidia spp*., 49.8% (1,809) *Culex spp*., and 2.4% (89) *Culiseta spp*., **(Figure 10)**. Please refer to **Appendix A** for Louisville's Individual Light Trap Summaries.

A total of 13 species were represented in 2019 in Louisville. No exotic/introduced species (such as Asian Tiger Mosquitoes) were collected this season.

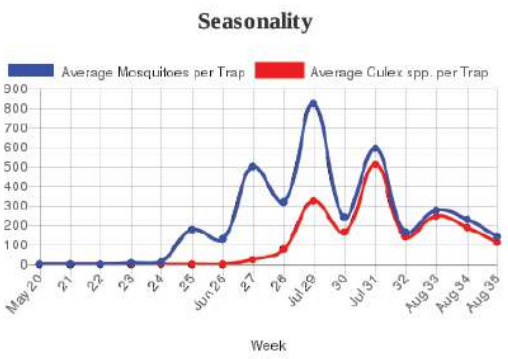
By comparison, in 2018 there were 42 CDC light surveillance trap nights set within the City. These traps collected a total of 2,750 mosquitoes. There was an average of 65 mosquitoes caught per trap per night and an average 29 *Culex spp.* mosquitoes per trap per night. The composition of mosquitoes collected was 51.1% (1,488) *Aedes/Ochlerotatus spp*., <1% (13) *Anopheles spp*., <1% (2) *Coquillettidia spp*., 43.7% (1,201) *Culex spp*., and 1.7% (46) *Culiseta spp*.

Figure 10 2019 City of Louisville Light Trap Composite Data

Total number of trap/nights set:	41
Total number of mosquitoes collected:	3,634.0
Average mosquitoes per trap/night:	88.6
Average Culex per trap/night:	44.1

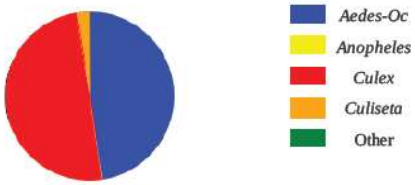
Species collected and abundance:

Aedes dorsalis	11.0	0.3%
Aedes increpitus	67.0	1.8%
Aedes melanimon	763.0	21.0%
Aedes nigromaculis	2.0	0.1%
Aedes trivittatus	131.0	3.6%
Aedes vexans	757.0	20.8%
Anopheles freeborni	3.0	0.1%
Coquillettidia perturbans	2.0	0.1%
Culex pipiens	172.0	4.7%
Culex salinarius	37.0	1.0%
Culex tarsalis	1,600.0	44.0%
Culiseta incidens	1.0	0.0%
Culiseta inornata	88.0	2.4%



Genus Proportions:

Genus	Number	Percent of Total
Aedes/Ochlerotatus	1,731	47.6%
Anopheles	3	0.1%
Culex	1,809	49.8%
Culiseta	89	2.4%
Other	2	0.1%



WEST NILE VIRUS MOSQUITO SAMPLE TESTING RESULTS - BOULDER COUNTY

VDCI and Louisville used the adult mosquito data collected to help determine local areas of concern for public awareness and safety as well as to monitor the local vector mosquito populations. Many local health departments have moved towards mosquito-based surveillance indicators to assess the weekly risk of West Nile transmission and guide response decisions for adult mosquito control applications. The vector index and infection rate is derived by testing the mosquitoes VDCI collects for the presence of West Nile virus. This value is closely monitored by the CDPHE and local health departments to evaluate the risk posed by the vector mosquito population.

As defined in the CDC guidelines for West Nile virus surveillance, prevention and control, the vector index (VI) is an estimate of the number of West Nile virus infected mosquitoes in an area. This number can

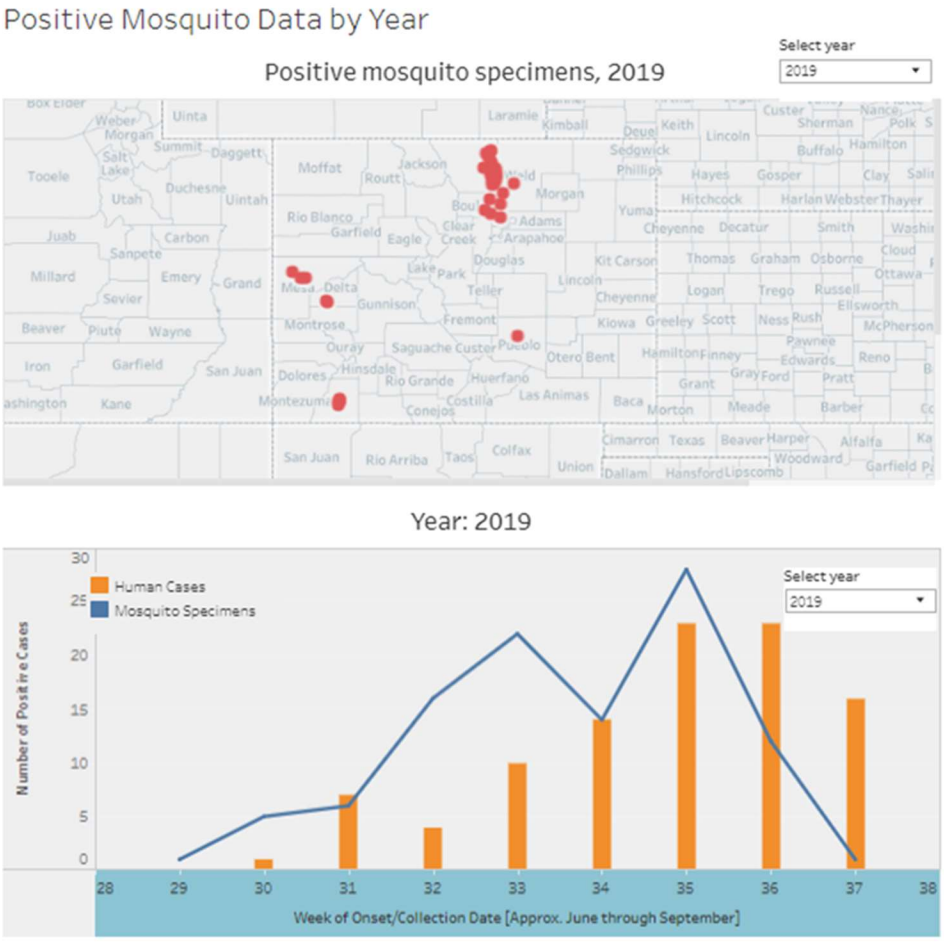
serve as a human health risk value. An operational value of 0.75, which was derived from the comparison of historical data for human infections, as well as relative abundance and infection in mosquitoes, serves as an indicator of high risk for West Nile virus transmission to humans in the corresponding area. As the value of the vector index increases there is a corresponding risk of human disease and this value can be used to offset epidemics.

Due to budget cutbacks associated with West Nile virus surveillance in recent years, the CDPHE does not have the ability to test mosquitoes from every trap set across the state. As a result, there is select testing done within three sentinel zones in Boulder County. *Culex species* mosquito samples are sent to CDPHE for WNV testing on a weekly basis as part of the state's Sentinel Encephalitis Surveillance program **(Figure 11)**, which VDCI is contracted separately through BCPH to perform.

As of September 14th, 2019 (week 37), CDPHE tested a total of 206 mosquito pools from Boulder County. Of the tested mosquito pools, eight (8) pools tested positive for West Nile virus from all three sentinel zones in 2019 **(Appendix B)**. The first Boulder County West Nile virus positive mosquito sample pool (1) in 2019 was on August 7th, 2019 (week 32), two weeks later than 2018, in BCZ2 **(Figure 12)**.

Figure 11 **Number of Colorado Positive WNV Specimens 2019***

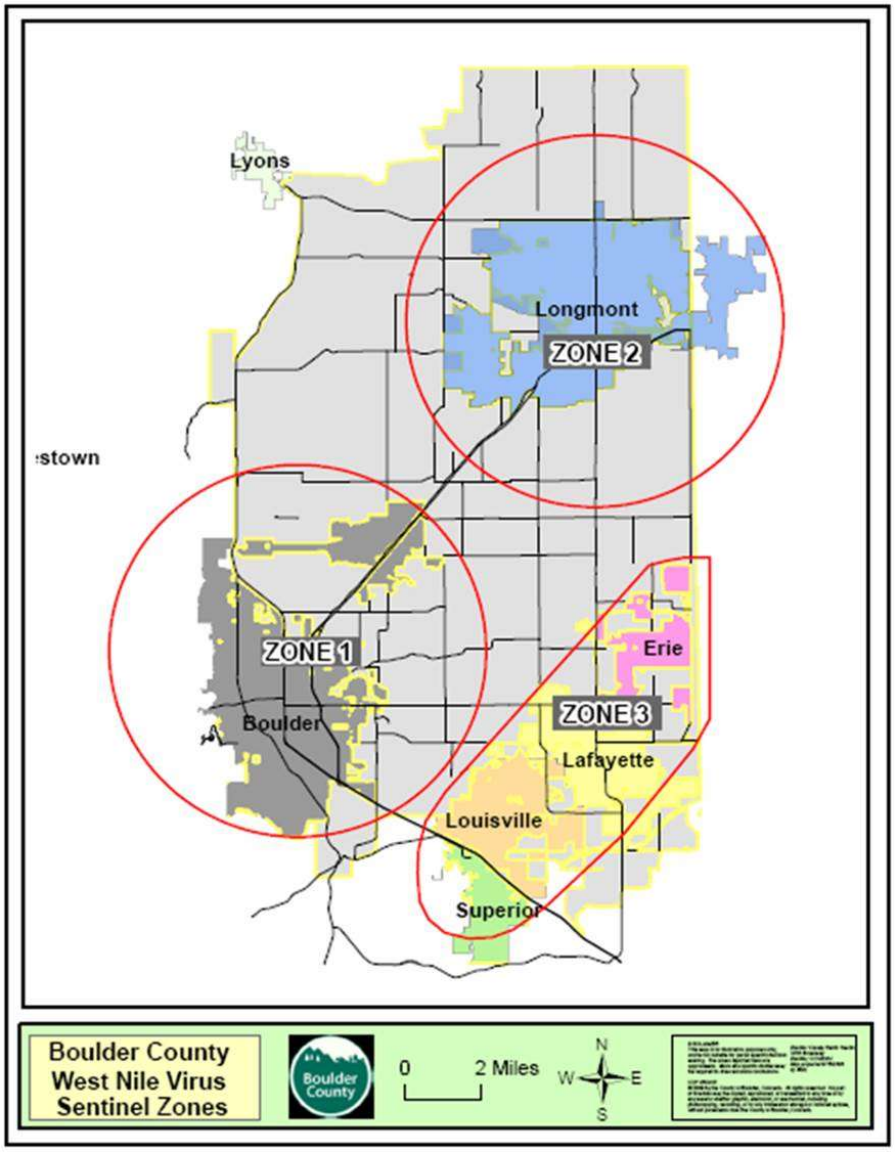
*CDPHE image https://www.colorado.gov/pacific/cdphe/west-nile-virus-data



BOULDER COUNTY PUBLIC HEALTH ADULT MOSQUITO SENTINEL ZONES

The Sentinel Encephalitis Surveillance Program was funded by the Colorado Department of Public Health and Environment and Boulder County Public Health in 2019. VDCI maintained the sentinel system with five surveillance traps at permanent locations in each of three Boulder County Sentinel Zones: City of Boulder (BCZ1); City of Longmont (BCZ2); Town of Erie, City of Lafayette, City of Louisville, Town of Superior (BCZ3) **(Figure 12**). The sentinel light traps were set once a week from June 3rd to August 26th.

Figure 12 Boulder County Public Health Sentinel Surveillance Zone Map



ADULT MOSQUITO CONTROL

The goal of Vector Disease Control International is to provide our customers with the best options for safe, effective, modern mosquito management. The primary emphasis of Louisville's Integrated Mosquito Management Program is to control mosquitoes in the larval stage, using safe biological control products. When mosquito counts surpass nuisance thresholds of 100 mosquitoes, VDCI uses EPA and CDC approved adulticides to reduce mosquito populations.

During the 2019 season a total of 140 gallons of Talstar Pro (Active Ingredient – Bifenthrin) were applied as daytime adult barrier applications **(Figures 13 and 14)**. A detailed summary of adulticide applications, by neighborhood, can be found in **Appendix C**.

In 2018, a total of 54 gallons of Talstar Pro (Active Ingredient – Bifenthrin) **(Figure 15)** were applied as daytime adult barrier applications in the City of Lafayette.

VDCI uses state of the art technology, calibrated application timing, and least-toxic products to minimize non-target impacts. Adult mosquito control applications are accomplished using Ultra Low Volume (ULV) spray equipment and performed after dusk when the majority of mosquito species are most active. This type of equipment produces droplets averaging 10-25 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 the greatest numbers and non-target insect activity (for example, day-flying pollinators like bees) is greatly reduced. Using this application technique, the overall goal of minimal environmental impact and effective adult control is achieved in the targeted area.

Figure 13 2019 Barrier Adulticide Gallons by Month

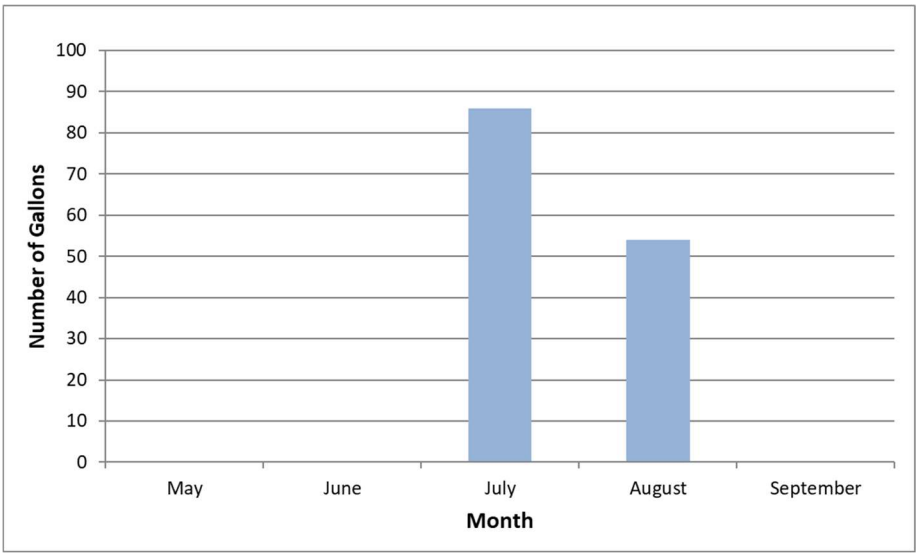
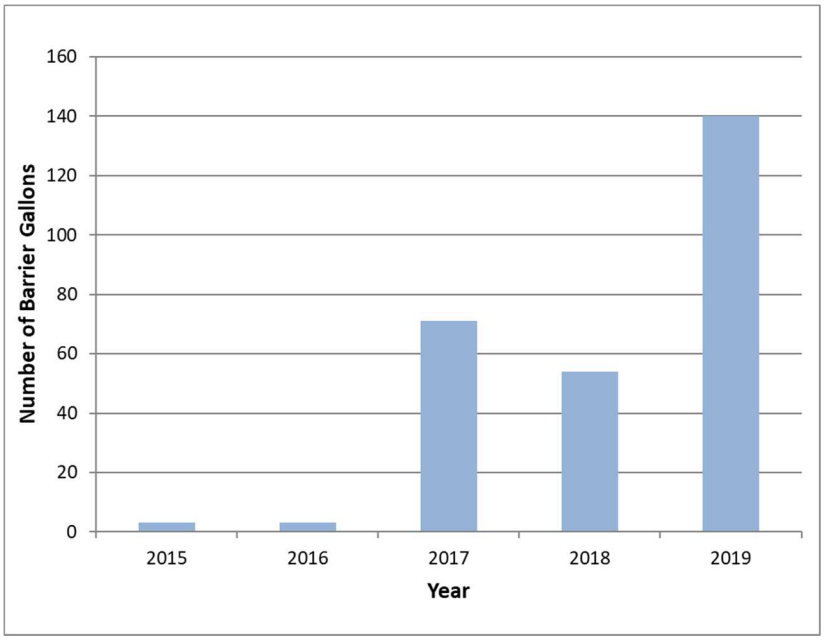


Figure 14 Comparison of Barrier Adulticide Gallons by Year



CALL NOTIFICATION & SHUTOFF SYSTEM

Both VDCI and Louisville acknowledge that adult mosquito control can be a sensitive matter to many residents; therefore a Spray Shutoff and/or Notification request option was available to the public. Residents were able to call VDCI's MosquitoLine™ or submit a website request to be notified before adult control applications were performed and/or request that the ULV sprayer be shutoff in front of their address.

At the beginning of the 2019 season, VDCI sent out 26 letters to all historical shutoff and notification households to establish a current list for the 2019 season. VDCI received a total of 6 shut off and/or notification requests for the 2019 season via VDCI's online request form. Of these, one was a shut off only request, 3 were shut off and notification requests, and one was a notification only request. The 2019 season shutoff and notification list concluded with 5 households on established ULV routes and other requests were received but were not on established ULV routes. Residents on the shutoff and notification list were notified 24 hours in advance when their community was scheduled to be sprayed. VDCI used an automated message service to contact residents and listed weekly ULV spray events on VDCI's website, www.vdci.net/colorado-schedules, which utilized Google Calendar.

Public Relations and Education

VDCI is dedicated to providing strong Public Outreach and Education Programs to residents in all of our communities. Citizen complaints, inquiry, information and satisfaction surveys can aid in evaluating the effectiveness of a program. VDCI constantly looks for ways to better serve the communities we work with and encourages both the citizen and local media involvement in order to increase the effectiveness of our programs. We have clearly demonstrated that commitment and belief by proactively serving City of Louisville (and all of our contracted communities) with numerous innovative programs, activities and services.

Customer service is always a high priority for VDCI. We take pride in training each and every technician so that they have the knowledge to provide residents with the correct answers to their questions. Each field technician spends part of their day responding to resident concerns in their work area. This in-field customer service personalizes the mosquito control program, provides VDCI with local information on mosquito activity and presents a valuable opportunity to educate our residents about mosquito biology and control.

MosquitoLine™

VDCI maintains a toll-free telephone line specific to Boulder County, (888) 774-2161 and a local line (303) 466-1892 to accept calls from the public concerning:

- Information requests about mosquito biology and source reduction of mosquito habitats
- Information on program components, operations and monitoring
- Seasonal West Nile virus activity
- Personal protection options for mosquito annoyances and West Nile virus risk
- Reports about mosquitoes and possible larval mosquito habitats
- Requests to perform larvicide applications and/or opt-out of any adulticide spraying
- Request notification when adulticide spraying is planned in their neighborhood
- Request health and safety information about mosquito control operations and pesticide products used

VDCI has provided Mosquito Hotlines to the residents in communities which we are contracted to also reduce workload by municipal personnel. This enables direct communication and response by mosquito control employees to resident's concerns about West Nile virus and larval site activity and treatment. VDCI maintains a log of calls received and will summarize call activity in monthly and annual reports.

In 2019 VDCI received 8 phone calls from residents of Louisville. The majority of these calls (4) were adult mosquito complaints, 4 calls were requests for sprayer shutoffs and/or call notifications prior to spraying. No requests for habitat inspection or general information were received **(Table 3; Figures 15 and 16)**.

In 2017 VDCI received 59 phone calls from residents of Louisville. 50 calls were requests for shutoff and/or call notifications prior to spraying, 5 calls were adult mosquito complaints, 3 calls were requests to have habitat inspected for mosquito larvae and one request for general information **(Figure 16)**.

Table 3 2019 Mosquito Control Calls by Category

Call Category	2019	
	Number of Calls	Percentage
Adult Complaint	0	0.0%
Habitat Assessment	1	14.3%
Shutoff/Notification*	4	57.1%
Notification*	0	0.0%
General Info/Other	2	28.6%
Total	**7**	100.0%
*VDCI website submission		

Figure 15 2019 Mosquito Control Calls by Month

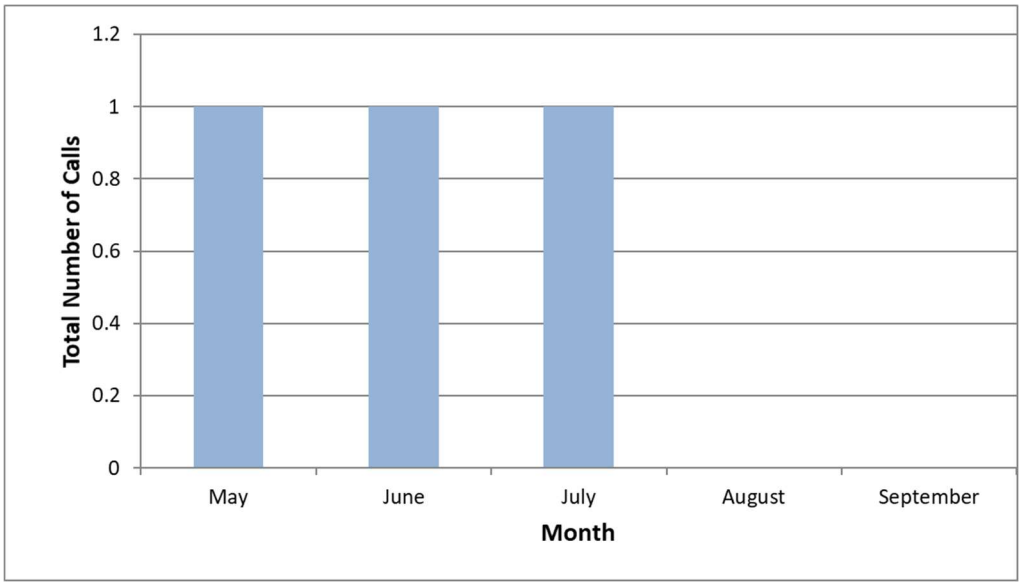
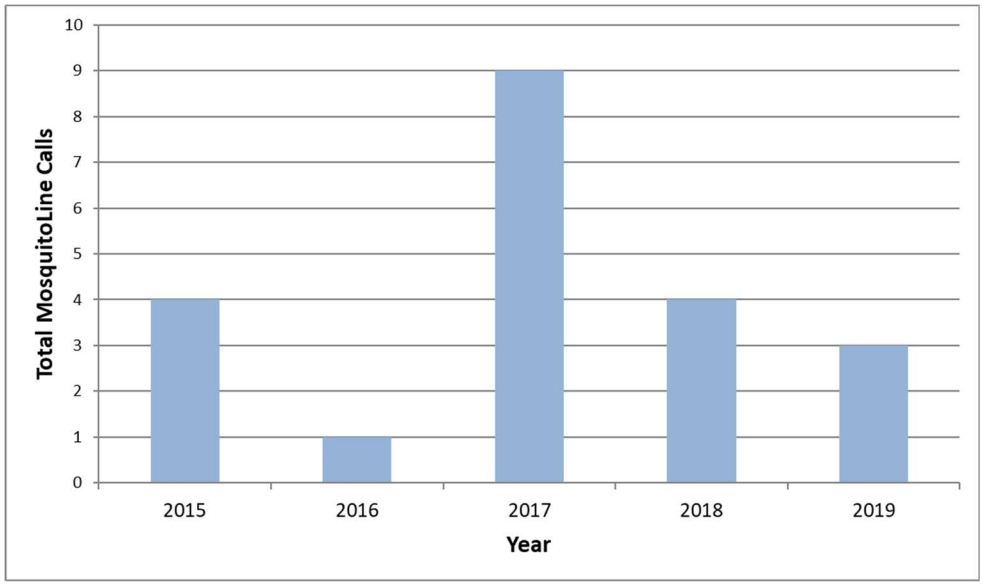


Figure 16 Comparison of Total Mosquito Control Calls by Year



Appendix A: City of Louisville Individual Light Trap Summaries

LO-01

Season: 05/01/2019 - 09/30/2019

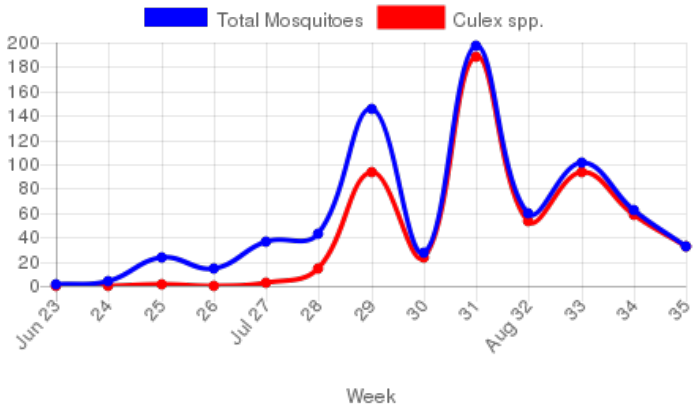
Trap Type: CDC Light Trap

Location: 769 W Dillon Rd, Louisville, CO 80027, USA

GPS: 39.957750025757214, -105.15199989080428

Total number of trap/nights set:	13.0
Total number of mosquitoes collected:	749.0
Average mosquitoes per trap/night:	57.6
Average Culex per trap/night:	43.2

Seasonality

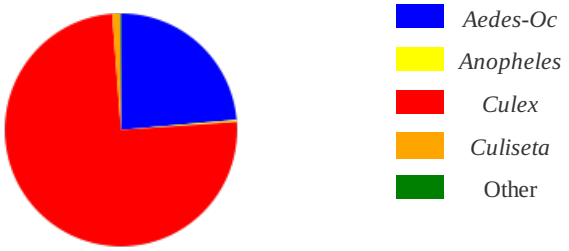


Species collected and abundance:

Aedes dorsalis	1.0	0.1%
Aedes increpitus	42.0	5.6%
Aedes melanimon	54.0	7.2%
Aedes trivittatus	6.0	0.8%
Aedes vexans	74.0	9.9%
Anopheles freeborni	2.0	0.3%
Coquillettidia perturbans	1.0	0.1%
Culex pipiens	36.0	4.8%
Culex salinarius	7.0	0.9%
Culex tarsalis	518.0	69.2%
Culiseta inornata	8.0	1.1%

Genus Proportions:

Genus	Number	Percent of Total
Aedes/Ochlerotatus	177.0	23.6%
Anopheles	2.0	0.3%
Culex	561.0	74.9%
Culiseta	8.0	1.1%
Other	1.0	0.1%



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LO-04

Season: 05/01/2019 - 09/30/2019

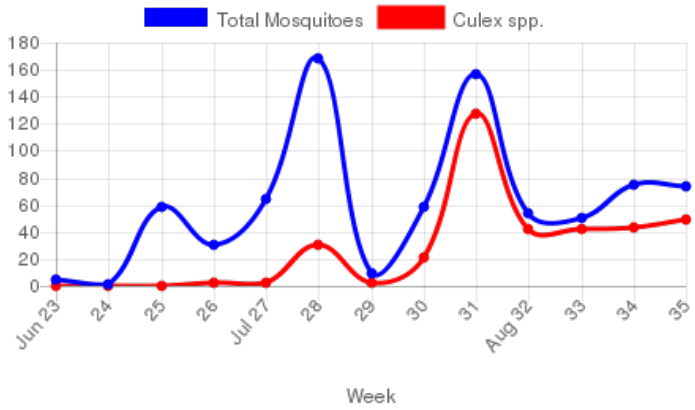
Trap Type: CDC Light Trap

Location: Annette A. Brand Park/Louisville Reservoir

GPS: 39.99025, -105.15825

Total number of trap/nights set:	13.0
Total number of mosquitoes collected:	804.0
Average mosquitoes per trap/night:	61.8
Average Culex per trap/night:	27.8

Seasonality

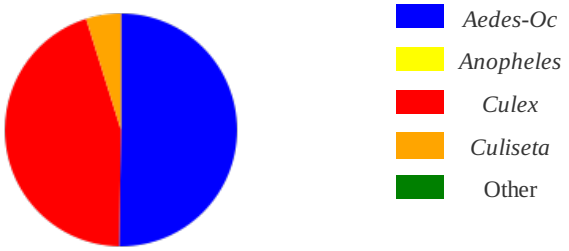


Species collected and abundance:

Aedes dorsalis	1.0	0.1%
Aedes increpitus	16.0	2.0%
Aedes melanimon	10.0	1.2%
Aedes nigromaculis	2.0	0.2%
Aedes trivittatus	2.0	0.2%
Aedes vexans	373.0	46.4%
Culex pipiens	31.0	3.9%
Culex salinarius	5.0	0.6%
Culex tarsalis	325.0	40.4%
Culiseta incidens	1.0	0.1%
Culiseta inornata	38.0	4.7%

Genus Proportions:

Genus	Number	Percent of Total
Aedes/Ochlerotatus	404.0	50.2%
Anopheles	0.0	0.0%
Culex	361.0	44.9%
Culiseta	39.0	4.9%
Other	0.0	0.0%



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LO-08

Season: 05/01/2019 - 09/30/2019

Trap Type: CDC Light Trap

Location: 202 S Jefferson Ave, Louisville, CO 80027, USA

GPS: 39.96849929260254, -105.13332769274712

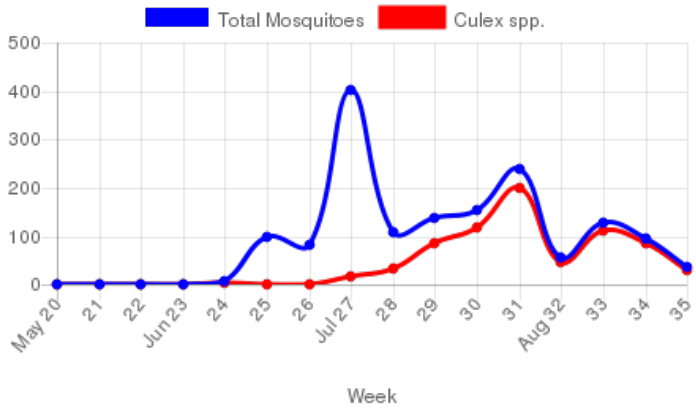
Total number of trap/nights set: 14.0

Total number of mosquitoes collected: 1,551.0

Average mosquitoes per trap/night: 110.8

Average Culex per trap/night: 53.1

Seasonality

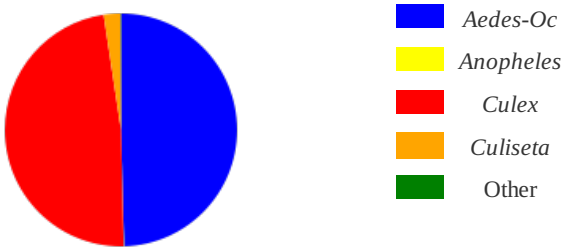


Species collected and abundance:

Aedes dorsalis	9.0	0.6%
Aedes increpitus	2.0	0.1%
Aedes melanimon	510.0	32.9%
Aedes trivittatus	11.0	0.7%
Aedes vexans	237.0	15.3%
Anopheles freeborni	1.0	0.1%
Coquillettidia perturbans	1.0	0.1%
Culex pipiens	98.0	6.3%
Culex salinarius	21.0	1.4%
Culex tarsalis	625.0	40.3%
Culiseta inornata	36.0	2.3%

Genus Proportions:

Genus	Number	Percent of Total
Aedes/Ochlerotatus	769.0	49.6%
Anopheles	1.0	0.1%
Culex	744.0	48.0%
Culiseta	36.0	2.3%
Other	1.0	0.1%



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LO-09

Season: 05/01/2019 - 09/30/2019

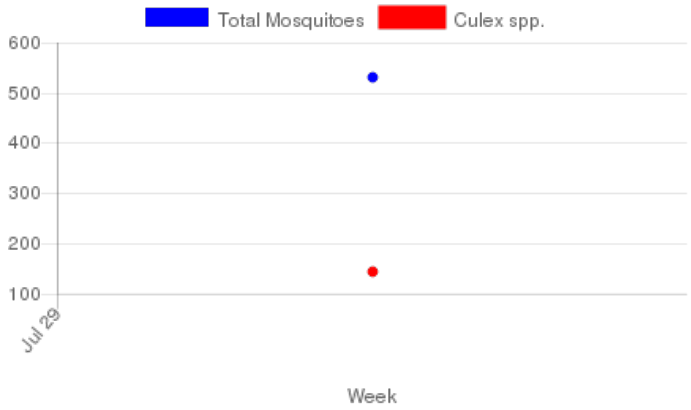
Trap Type: CDC Light Trap

Location: Louisville Sycamore Circle

GPS: 39.972576016861076, -105.14751691371202

Total number of trap/nights set:	1.0
Total number of mosquitoes collected:	530.0
Average mosquitoes per trap/night:	530.0
Average Culex per trap/night:	143.0

Seasonality

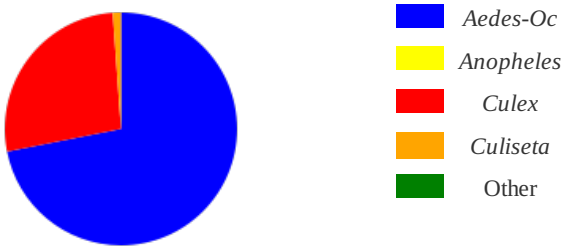


Species collected and abundance:

Aedes increpitus	7.0	1.3%
Aedes melanimon	189.0	35.7%
Aedes trivittatus	112.0	21.1%
Aedes vexans	73.0	13.8%
Culex pipiens	7.0	1.3%
Culex salinarius	4.0	0.8%
Culex tarsalis	132.0	24.9%
Culiseta inornata	6.0	1.1%

Genus Proportions:

Genus	Number	Percent of Total
Aedes/Ochlerotatus	381.0	71.9%
Anopheles	0.0	0.0%
Culex	143.0	27.0%
Culiseta	6.0	1.1%
Other	0.0	0.0%



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Appendix B: Adult Sample Pool Test Results for West Nile Virus Positive Locations

Arboviral Surveillance Results

Start Date: 06/01/2019 **End Date:** 08/31/2019

City of Louisville

Trap Number	Trap Date	Trap Type	Date Tested	Pool No.	Mosquito Species	Pool Size	Results	Assay
Treatment Area LO-01 Test Results								
LO-01	06/17/2019	CDC Light Trap	06/18/2019	S321908	*Culex tarsalis*	1	Negative	RT-PCR
LO-01	07/01/2019	CDC Light Trap	07/02/2019	S321929	*Culex tarsalis*	3	Negative	RT-PCR
LO-01	07/15/2019	CDC Light Trap	07/16/2019	S322346	*Culex tarsalis*	65	Negative	RT-PCR
LO-01	07/15/2019	CDC Light Trap	07/16/2019	S322348	*Culex tarsalis*	25	Negative	RT-PCR
LO-01	07/15/2019	CDC Light Trap	07/16/2019	S322349	*Culex pipiens*	2	Negative	RT-PCR
LO-01	07/22/2019	CDC Light Trap	07/23/2019	S322431	*Culex tarsalis*	24	Negative	RT-PCR
LO-01	07/29/2019	CDC Light Trap	07/30/2019	S322510	*Culex tarsalis*	65	Negative	RT-PCR
LO-01	07/29/2019	CDC Light Trap	07/30/2019	S322511	*Culex tarsalis*	65	Negative	RT-PCR
LO-01	07/29/2019	CDC Light Trap	07/30/2019	S322514	*Culex pipiens*	9	Negative	RT-PCR
LO-01	08/05/2019	CDC Light Trap	08/06/2019	S322592	*Culex tarsalis*	46	Negative	RT-PCR
LO-01	08/05/2019	CDC Light Trap	08/06/2019	S322594	*Culex pipiens*	7	Negative	RT-PCR
LO-01	08/12/2019	CDC Light Trap	08/13/2019	S322752	*Culex tarsalis*	65	Negative	RT-PCR
LO-01	08/19/2019	CDC Light Trap	08/20/2019	S322811	*Culex tarsalis*	26	Negative	RT-PCR
LO-01	08/26/2019	CDC Light Trap	08/27/2019	S323065	*Culex tarsalis*	6	Negative	RT-PCR
LO-01	08/26/2019	CDC Light Trap	08/27/2019	S323066	*Culex tarsalis*	21	Negative	RT-PCR
LO-08	06/10/2019	CDC Light Trap	06/12/2019	S321901	*Culex tarsalis*	3	Negative	RT-PCR

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Trap Number	Trap Date	Trap Type	Date Tested	Pool No.	Mosquito Species	Pool Size	Results	Assay
LO-08	07/01/2019	CDC Light Trap	07/02/2019	S321929	*Culex tarsalis*	15	Negative	RT-PCR
LO-08	07/01/2019	CDC Light Trap	07/02/2019	S321930	*Culex pipiens*	2	Negative	RT-PCR
LO-08	07/08/2019	CDC Light Trap	07/09/2019	S321964	*Culex tarsalis*	26	Negative	RT-PCR
LO-08	07/08/2019	CDC Light Trap	07/09/2019	S321965	*Culex pipiens*	8	Negative	RT-PCR
LO-08	07/15/2019	CDC Light Trap	07/16/2019	S322347	*Culex tarsalis*	65	Negative	RT-PCR
LO-08	07/15/2019	CDC Light Trap	07/16/2019	S322348	*Culex tarsalis*	13	Negative	RT-PCR
LO-08	07/15/2019	CDC Light Trap	07/16/2019	S322349	*Culex pipiens*	8	Negative	RT-PCR
LO-08	07/22/2019	CDC Light Trap	07/23/2019	S322432	*Culex tarsalis*	55	Negative	RT-PCR
LO-08	07/22/2019	CDC Light Trap	07/23/2019	S322433	*Culex tarsalis*	54	Negative	RT-PCR
LO-08	07/22/2019	CDC Light Trap	07/23/2019	S322434	*Culex pipiens*	7	Negative	RT-PCR
LO-08	07/29/2019	CDC Light Trap	07/30/2019	S322512	*Culex tarsalis*	65	Negative	RT-PCR
LO-08	07/29/2019	CDC Light Trap	07/30/2019	S322513	*Culex tarsalis*	50	Negative	RT-PCR
LO-08	07/29/2019	CDC Light Trap	07/30/2019	S322514	*Culex pipiens*	10	Negative	RT-PCR
LO-08	08/05/2019	CDC Light Trap	08/06/2019	S322593	*Culex tarsalis*	39	Negative	RT-PCR
LO-08	08/05/2019	CDC Light Trap	08/06/2019	S322594	*Culex pipiens*	9	Negative	RT-PCR
LO-08	08/12/2019	CDC Light Trap	08/13/2019	S322753	*Culex tarsalis*	65	Negative	RT-PCR
LO-08	08/26/2019	CDC Light Trap	08/27/2019	S323066	*Culex tarsalis*	27	Negative	RT-PCR

Total Pools Tested: 33 Total Mosquitoes Tested: 951 Total Negative: 33 Total Positive: 0

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Arboviral Surveillance Results

Start Date: 06/01/2019 **End Date:** 08/31/2019

City of Lafayette

Trap Number	Trap Date	Trap Type	Date Tested	Pool No.	Mosquito Species	Pool Size	Results	Assay
Treatment Area LA-01 Test Results								
LA-11	06/10/2019	CDC Light Trap	06/11/2019	S321901	*Culex tarsalis*	3	Negative	RT-PCR
LA-11	06/17/2019	CDC Light Trap	06/18/2019	S321908	*Culex tarsalis*	7	Negative	RT-PCR
LA-11	06/24/2019	CDC Light Trap	06/25/2019	S321916	*Culex tarsalis*	13	Negative	RT-PCR
LA-11	07/15/2019	CDC Light Trap	07/16/2019	S322343	*Culex tarsalis*	63	Negative	RT-PCR
LA-11	07/15/2019	CDC Light Trap	07/16/2019	S322344	*Culex tarsalis*	63	Negative	RT-PCR
LA-11	07/15/2019	CDC Light Trap	07/16/2019	S322345	*Culex tarsalis*	64	Negative	RT-PCR
LA-11	07/15/2019	CDC Light Trap	07/16/2019	S322349	*Culex pipiens*	8	Negative	RT-PCR
LA-11	07/22/2019	CDC Light Trap	07/23/2019	S322428	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	07/22/2019	CDC Light Trap	07/23/2019	S322429	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	07/22/2019	CDC Light Trap	07/23/2019	S322430	*Culex tarsalis*	22	Negative	RT-PCR
LA-11	07/22/2019	CDC Light Trap	07/23/2019	S322434	*Culex pipiens*	6	Negative	RT-PCR
LA-11	07/29/2019	CDC Light Trap	07/30/2019	S322506	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	07/29/2019	CDC Light Trap	07/30/2019	S322507	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	07/29/2019	CDC Light Trap	07/30/2019	S322508	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	07/29/2019	CDC Light Trap	07/30/2019	S322509	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	07/29/2019	CDC Light Trap	07/30/2019	S322514	*Culex pipiens*	34	Negative	RT-PCR

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Trap Number	Trap Date	Trap Type	Date Tested	Pool No.	Mosquito Species	Pool Size	Results	Assay
LA-11	08/05/2019	CDC Light Trap	08/06/2019	S322586	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	08/05/2019	CDC Light Trap	08/06/2019	S322587	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	08/05/2019	CDC Light Trap	08/06/2019	S322588	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	08/05/2019	CDC Light Trap	08/06/2019	S322589	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	08/05/2019	CDC Light Trap	08/06/2019	S322590	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	08/05/2019	CDC Light Trap	08/06/2019	S322591	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	08/05/2019	CDC Light Trap	08/06/2019	S322592	*Culex tarsalis*	19	Negative	RT-PCR
LA-11	08/05/2019	CDC Light Trap	08/06/2019	S322593	*Culex tarsalis*	18	Negative	RT-PCR
LA-11	08/05/2019	CDC Light Trap	08/06/2019	S322594	*Culex pipiens*	7	Negative	RT-PCR
LA-11	08/19/2019	CDC Light Trap	08/20/2019	S322808	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	08/19/2019	CDC Light Trap	08/20/2019	S322809	*Culex tarsalis*	65	WNV+	RT-PCR
LA-11	08/19/2019	CDC Light Trap	08/20/2019	S322810	*Culex tarsalis*	32	Negative	RT-PCR
LA-11	08/26/2019	CDC Light Trap	08/27/2019	S323063	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	08/26/2019	CDC Light Trap	08/27/2019	S323064	*Culex tarsalis*	65	Negative	RT-PCR
LA-11	08/26/2019	CDC Light Trap	08/27/2019	S323065	*Culex tarsalis*	35	Negative	RT-PCR

Total Pools Tested: 31 Total Mosquitoes Tested: 1434 Total Negative: 30 Total Positive: 1

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Arboviral Surveillance Results

Start Date: 06/01/2019 **End Date:** 08/31/2019

Town of Erie

Trap Number	Trap Date	Trap Type	Date Tested	Pool No.	Mosquito Species	Pool Size	Results	Assay
Treatment Area ER-01 Test Results								
ER-03	06/10/2019	CDC Light Trap	06/11/2019	S321901	*Culex tarsalis*	2	Negative	RT-PCR
ER-03	06/24/2019	CDC Light Trap	06/25/2019	S321916	*Culex tarsalis*	3	Negative	RT-PCR
ER-03	07/01/2019	CDC Light Trap	07/02/2019	S321929	*Culex tarsalis*	8	Negative	RT-PCR
ER-03	07/01/2019	CDC Light Trap	07/02/2019	S321930	*Culex pipiens*	4	Negative	RT-PCR
ER-03	07/08/2019	CDC Light Trap	07/09/2019	S321963	*Culex tarsalis*	46	Negative	RT-PCR
ER-03	07/08/2019	CDC Light Trap	07/09/2019	S321965	*Culex pipiens*	4	Negative	RT-PCR
ER-03	07/15/2019	CDC Light Trap	07/16/2019	S322341	*Culex tarsalis*	63	Negative	RT-PCR
ER-03	07/15/2019	CDC Light Trap	07/16/2019	S322342	*Culex tarsalis*	62	Negative	RT-PCR
ER-03	07/15/2019	CDC Light Trap	07/16/2019	S322349	*Culex pipiens*	3	Negative	RT-PCR
ER-03	07/22/2019	CDC Light Trap	07/23/2019	S322426	*Culex tarsalis*	65	Negative	RT-PCR
ER-03	07/22/2019	CDC Light Trap	07/23/2019	S322427	*Culex tarsalis*	65	Negative	RT-PCR
ER-03	07/22/2019	CDC Light Trap	07/23/2019	S322430	*Culex tarsalis*	39	Negative	RT-PCR
ER-03	07/22/2019	CDC Light Trap	07/23/2019	S322434	*Culex pipiens*	6	Negative	RT-PCR
ER-03	07/29/2019	CDC Light Trap	07/30/2019	S322503	*Culex tarsalis*	65	Negative	RT-PCR
ER-03	07/29/2019	CDC Light Trap	07/30/2019	S322504	*Culex tarsalis*	65	Negative	RT-PCR
ER-03	07/29/2019	CDC Light Trap	07/30/2019	S322505	*Culex tarsalis*	65	Negative	RT-PCR

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Trap Number	Trap Date	Trap Type	Date Tested	Pool No.	Mosquito Species	Pool Size	Results	Assay
ER-03	07/29/2019	CDC Light Trap	07/30/2019	S322514	*Culex pipiens*	12	Negative	RT-PCR
ER-03	08/05/2019	CDC Light Trap	08/06/2019	S322583	*Culex tarsalis*	65	Negative	RT-PCR
ER-03	08/05/2019	CDC Light Trap	08/06/2019	S322584	*Culex tarsalis*	65	Negative	RT-PCR
ER-03	08/05/2019	CDC Light Trap	08/06/2019	S322585	*Culex tarsalis*	65	Negative	RT-PCR
ER-03	08/05/2019	CDC Light Trap	08/06/2019	S322594	*Culex pipiens*	6	Negative	RT-PCR
ER-03	08/12/2019	CDC Light Trap	08/13/2019	S322748	*Culex tarsalis*	65	Negative	RT-PCR
ER-03	08/12/2019	CDC Light Trap	08/13/2019	S322749	*Culex tarsalis*	65	Negative	RT-PCR
ER-03	08/19/2019	CDC Light Trap	08/20/2019	S322806	*Culex tarsalis*	65	Negative	RT-PCR
ER-03	08/19/2019	CDC Light Trap	08/20/2019	S322807	*Culex tarsalis*	65	Negative	RT-PCR
ER-03	08/19/2019	CDC Light Trap	08/20/2019	S322810	*Culex tarsalis*	33	Negative	RT-PCR
ER-03	08/26/2019	CDC Light Trap	08/27/2019	S323062	*Culex tarsalis*	65	WNV+	RT-PCR
ER-03	08/26/2019	CDC Light Trap	08/27/2019	S323065	*Culex tarsalis*	24	Negative	RT-PCR

Total Pools Tested: 28 Total Mosquitoes Tested: 1160 Total Negative: 27 Total Positive: 1

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Arboviral Surveillance Results

Start Date: 06/01/2019 **End Date:** 08/31/2019

Town of Superior

Trap Number	Trap Date	Trap Type	Date Tested	Pool No.	Mosquito Species	Pool Size	Results	Assay
Treatment Area SU-01 Test Results								
SU-02	06/17/2019	CDC Light Trap	06/18/2019	S321908	*Culex tarsalis*	1	Negative	RT-PCR
SU-02	07/08/2019	CDC Light Trap	07/09/2019	S321964	*Culex tarsalis*	5	Negative	RT-PCR
SU-02	07/15/2019	CDC Light Trap	07/16/2019	S322348	*Culex tarsalis*	10	Negative	RT-PCR
SU-02	07/22/2019	CDC Light Trap	07/23/2019	S322431	*Culex tarsalis*	37	Negative	RT-PCR
SU-02	07/22/2019	CDC Light Trap	07/23/2019	S322434	*Culex pipiens*	2	Negative	RT-PCR
SU-02	07/29/2019	CDC Light Trap	07/30/2019	S322513	*Culex tarsalis*	15	Negative	RT-PCR
SU-02	08/05/2019	CDC Light Trap	08/06/2019	S322593	*Culex tarsalis*	8	Negative	RT-PCR
SU-02	08/19/2019	CDC Light Trap	08/20/2019	S322811	*Culex tarsalis*	7	Negative	RT-PCR
SU-02	08/26/2019	CDC Light Trap	08/27/2019	S323066	*Culex tarsalis*	15	Negative	RT-PCR

Total Pools Tested: 9 **Total Mosquitoes Tested: 100** **Total Negative: 9** **Total Positive: 0**

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Appendix C: City of Louisville Adulticide Application Data - Barrier

Ground Adulticide Applications

Start Date: 06/01/2019 **End Date:** 09/30/2019

City of Louisville

Month	Date	Municipality	Chemical	Mix Ratio	Trip Miles	Spray Miles	Spray Acres	Gallons Sprayed
Annette Brand Park Applications								
July 2019	07/12/2019		Talstar Pro (279-3206)	1:128	0.0	0.0	0.1	4.0
August 2019	08/02/2019		Talstar Pro (279-3206)	1:128	0.0	0.0	0.1	4.0
						Total Talstar Pro Applied:		*8.0*
Coal Creek @ Aspen Way Applications								
July 2019	07/03/2019		Talstar Pro (279-3206)	1:128	0.0	0.0	0.4	18.0
	07/12/2019		Talstar Pro (279-3206)	1:128	0.0	0.0	0.4	18.0
	07/19/2019		Talstar Pro (279-3206)	1:128	0.0	0.0	0.3	12.0
	07/26/2019		Talstar Pro (279-3206)	1:128	0.0	0.0	0.4	16.0
August 2019	08/02/2019		Talstar Pro (279-3206)	1:128	0.0	0.0	0.3	14.0

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Month	Date	Municipality	Chemical	Mix Ratio	Trip Miles	Spray Miles	Spray Acres	Gallons Sprayed
	08/16/2019		Talstar Pro (279-3206)	1:128	0.0	0.0	0.4	18.0
							Total Talstar Pro Applied:	*96.0*
Coal Creek @ Dillon Way Applications								
July 2019	07/19/2019		Talstar Pro (279-3206)	1:128	0.0	0.0	0.2	8.0
August 2019	08/02/2019		Talstar Pro (279-3206)	1:128	0.0	0.0	0.2	8.0
	08/16/2019		Talstar Pro (279-3206)	1:128	0.0	0.0	0.2	10.0
							Total Talstar Pro Applied:	*26.0*
Hecla Lake at Halyard Ct. Applications								
July 2019	07/19/2019		Talstar Pro (279-3206)	1:128	0.0	0.0	0.1	4.0
							Total Talstar Pro Applied:	*4.0*
Warembourg Park Applications								
July 2019	07/19/2019		Talstar Pro (279-3206)	1:128	0.0	0.0	0.1	6.0
							Total Talstar Pro Applied:	*6.0*
				Warembourg Park Totals:	***0.0***	***0.0***	***3.2***	***140.0***
				Grand Totals:	***0.0***	***0.0***	***3.2***	***140.0***

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