

City of Louisville Integrated Mosquito Management Program 2021 Annual Report

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**City of Louisville
Integrated Mosquito Management Program**

2021 Annual Report

Table of Contents

	Page
PROGRAM OBJECTIVES	3
VDCI'S COMMITMENT	3
2021 SEASON PERSPECTIVE	4
CLIMATE COMPARISON DATA	
WEST NILE VIRUS SEASON	6
WNV ACTIVITY BY STATE (2021 HUMAN & NON-HUMAN CASE MAP)	
NEUROINVASIVE DISEASE ACTIVITY BY STATE (2021 HUMAN CASE MAP)	
WNV ACTIVITY IN COLORADO BY COUNTY (2021 HUMAN CASE REPORTS)	
LARVAL MOSQUITO CONTROL	10
LARVAL SITE INSPECTIONS AND TREATMENTS	
LARVAL ACREAGE TREATMENTS	
LARVICIDE PRODUCT APPLICATION BY TYPE	
ADULT MOSQUITO SURVEILLANCE AND LABORATORY	13
CDC LIGHT TRAP TOTAL FOR BOULDER COUNTY 2021	
CDC LIGHT TRAP COMPOSITE SUMMARY FOR LOUISVILLE 2021	
CDPHE WEST NILE VIRUS MOSQUITO SAMPLE TESTING RESULTS 2021	
ADULT MOSQUITO CONTROL	20
SEASON DETAILS	
ADULT MOSQUITO CONTROL APPLICATIONS FOR LOUISVILLE 2021	
PUBLIC RELATIONS AND EDUCATION	22
MOSQUITO LINE CALLS FOR LOUISVILLE 2021	
APPENDIX	25
A. CITY OF LOUISVILLE INDIVIDUAL LIGHT TRAP SUMMARIES 2021	
B. ADULT SAMPLE POOL TEST RESULTS (BCZ3) FOR WEST NILE VIRUS POSITIVE LOCATIONS 2021	
C. CITY OF LOUISVILLE ADULTICIDE APPLICATION DATA 2021	

Program Objectives

City of Louisville (Louisville) contracted Vector Disease Control International, LLC (VDCI) to operate an Integrated Mosquito Management (IMM) program in 2021. 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.

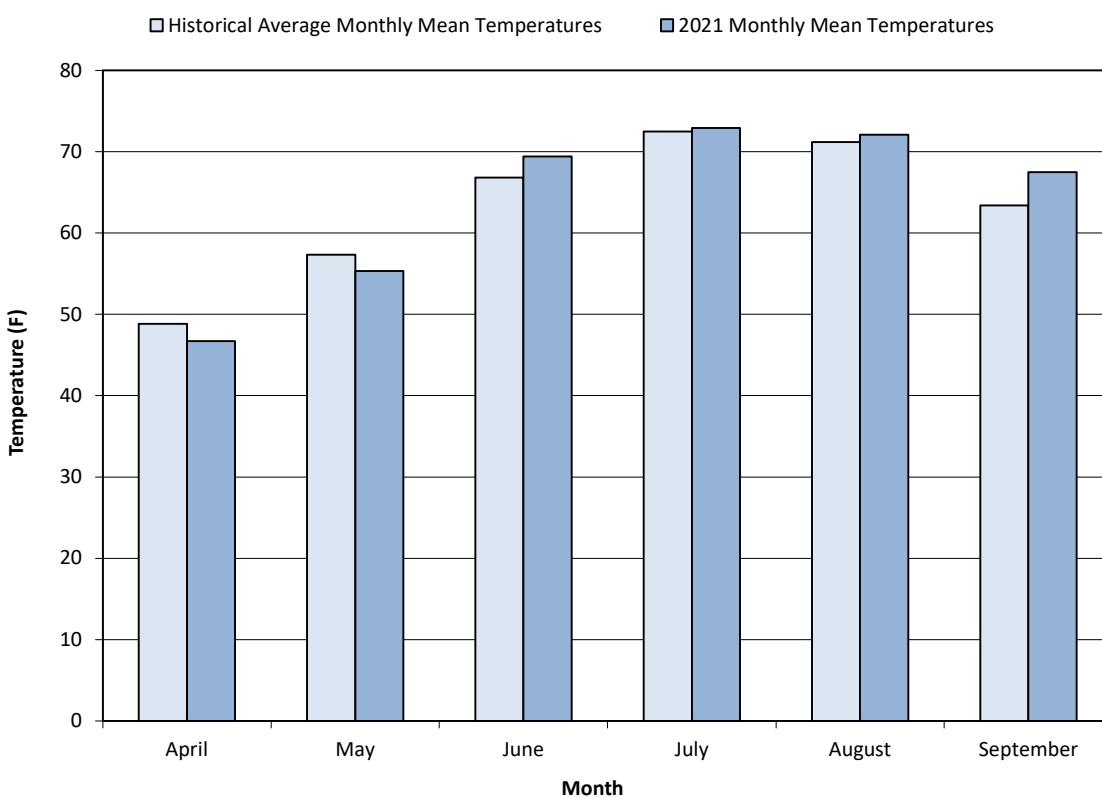
Vector Disease Control International, as the contractor for the City of Louisville, will continue to use proven scientific Integrated Mosquito Management techniques to survey and control local mosquito populations using biorational larval controls and limited low-toxicity insecticide applications. All 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.

2021 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.

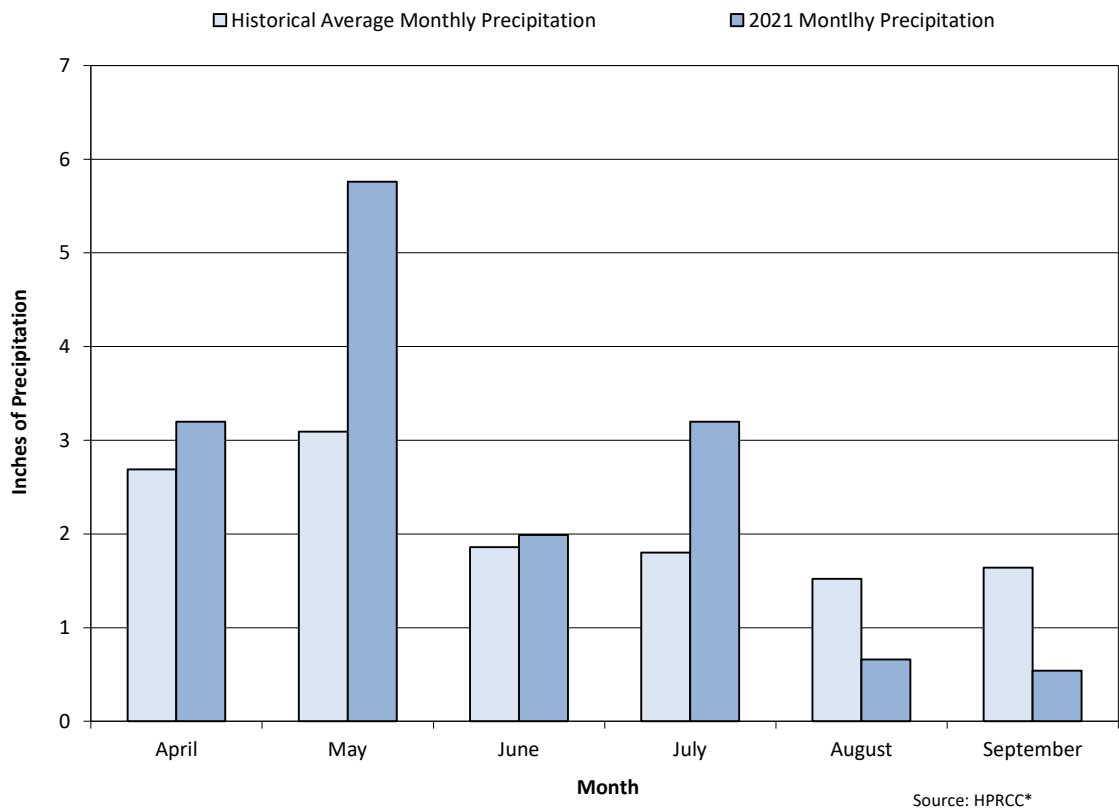
In 2021, every month of the mosquito season, except May, had temperatures above normal (**Figure 1**). The months of April and May were far below average at -2.1° and -2.0° while July and August were slightly above normal. However, June and September experienced the highest deviation from average, $+2.6^{\circ}$, and $+4.1^{\circ}$ degrees. Overall, the 2021 season was approximately 21.3% warmer than an average year. The end of the season saw a record high temperature of 99° on September 10th and 8 days still recording $>90^{\circ}$ in September. Even with these above average daytime temperatures, consistent nightly temperatures in the 50's triggered mosquitoes overwintering behavior and they stopped seeking blood meals (biting) as abundance plummeted in the last trap week.

Figure 1 2021 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. The most significant variation during the 2021 mosquito season was the month of May, which received 86.4 percent more precipitation (5.76”) than the average amount (3.09”), making it the wettest month of 2021 followed closely by July with 1.4” more than normal and April with 0.51”. The total accumulated precipitation from April through September of 15.35 inches and was 21.8% higher than the historical average of 12.6 inches for the same time period (**Figure 2**). June was slightly above average, while August and September received approximately 43.4% and 32.9% of normal precipitation respectively, making those two months the driest of the mosquito season in 2021.

Figure 2 2021 Monthly Total Precipitation Data and Historical Averages*



Early and abundant spring precipitation in April and May followed by a really wet July likely influenced the historically higher than average nuisance and vector mosquito populations during 2021 mosquito season. A wet April and May presumably elevated the abundance of nuisance mosquitoes normally seen early in the season and unusually high humidity in June and July contributed to the longevity of adult mosquitoes, especially vector species, resulting in a historical abundance of all mosquito species and contributing to high West Nile virus incidence than what is normally seen throughout the front range Metro area.

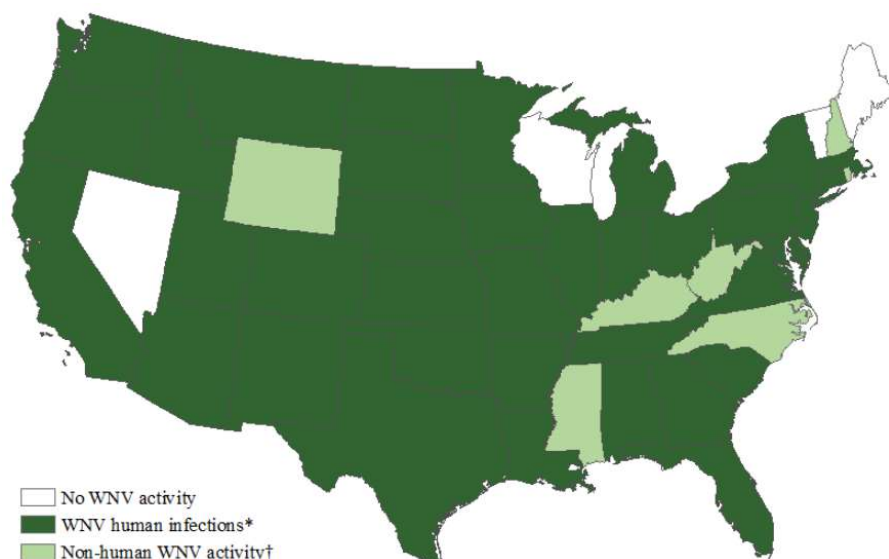
2021 West Nile Virus Season – United States

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 5th, 2021, a total of 43 states have reported West Nile virus infections in people, birds, or mosquitoes in 2021 (**Figure 3**). Overall, 725 cases of West Nile virus disease in humans have been reported to CDC. This is about 4x increase from the number of cases reported (174) in 2020 at this time last year and compared to 627 cases in October 2019. Of these, 494 (68.1%) were classified as neuroinvasive disease (such as meningitis or encephalitis) and 231 (31.9%) were classified as non-neuroinvasive disease (**Figure 4**). A total of 35 deaths have resulted from these infections compared to 6 deaths last year at this time and 30 deaths in October 2019.

Figure 3 West Nile Virus Activity by State – United States, 2021 (as of October 5th, 2021)*

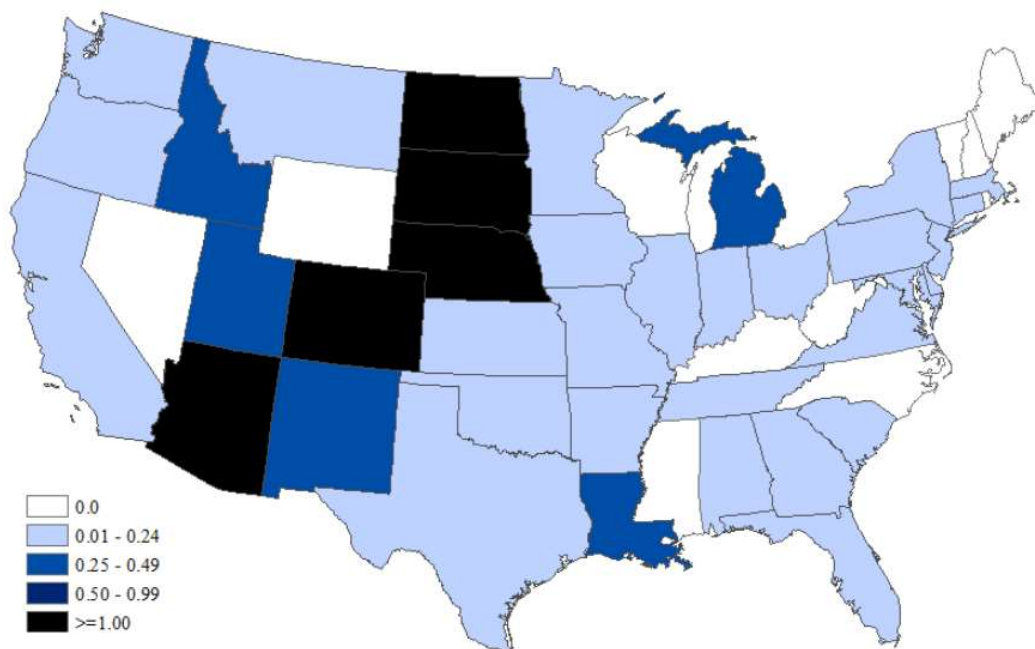
*CDC image <https://www.cdc.gov/westnile/statsmaps/preliminarymapsdata2021/activitybystate2021.html>



*WNV human disease cases or presumptive viremic blood donors. Presumptive viremic blood donors have a positive screening test which has not necessarily been confirmed.

†WNV veterinary disease cases, or infections in mosquitoes, birds, or sentinel animals.

Figure 4 West Nile Virus Neuroinvasive Disease Incidence by State – United States, 2021 (as of September 22nd, 2021)* *CDC image <https://www.cdc.gov/westnile/statsmaps/preliminarymapsdata2021/activitybystate2021.html>



2021 West Nile Virus Season - Colorado

As of October 5th, 2021, the Colorado Department of Health and Environment has identified 139 cases of human West Nile virus (WNV) infections in Colorado (**Figure 5**) compared to 29 cases in 2020; a 4.8x increase, and six (6) deaths. The CDC reports 133 cases as of October 5th, 2021 with 22 (14.2%) asymptomatic blood donor, 74 (47.7%) neuroinvasive cases including symptoms of meningitis or encephalitis (including meningoencephalitis), and 59 (38.1%) non-neuroinvasive which includes cases where individuals are non-symptomatic or present with fever and other minor symptoms (**Figure 6**). There have been six (6) deaths (**Figure 6**) associated with West Nile virus infections in Colorado during the 2021 season to date. 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 Count 2021 (2014-2018 Average) *

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

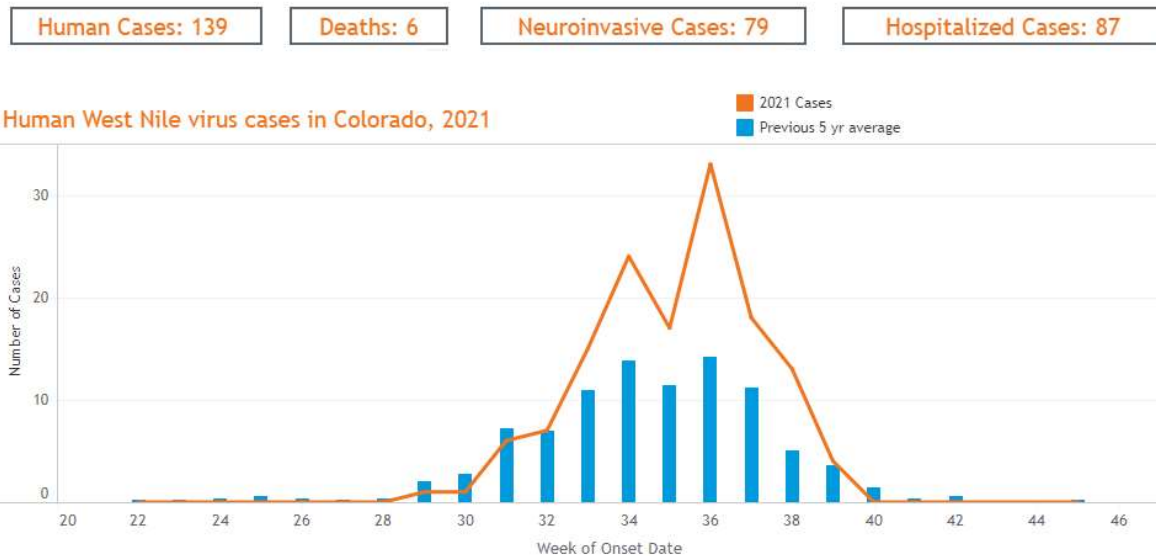


Figure 6 West Nile Virus Disease Cases and Presumptive Viremic Blood Donors by State – United States, 2021 (as of October 5th, 2021)*

*CDC image <https://www.cdc.gov/westnile/statsmaps/preliminarymapsdata2021/activitybystate2021.html>

State	Neuroinvasive Disease Cases†	Non-neuroinvasive Disease Cases	Total cases	Deaths	Presumptive viremic blood donors‡
Colorado	74	59	133	6	22

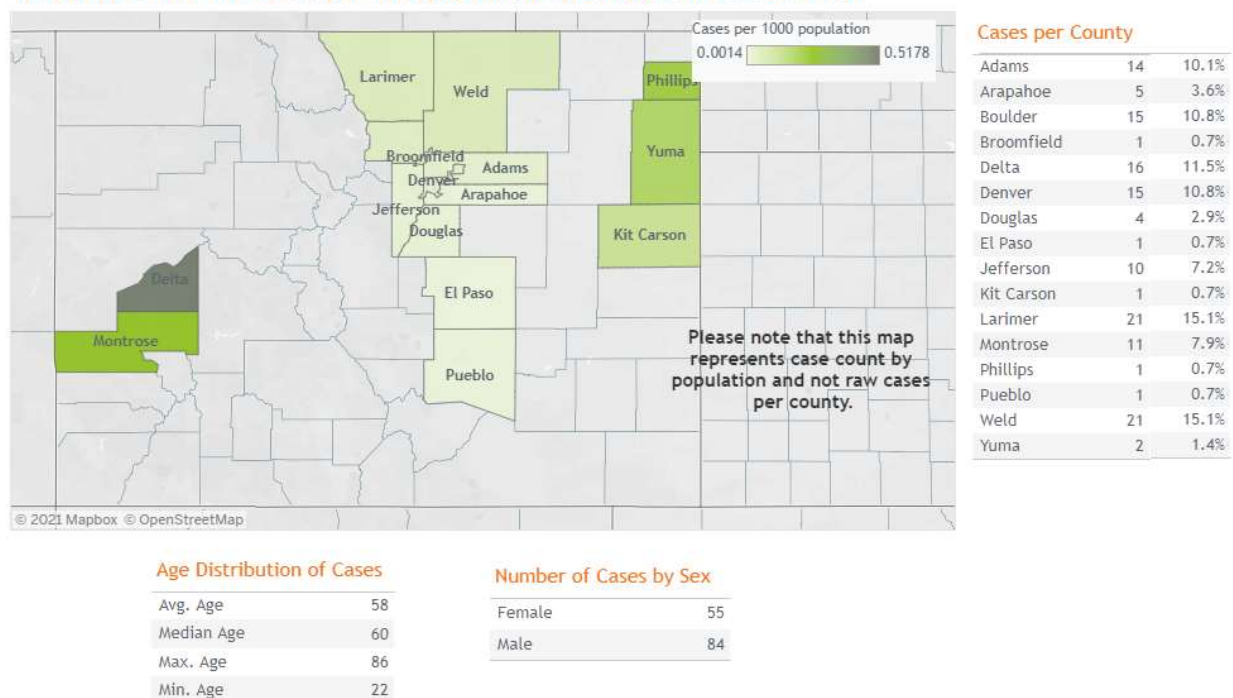
2021 West Nile Virus Season - Boulder County

CDPHE data currently shows Larimer and Weld Counties both with the most West Nile virus human cases (15.1%) while Delta, ranks 2nd with 11.5% and Boulder and Denver Counties rank 3rd with 10.8% followed by Adams County with 10.1% of human cases. (**Figure 7**). For comparison, Boulder County had 10.3% of human cases out of only eight (8) counties reporting cases in 2020 compared to 16 counties reporting human cases this year.

Figure 7 Colorado WNV Human Cases per 1000 population by County, 2021*

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

Human West Nile virus cases per 1000 population by county of residence, 2021



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 Superior 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 2021 weekly Vector Index rates, as calculated by BCPH, for sentinel zones 1, 2 and 3 are illustrated below (**Table 1**). WNV activity in 2021 was very high compared to 2020, an increase in positive mosquito pools from 4.4% in 2020 to 28.5% in 2021.

Table 1 Vector Index, Boulder County Sentinel Zones 1 - 3, 2021

Boulder County Vector Index 2021 ¹			
	Sentinel Zone 1 ²	Sentinel Zone 2 ³	Sentinel Zone 3 ⁴
Season Week	Vector Index	Vector Index	Vector Index
Week 24 (June 7-13)	----	----	----
Week 24 (June 13-19)	----	----	----
Week 25 (June 20-26)	----	----	----
Week 26 (June 27-July 3)	0.00	0.00	0.00
Week 27 (July 4-10)	0.00	0.00	0.00
Week 28 (July 11-17)	0.00	0.00	0.00
Week 29 (July 18-24)	0.95	5.03	0.00
Week 30 (July 25 - July 31)	0.76	1.86	0.49
Week 31 (August 1-7)	1.53	2.56	0.37
Week 32 (August 8-14)	0.39	1.35	2.03
Week 33 (August 15-21)	0.00	0.59	0.59
Week 34 (August 22-28)	1.54	1.09	0.53
Week 35 (Aug 29 - Sept 4)	0.46	0.60	0.40
Week 36 (Sept 5 - 11)	0.00	0.20	0.20
1. Reported by BCPH as of September 17, 2021			
2. Boulder County; 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 the first full week in May. Hiring of seasonal field technicians began in April and continued into May. VDCI's Annual Field Technician Classroom Training Day looked different with continued Covid-19 pandemic restrictions on large gatherings. Instead, each Colorado VDCI office conducted small group class and field training during the week of May 17th. A less than normal contingent of returning technicians resulted in 13 newly trained field technicians for the 2021 season. Additional field training by VDCI management and veteran employees lasted through May and full-time field activities were in effect by early June.

In 2021 Vector Disease Control International performed 366 larval site inspections at 93 documented breeding sites throughout the City. Of these individual inspections, 273 sites (74.6%) were wet upon inspection and 74 (20.2%) were producing mosquito larvae in the City of Louisville. These inspections resulted in 72 applications in which VDCI applied 25.8 lbs. of VectoBac G (*Bti*), 3.0 lbs. of VectoMax FG (*Bti+Bs*), 6.4 oz. of Altosid XRG (S-Methoprene), and 13.9 gallons of BVA 2 larvicide oil (**Table 2; Figures 8 and 9**) to 8.8 acres of land within the City of Louisville.



By comparison, in 2020 VDCI performed 446 larval site inspections at 99 documented breeding sites throughout the City. Of these individual inspections, 279 sites (62.6%) were wet upon inspection and 59 (13.2%) were producing mosquito larvae in the City of Louisville. These inspections resulted in 54 applications in which VDCI applied 19.8 lbs. of VectoBac G (*Bti*), 0.01 lbs. of Vectolex FG (*Bs*) and 0.2 gallons of BVA 2 larvicide oil (**Table 2 and Figure 9**) to 2.2 acres.

In 2019 VDCI 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 and Figure 9**) to 9.4 acres.



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 2021 Summary of Larval Control Product Applications by Type

Larval Control Product Types	2017	2018	2019	2020	2021
<i>Bacillus thuringiensis israelensis (Bti)</i>					
Vectobac G (lbs) EPA Reg. #73049-10	17.9	46.8	58.3	19.8	25.8
<i>Bacillus thuringiensis israelensis (Bti) +Bacillus sphaericus (Bs)</i>					
Vectomax FG (lbs) EPA Reg. #73049-429	0.0	0.0	0.0	0.0	3.0
<i>Bacillus sphaericus (Bs)</i>					
Vectolex FG (lbs) EPA Reg. #73049-20	1.7	0.0	16.0	0.01	0.00
S-Methoprene					
Altosid Briquet (oz) EPA Reg. #2724-375	0.0	0.0	0.0	0.0	0.0
Altosid XRG (oz) EPA Reg. #2724-451	0.0	0.0	0.0	0.0	6.4
Mineral Oil					
BVA 2 Larvicide Oil (gal) EPA Reg. #70589-1	1.8	0.5	0.6	0.2	13.9

Figure 8 2021 Larval Site Inspections and Applications by Month

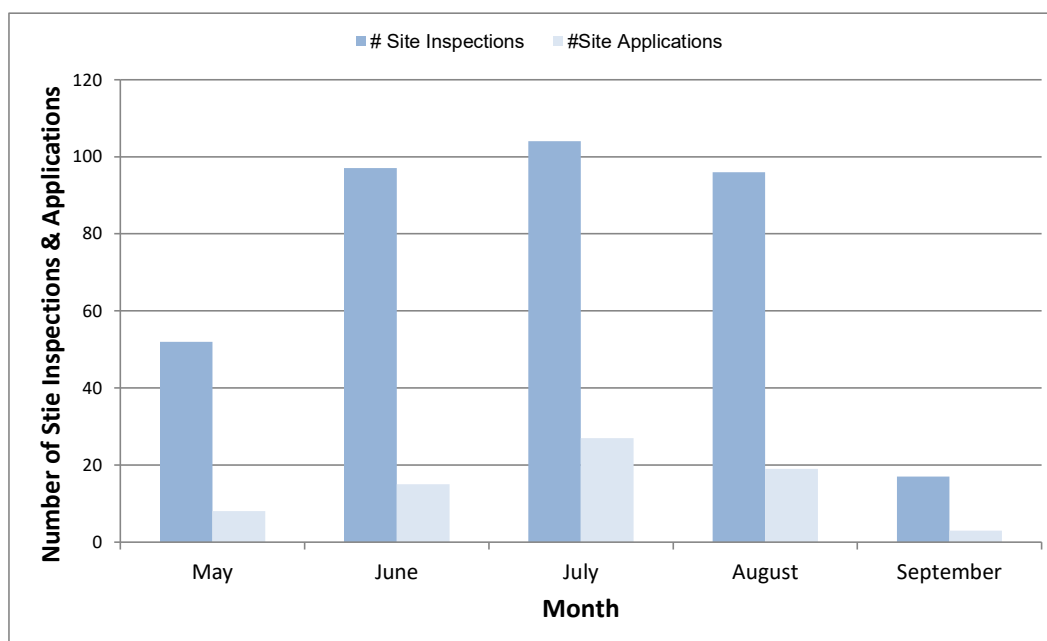
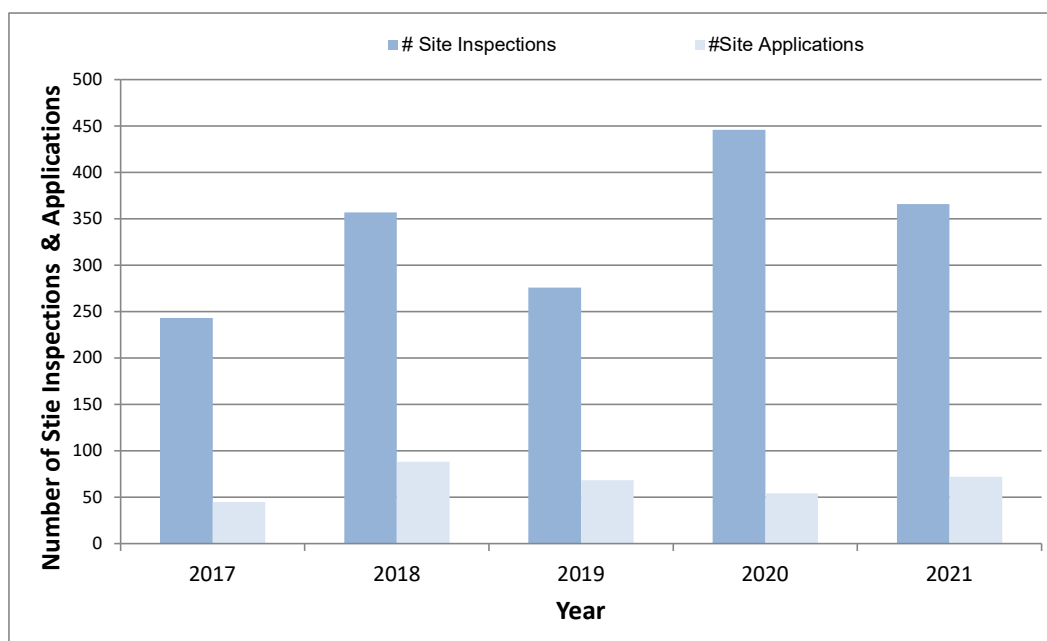


Figure 9 Comparison of Larval Site Inspections and Applications by Year



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 CO₂, 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 2021, Vector Disease Control International monitored a statewide network of hundreds of weekly trap sites, collecting 1,127,553 adult mosquitoes that were counted and identified to species by the VDCI Surveillance Laboratories compared to 516,629 in 2020, a 118.3% increase. A total of 233,922 adult mosquitoes were counted and identified in the entirety of Boulder County in 2021 compared to 166,058 in 2020, a 40.9% increase. (City of Boulder is not included for both years). 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 2021, an average of 3 surveillance light traps monitored adult mosquito populations within the City of Louisville on a weekly basis (**Figure 10**). Early season adult surveillance began with select site LO-08 (Coal Creek at Aspen Way) the week of May 25th. VDCI began full surveillance (3 traps) the week of June 1st and concluded on September 13th corresponding with low adult mosquito activity.

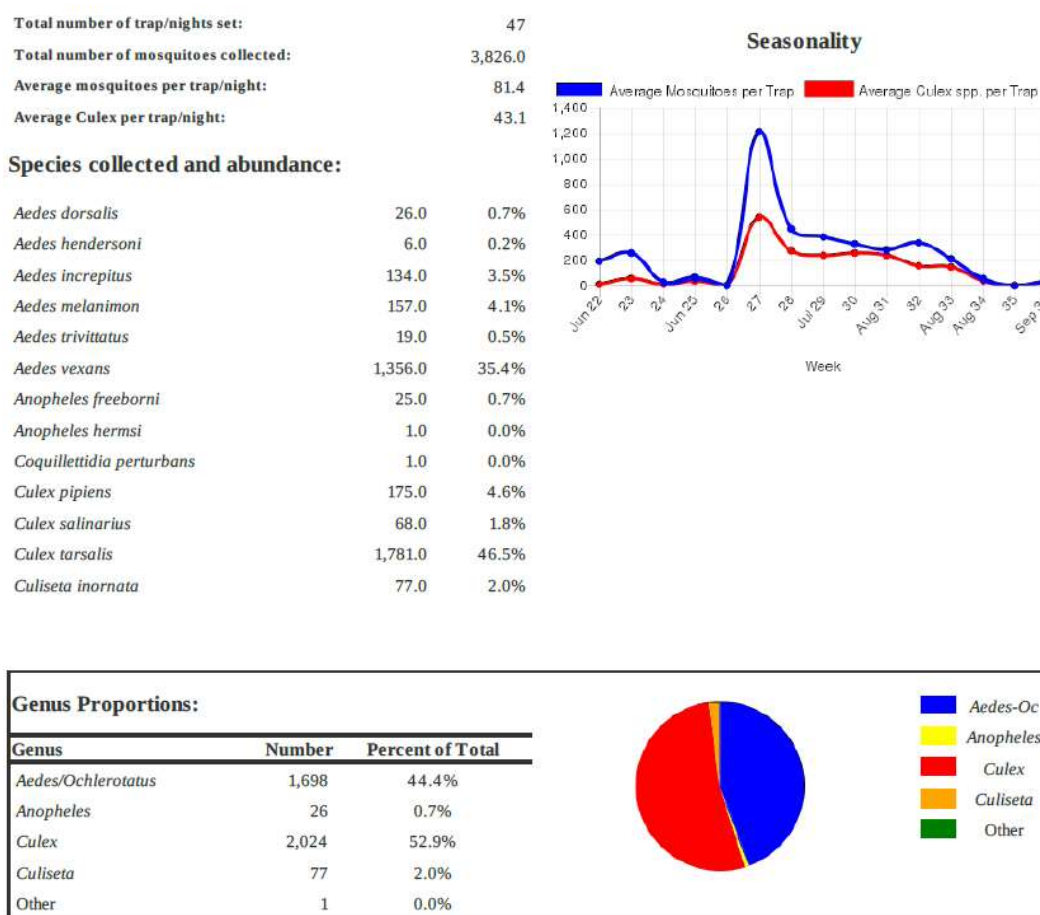
There were 47 CDC light surveillance trap nights set within City of Louisville during the 2021 season. These traps collected a total of 3,826 mosquitoes. There was an average of 81.4 mosquitoes caught per trap per night and an average 43.1 *Culex spp.* mosquitoes per trap per night. The composition of mosquitoes collected was 1,698 (44.4%) *Aedes/Ochlerotatus spp.*, 26 (0.7%) *Anopheles spp.*, 1 (<1%) *Coquillettidia spp.*, 2,024 (52.9%) *Culex spp.*, and 77 (2.0%) *Culiseta spp.*, (**Figure 10**). Please refer to **Appendix A** for Louisville's Individual Light Trap Summaries.

A total of 13 species were represented in 2021 in Louisville. No exotic/introduced species (such as Asian Tiger Mosquitoes) were collected this season.

By comparison, in 2020 there were 49 CDC light surveillance trap nights set within City of Louisville. These traps collected a total of 4,885 mosquitoes. There was an average of 99.7 mosquitoes caught per trap per night and an average 29.2 *Culex spp.* mosquitoes per trap per night. The composition of mosquitoes collected was 69.6% (3,401) *Aedes/Ochlerotatus spp.*, 0.2% (10) *Anopheles spp.*, <1% (1) *Coquillettidia spp.*, 29.3% (1,433) *Culex spp.*, and 0.8% (40) *Culiseta spp.*

In 2019 there were 41 CDC light surveillance trap nights set within City of Louisville. 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 2021 City of Louisville Light Trap Composite Data



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.

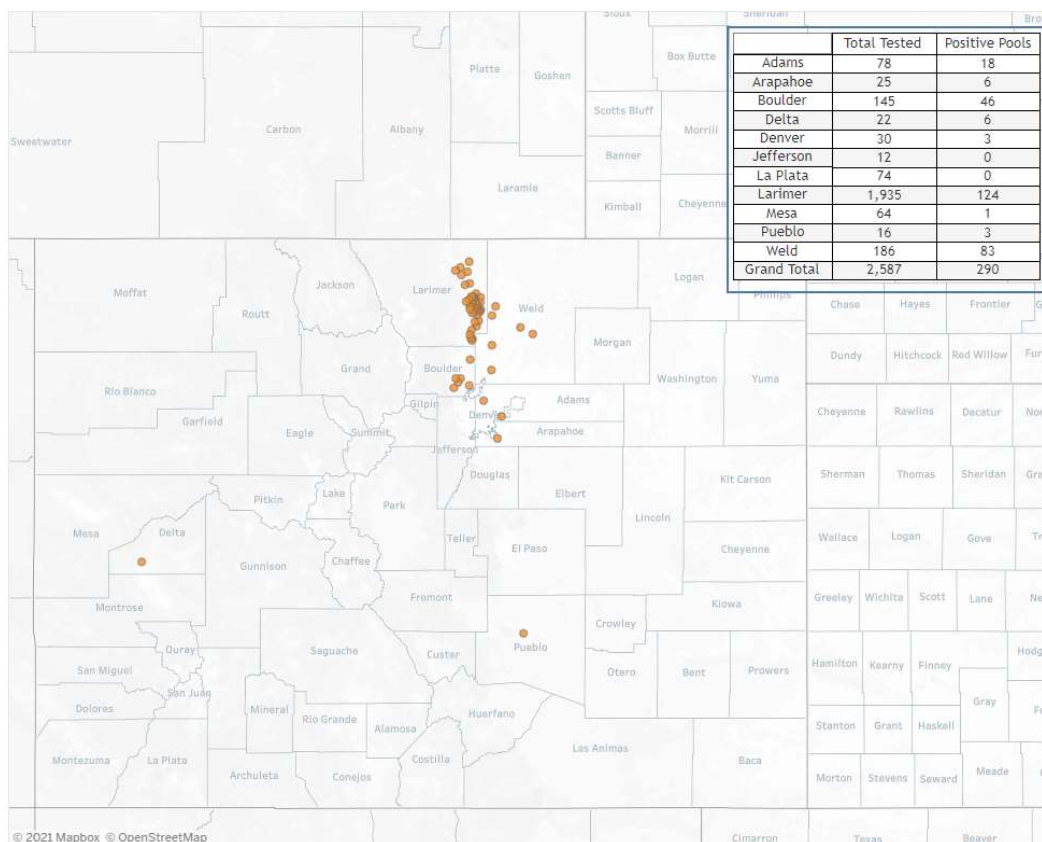
As defined in the CDC guidelines for West Nile virus surveillance, prevention and control, the vector index (VI) is an estimate of the number of West Nile virus infected mosquitoes in an area. This number can serve as a human health risk value. An operational value of 0.75, which was derived from the 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 28th, 2021, CDPHE reported 290 positive mosquito pools from Colorado Sentinel Zones compared with 66 last year, approximately 4x increase. Larimer County had the most West Nile virus positive mosquito pools (124) while Weld County ranked 2nd with 83 positive pools followed by Boulder and Adams Counties with 46 and 18 respectively. The first Colorado West Nile virus positive mosquito sample pool in 2021 was the week of June 27th (week 26) in Weld County followed by City of Boulder and Larimer County the week of July 11th (week 28), while Boulder County sample pools tested positive the week of July 18th (week 29) 3-4 weeks earlier than last year (**Figure 11**).

Figure 11 Number of Colorado Positive WNV Specimens 2021*

*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 2021. VDCI maintained the sentinel system with five surveillance traps at permanent locations in each of three Boulder County Sentinel Zones: Boulder County (BCZ1); City of Longmont (BCZ2); Town of Erie, City of Lafayette, City of Louisville, Town of Superior (BCZ3) (**Figure 12**). The sentinel CDC light traps were set once a week from June 14th (week 25) to September 13th, 2021 (week 37). WNV sentinel pool testing began June 28th (week 26) and ended September 8th, 2021 (week 36).

As of September 17th, 2021 (week 36), CDPHE tested a total of 144 mosquito pools from Boulder County Sentinel Zones. Of the tested mosquito pools, 41 pools tested positive for West Nile virus out of all three sentinel zones in 2021 (**Tables 3 and 4**). The first Boulder County West Nile virus positive mosquito sample pools (3) in 2021 were on July 19th, 2021 (week 29) in BCZ1 and BCZ2 compared to last year on August 3rd (week 32) in BCZ3. (**Table 1; Figures 11 and 12**).

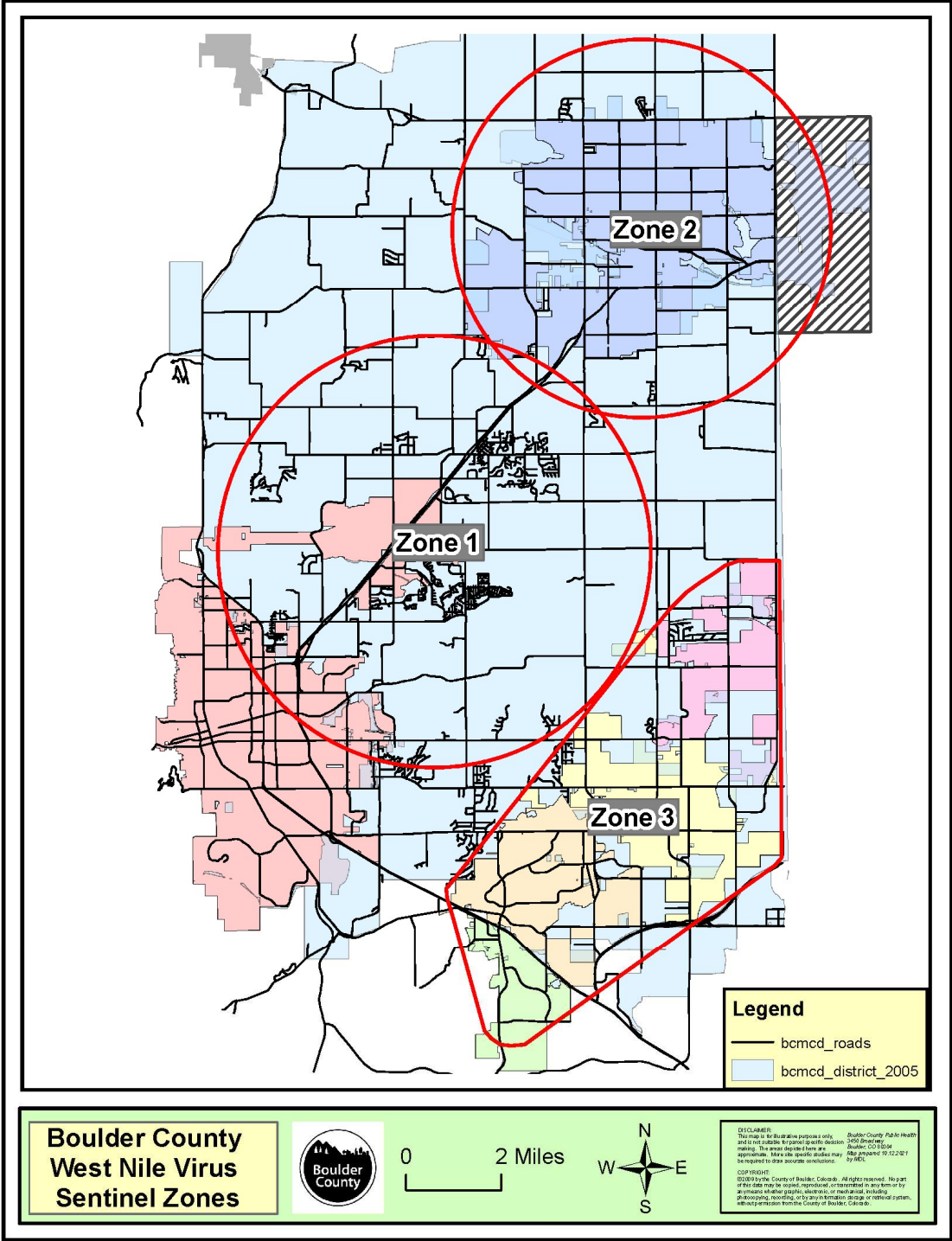
Table 3 Total Submitted and Positive Mosquito Pools, BCPH Sentinel Zones, 2014-2021

Positive WNV Mosquito Pools								
	2014	2015	2016	2017	2018	2019	2020	2021
# Submitted	131	132	145	188	189	206	114	144
# Positive	16	10	21	15	11	8	5	41
% Positive	12.2	7.6	14.5	8.0	5.8	3.9	4.4	28.8

Table 4 Boulder County Sentinel Zone 3 – WNV positive mosquito sample pools 2021

City of Lafayette	
Trap Location	Total Positive Pools
Waneka Reservoir North	7
Total Positive: 7	
City of Louisville	
Trap Location	Total Positive Pools
Louisville Coal Creek At Dillon Road	2
Louisville SE - Coal Creek Aspen Way	5
Total Positive: 7	
Town of Erie	
Trap Location	Total Positive Pools
Canyon Creek - Sunwest	6
Total Positive: 6	
Town of Superior	
Trap Location	Total Positive Pools
Superior Central	2
Total Positive: 2	

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 2021 season a total of 140 gallons of Wisdom TC (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**.

By comparison, in 2020 season a total of 112 gallons of Talstar Pro or Wisdom TC (Active Ingredient – Bifenthrin) were applied as daytime adult barrier applications (**Figure 14**). A detailed summary of adulticide applications, by neighborhood, can be found in **Appendix C**.

In 2019, a total of 140 gallons of Talstar Pro (Active Ingredient – Bifenthrin) (**Figure 14**) 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 2021 Backpack Barrier Adulticide Gallons by Month

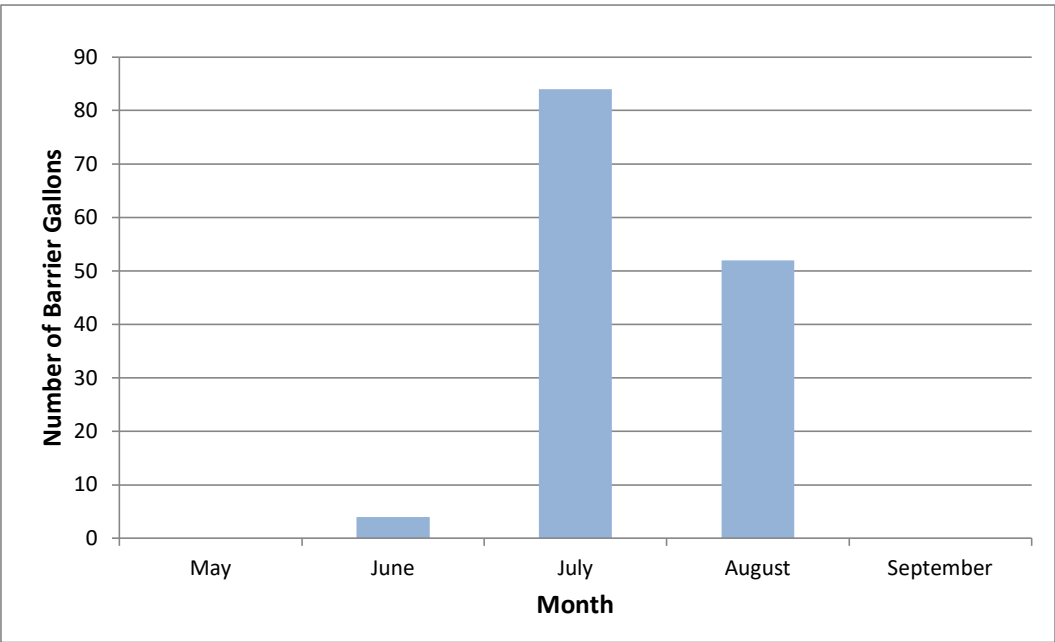
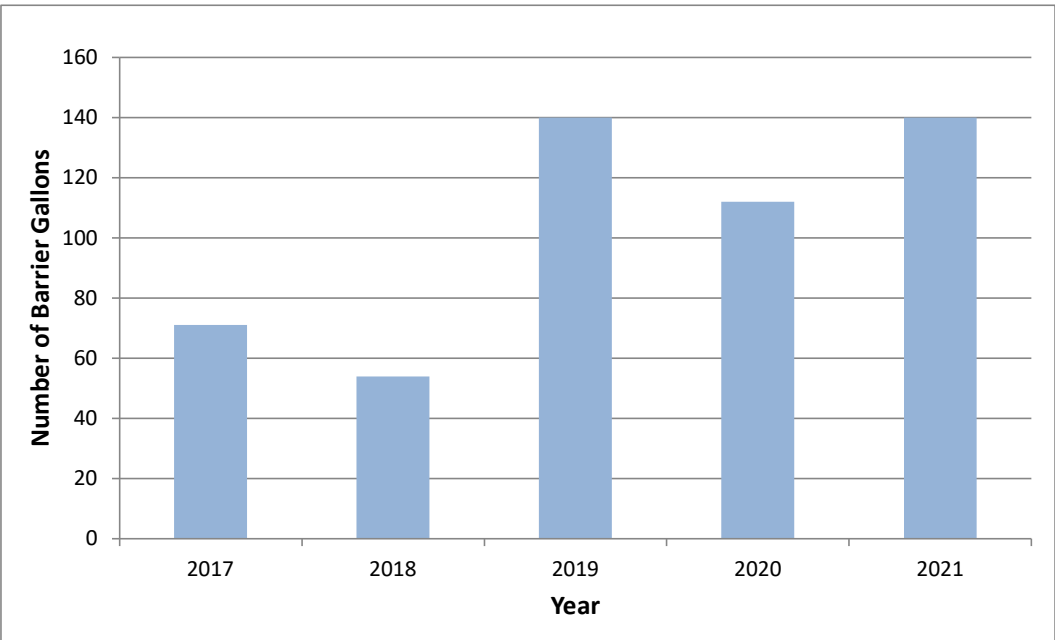


Figure 14 Comparison of Backpack Barrier Adulticide Gallons by Year



CALL NOTIFICATION & SHUTOFF SYSTEM

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

Website shutoff and notification submissions received this season were not on established ULV routes therefore the 2021 season list concluded with no households on a shutoff or notification list for established ULV routes. Residents are notified 48-24 hours in advance if their community is scheduled to be fogged. VDCI uses an automated message service to contact residents by phone or text message and listed weekly ULV adult control operations 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, (877) 276-4306 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 2021 Vector Disease Control International received approximately four (4) phone calls from residents of the City of Louisville. Two (2) of these calls were for adult mosquito complaints, two (2) calls were requests for habitat assessment and there were no requests for general information or other reasons (**Table 5; Figure 15 and Figure 16**).

By comparison, in 2020 VDCI received approximately 10 phone calls from residents of the City of Louisville. Most of these calls (6) were for adult mosquito complaints. Of the rest, 2 calls were requests for habitat assessment, 2 calls were requests for general information or other reasons and one request for ULV adult control shut off and/or call notification (website submission) (**Figure 16**).

In 2019 VDCI received approximately 8 phone calls from residents of the Town of Erie. No calls were received for adult mosquito annoyance. Of the rest, 1 call requested a habitat assessment and 2 calls requested general information or other information and 4 requests were for ULV adult control shut off and/or call notification (website submission) (**Figure 16**).

Table 5 2021 Mosquito Control Calls by Category

Call Category	2021	
	Number of Calls	Percentage
Adult Complaint	2	50.0%
Habitat Assessment	2	50.0%
General Info/Other	0	0.0%
Shutoff/Notification*	0	0.0%
Notification*	0	0.0%
Total	4	100.0%
*VDCI website submission		

Figure 15 2021 Mosquito Control Calls by Month

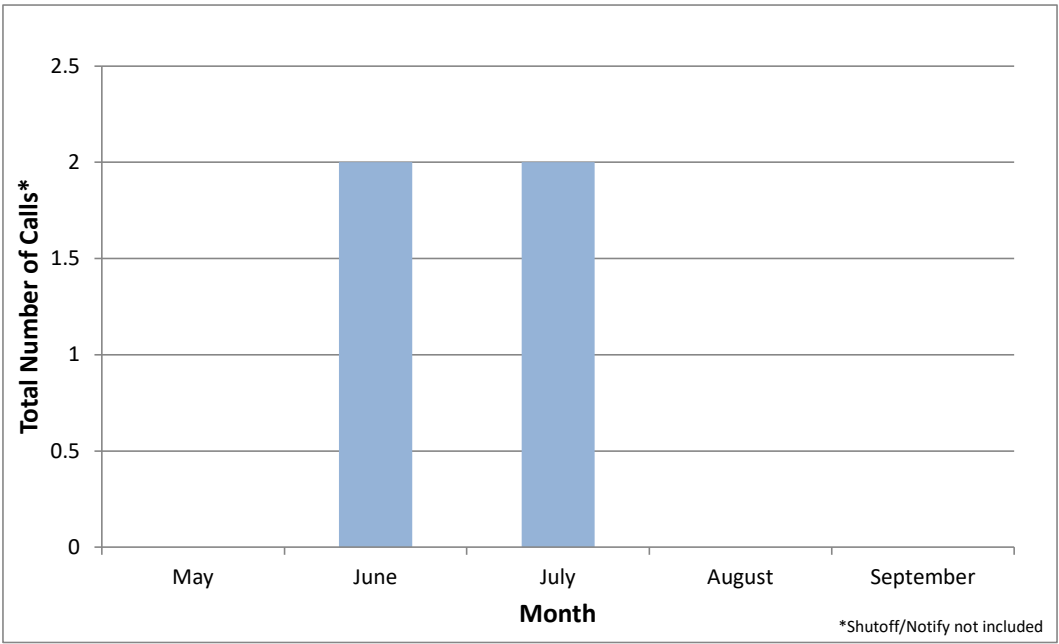
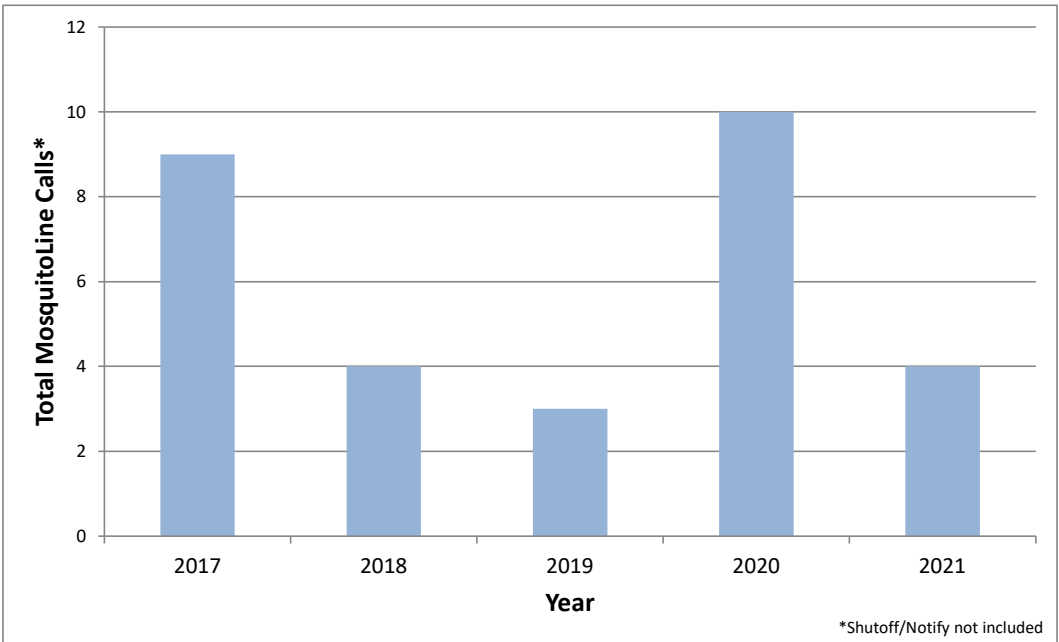


Figure 16 Comparison of Total Mosquito Control Calls by Year



Appendix A: City of Louisville Individual Light Trap Summaries

LO-01

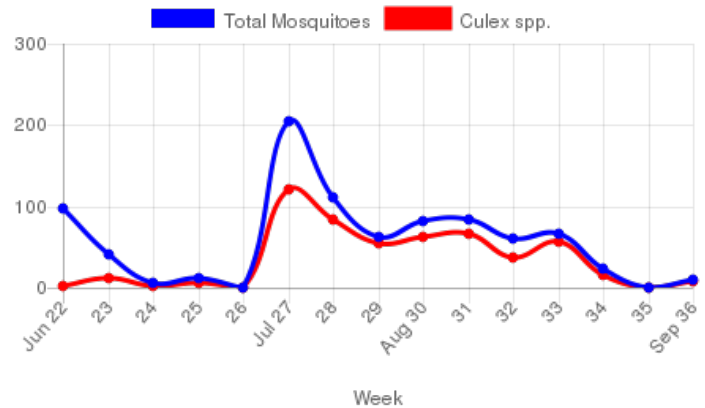
Season: 06/01/2021 - 09/20/2021
 Trap Type: CDC Light Trap
 Location: Louisville Coal Creek At Dillon Road
 GPS: 39.957750025757214, -105.15199989080428

Total number of trap/nights set: 16.0
 Total number of mosquitoes collected: 862.0
 Average mosquitoes per trap/night: 53.9
 Average Culex per trap/night: 33.2

Species collected and abundance:

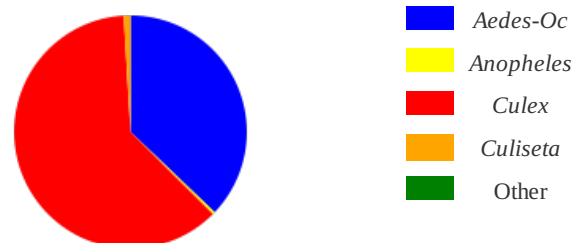
<i>Aedes dorsalis</i>	4.0	0.5%
<i>Aedes hendersoni</i>	3.0	0.3%
<i>Aedes increpitus</i>	121.0	14.0%
<i>Aedes melanimon</i>	7.0	0.8%
<i>Aedes vexans</i>	185.0	21.5%
<i>Anopheles freeborni</i>	3.0	0.3%
<i>Culex pipiens</i>	42.0	4.9%
<i>Culex salinarius</i>	26.0	3.0%
<i>Culex tarsalis</i>	463.0	53.7%
<i>Culiseta inornata</i>	8.0	0.9%

Seasonality



Genus Proportions:

Genus	Number	Percent of Total
<i>Aedes/Ochlerotatus</i>	320.0	37.1%
<i>Anopheles</i>	3.0	0.3%
<i>Culex</i>	531.0	61.6%
<i>Culiseta</i>	8.0	0.9%
Other	0.0	0.0%



LO-04

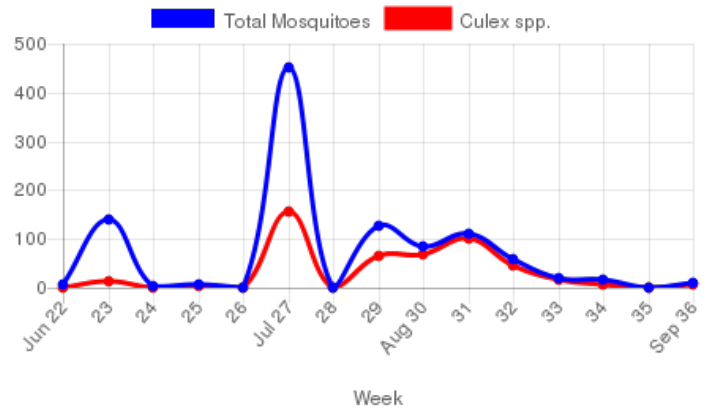
Season: 06/01/2021 - 09/20/2021
 Trap Type: CDC Light Trap
 Location: Annette A. Brand Park/Louisville Reservoir
 GPS: 39.99025, -105.15825

Total number of trap/nights set: 15.0
 Total number of mosquitoes collected: 1,034.0
 Average mosquitoes per trap/night: 68.9
 Average Culex per trap/night: 32.5

Species collected and abundance:

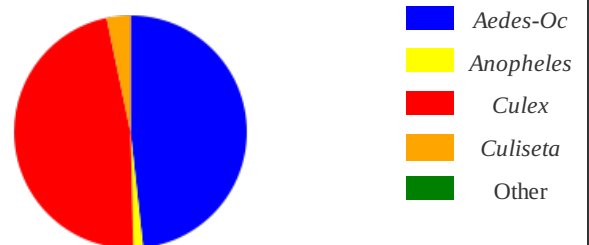
<i>Aedes dorsalis</i>	11.0	1.1%
<i>Aedes increpitus</i>	4.0	0.4%
<i>Aedes melanimon</i>	8.0	0.8%
<i>Aedes trivittatus</i>	1.0	0.1%
<i>Aedes vexans</i>	475.0	45.9%
<i>Anopheles freeborni</i>	14.0	1.4%
<i>Culex pipiens</i>	47.0	4.5%
<i>Culex salinarius</i>	14.0	1.4%
<i>Culex tarsalis</i>	426.0	41.2%
<i>Culiseta inornata</i>	34.0	3.3%

Seasonality



Genus Proportions:

Genus	Number	Percent of Total
<i>Aedes/Ochlerotatus</i>	499.0	48.3%
<i>Anopheles</i>	14.0	1.4%
<i>Culex</i>	487.0	47.1%
<i>Culiseta</i>	34.0	3.3%
Other	0.0	0.0%



LO-08

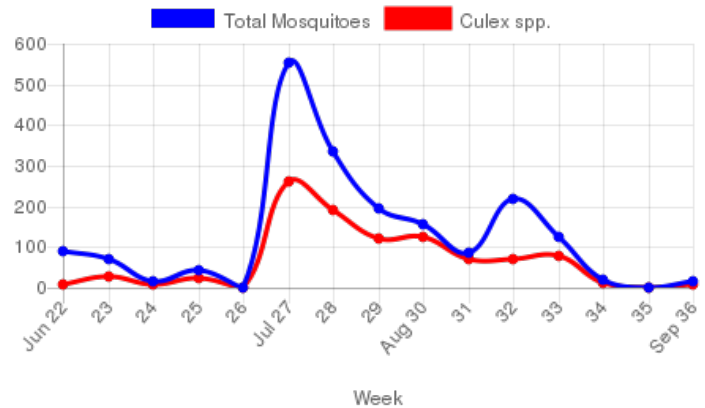
Season: 06/01/2021 - 09/20/2021
 Trap Type: CDC Light Trap
 Location: Louisville SE - Coal Creek Aspen Way
 GPS: 39.96849929260254, -105.13332769274712

Total number of trap/nights set: 16.0
 Total number of mosquitoes collected: 1,930.0
 Average mosquitoes per trap/night: 120.6
 Average Culex per trap/night: 62.9

Species collected and abundance:

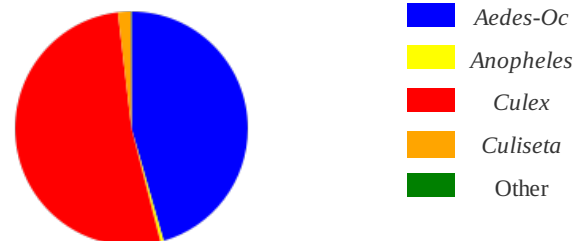
<i>Aedes dorsalis</i>	11.0	0.6%
<i>Aedes hendersoni</i>	3.0	0.2%
<i>Aedes increpitus</i>	9.0	0.5%
<i>Aedes melanimon</i>	142.0	7.4%
<i>Aedes trivittatus</i>	18.0	0.9%
<i>Aedes vexans</i>	696.0	36.1%
<i>Anopheles freeborni</i>	8.0	0.4%
<i>Anopheles hermsi</i>	1.0	0.1%
<i>Coquillettidia perturbans</i>	1.0	0.1%
<i>Culex pipiens</i>	86.0	4.5%
<i>Culex salinarius</i>	28.0	1.5%
<i>Culex tarsalis</i>	892.0	46.2%
<i>Culiseta inornata</i>	35.0	1.8%

Seasonality



Genus Proportions:

Genus	Number	Percent of Total
<i>Aedes/Ochlerotatus</i>	879.0	45.5%
<i>Anopheles</i>	9.0	0.5%
<i>Culex</i>	1,006.0	52.1%
<i>Culiseta</i>	35.0	1.8%
Other	1.0	0.1%



*Appendix B: Adult Sample Pool Test Results for West Nile Virus
Positive Locations (BCZ3)*



Arboviral Surveillance Results

Start Date: 06/01/2021 End Date: 09/30/2021

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	06/27/2021	CDC Light Trap	06/30/2021	BC03007	<i>Culex tarsalis</i>	6	Negative	RT-PCR
LO-01	07/05/2021	CDC Light Trap	07/07/2021	BC03024	<i>Culex tarsalis</i>	24	Negative	RT-PCR
LO-01	07/11/2021	CDC Light Trap	07/14/2021	BC03037	<i>Culex tarsalis</i>	65	Negative	RT-PCR
LO-01	07/11/2021	CDC Light Trap	07/14/2021	BC03039	<i>Culex tarsalis</i>	19	Negative	RT-PCR
LO-01	07/18/2021	CDC Light Trap	07/20/2021	BC03052	<i>Culex tarsalis</i>	65	Negative	RT-PCR
LO-01	07/18/2021	CDC Light Trap	07/20/2021	BC03054	<i>Culex tarsalis</i>	14	Negative	RT-PCR
LO-01	07/25/2021	CDC Light Trap	07/27/2021	BC03067	<i>Culex tarsalis</i>	52	Negative	RT-PCR
LO-01	08/01/2021	CDC Light Trap	08/04/2021	BC03083	<i>Culex tarsalis</i>	43	Negative	RT-PCR
LO-01	08/08/2021	CDC Light Trap	08/10/2021	BC03099	<i>Culex tarsalis</i>	42	Negative	RT-PCR
LO-01	08/15/2021	CDC Light Trap	08/17/2021	BC03115	<i>Culex tarsalis</i>	33	Negative	RT-PCR
LO-01	08/22/2021	CDC Light Trap	08/24/2021	BC03132	<i>Culex tarsalis</i>	49	Negative	RT-PCR
LO-01	08/29/2021	CDC Light Trap	08/31/2021	BC03141	<i>Culex tarsalis</i>	12	WNV+	RT-PCR
LO-01	09/07/2021	CDC Light Trap	09/08/2021	BC03144	<i>Culex tarsalis</i>	1	WNV+	RT-PCR
LO-08	06/27/2021	CDC Light Trap	06/30/2021	BC03007	<i>Culex tarsalis</i>	22	Negative	RT-PCR
LO-08	07/05/2021	CDC Light Trap	07/07/2021	BC03023	<i>Culex tarsalis</i>	65	Negative	RT-PCR
LO-08	07/11/2021	CDC Light Trap	07/14/2021	BC03038	<i>Culex tarsalis</i>	65	Negative	RT-PCR
LO-08	07/11/2021	CDC Light Trap	07/14/2021	BC03039	<i>Culex tarsalis</i>	34	Negative	RT-PCR
LO-08	07/18/2021	CDC Light Trap	07/20/2021	BC03053	<i>Culex tarsalis</i>	65	Negative	RT-PCR
LO-08	07/18/2021	CDC Light Trap	07/20/2021	BC03054	<i>Culex tarsalis</i>	43	Negative	RT-PCR
LO-08	07/25/2021	CDC Light Trap	07/27/2021	BC03068	<i>Culex tarsalis</i>	65	Negative	RT-PCR
LO-08	07/25/2021	CDC Light Trap	07/27/2021	BC03069	<i>Culex tarsalis</i>	41	Negative	RT-PCR
LO-08	08/01/2021	CDC Light Trap	08/04/2021	BC03084	<i>Culex tarsalis</i>	65	WNV+	RT-PCR
LO-08	08/08/2021	CDC Light Trap	08/10/2021	BC03098	<i>Culex tarsalis</i>	58	WNV+	RT-PCR

Trap Number	Trap Date	Trap Type	Date Tested	Pool No.	Mosquito Species	Pool Size	Results	Assay
LO-08	08/15/2021	CDC Light Trap	08/17/2021	BC03116	<i>Culex tarsalis</i>	50	WNV+	RT-PCR
LO-08	08/22/2021	CDC Light Trap	08/24/2021	BC03133	<i>Culex tarsalis</i>	65	Negative	RT-PCR
LO-08	08/29/2021	CDC Light Trap	08/31/2021	BC03141	<i>Culex tarsalis</i>	8	WNV+	RT-PCR
LO-08	09/07/2021	CDC Light Trap	09/08/2021	BC03144	<i>Culex tarsalis</i>	3	WNV+	RT-PCR
Total Pools Tested: 27 Total Mosquitoes Tested: 1074 Total Negative: 20 Total Positive: 7								



Arboviral Surveillance Results

Start Date: 06/01/2021 End Date: 09/30/2021

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	06/27/2021	CDC Light Trap	06/30/2021	BC03006	<i>Culex tarsalis</i>	20	Negative	RT-PCR
LA-11	07/05/2021	CDC Light Trap	07/07/2021	BC03022	<i>Culex tarsalis</i>	65	Negative	RT-PCR
LA-11	07/11/2021	CDC Light Trap	07/14/2021	BC03036	<i>Culex tarsalis</i>	65	Negative	RT-PCR
LA-11	07/18/2021	CDC Light Trap	07/20/2021	BC03051	<i>Culex tarsalis</i>	65	Negative	RT-PCR
LA-11	07/25/2021	CDC Light Trap	07/27/2021	BC03066	<i>Culex tarsalis</i>	65	Negative	RT-PCR
LA-11	07/25/2021	CDC Light Trap	07/27/2021	BC03067	<i>Culex tarsalis</i>	13	Negative	RT-PCR
LA-11	08/01/2021	CDC Light Trap	08/04/2021	BC03082	<i>Culex tarsalis</i>	65	Negative	RT-PCR
LA-11	08/08/2021	CDC Light Trap	08/10/2021	BC03097	<i>Culex tarsalis</i>	65	WNV+	RT-PCR
LA-11	08/08/2021	CDC Light Trap	08/10/2021	BC03098	<i>Culex tarsalis</i>	7	WNV+	RT-PCR
LA-11	08/15/2021	CDC Light Trap	08/17/2021	BC03114	<i>Culex tarsalis</i>	65	WNV+	RT-PCR
LA-11	08/15/2021	CDC Light Trap	08/17/2021	BC03115	<i>Culex tarsalis</i>	32	Negative	RT-PCR
LA-11	08/15/2021	CDC Light Trap	08/17/2021	BC03116	<i>Culex tarsalis</i>	1	WNV+	RT-PCR
LA-11	08/22/2021	CDC Light Trap	08/24/2021	BC03130	<i>Culex tarsalis</i>	65	Negative	RT-PCR
LA-11	08/22/2021	CDC Light Trap	08/24/2021	BC03131	<i>Culex tarsalis</i>	65	WNV+	RT-PCR
LA-11	08/29/2021	CDC Light Trap	08/31/2021	BC03141	<i>Culex tarsalis</i>	34	WNV+	RT-PCR
LA-11	09/07/2021	CDC Light Trap	09/08/2021	BC03144	<i>Culex tarsalis</i>	7	WNV+	RT-PCR

Total Pools Tested: 16 Total Mosquitoes Tested: 699 Total Negative: 9 Total Positive: 7



Arboviral Surveillance Results

Start Date: 06/01/2021 End Date: 09/30/2021

Town of Erie

Trap Number	Trap Date	Trap Type	Date Tested	Pool No.	Mosquito Species	Pool Size	Results	Assay
Treatment Area ER-02 Test Results								
ER-03	06/27/2021	CDC Light Trap	06/30/2021	BC03006	<i>Culex tarsalis</i>	27	Negative	RT-PCR
ER-03	07/05/2021	CDC Light Trap	07/07/2021	BC03020	<i>Culex tarsalis</i>	65	Negative	RT-PCR
ER-03	07/05/2021	CDC Light Trap	07/07/2021	BC03021	<i>Culex tarsalis</i>	65	Negative	RT-PCR
ER-03	07/11/2021	CDC Light Trap	07/14/2021	BC03035	<i>Culex tarsalis</i>	65	Negative	RT-PCR
ER-03	07/18/2021	CDC Light Trap	07/20/2021	BC03050	<i>Culex tarsalis</i>	65	Negative	RT-PCR
ER-03	07/25/2021	CDC Light Trap	07/27/2021	BC03065	<i>Culex tarsalis</i>	65	WNV+	RT-PCR
ER-03	08/01/2021	CDC Light Trap	08/04/2021	BC03081	<i>Culex tarsalis</i>	65	Negative	RT-PCR
ER-03	08/08/2021	CDC Light Trap	08/10/2021	BC03095	<i>Culex tarsalis</i>	65	WNV+	RT-PCR
ER-03	08/08/2021	CDC Light Trap	08/10/2021	BC03096	<i>Culex tarsalis</i>	65	WNV+	RT-PCR
ER-03	08/08/2021	CDC Light Trap	08/10/2021	BC03099	<i>Culex tarsalis</i>	10	Negative	RT-PCR
ER-03	08/15/2021	CDC Light Trap	08/17/2021	BC03112	<i>Culex tarsalis</i>	65	Negative	RT-PCR
ER-03	08/15/2021	CDC Light Trap	08/17/2021	BC03113	<i>Culex tarsalis</i>	65	Negative	RT-PCR
ER-03	08/22/2021	CDC Light Trap	08/24/2021	BC03129	<i>Culex tarsalis</i>	65	WNV+	RT-PCR
ER-03	08/29/2021	CDC Light Trap	08/31/2021	BC03140	<i>Culex tarsalis</i>	45	WNV+	RT-PCR
ER-03	09/07/2021	CDC Light Trap	09/08/2021	BC03144	<i>Culex tarsalis</i>	21	WNV+	RT-PCR

Total Pools Tested: 15 Total Mosquitoes Tested: 818 Total Negative: 9 Total Positive: 6



Arboviral Surveillance Results

Start Date: 06/01/2021 End Date: 09/30/2021

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	06/27/2021	CDC Light Trap	06/30/2021	BC03007	<i>Culex tarsalis</i>	4	Negative	RT-PCR
SU-02	07/05/2021	CDC Light Trap	07/07/2021	BC03024	<i>Culex tarsalis</i>	41	Negative	RT-PCR
SU-02	07/11/2021	CDC Light Trap	07/14/2021	BC03039	<i>Culex tarsalis</i>	12	Negative	RT-PCR
SU-02	07/18/2021	CDC Light Trap	07/20/2021	BC03054	<i>Culex tarsalis</i>	8	Negative	RT-PCR
SU-02	07/25/2021	CDC Light Trap	07/27/2021	BC03069	<i>Culex tarsalis</i>	24	Negative	RT-PCR
SU-02	08/01/2021	CDC Light Trap	08/04/2021	BC03083	<i>Culex tarsalis</i>	22	Negative	RT-PCR
SU-02	08/08/2021	CDC Light Trap	08/10/2021	BC03099	<i>Culex tarsalis</i>	13	Negative	RT-PCR
SU-02	08/15/2021	CDC Light Trap	08/17/2021	BC03116	<i>Culex tarsalis</i>	14	WNV+	RT-PCR
SU-02	08/22/2021	CDC Light Trap	08/24/2021	BC03132	<i>Culex tarsalis</i>	16	Negative	RT-PCR
SU-02	08/29/2021	CDC Light Trap	08/31/2021	BC03141	<i>Culex tarsalis</i>	1	WNV+	RT-PCR

Total Pools Tested: 10 Total Mosquitoes Tested: 155 Total Negative: 8 Total Positive: 2

Appendix C: City of Louisville Adulticide Application Data - Barrier



Ground Adulticide Applications

Start Date: 06/01/2021 End Date: 09/20/2021

City of Louisville

Month	Date	Municipality	Chemical	Mix Ratio	Trip Miles	Spray Miles	Spray Acres	Gallons Sprayed
LO Annette Brand Park Applications								
June 2021	06/17/2021		Wisdom TC (5481-520)	1:128	0.0	0.0	0.1	4.0
July 2021	07/16/2021		Wisdom TC (5481-520)	1:128	0.0	0.0	0.1	6.0
August 2021	08/12/2021		Wisdom TC (5481-520)	1:128	0.0	0.0	0.1	6.0
Total Wisdom TC Applied:								16.0
LO Coal Creek @ Aspen Way Applications								
July 2021	07/08/2021		Wisdom TC (5481-520)	1:128	0.0	0.0	0.0	18.0
	07/15/2021		Wisdom TC (5481-520)	1:128	0.0	0.0	0.3	12.0
	07/22/2021		Wisdom TC (5481-520)	1:128	0.0	0.0	0.4	18.0
	07/29/2021		Wisdom TC (5481-520)	1:128	0.0	0.0	0.4	18.0
August 2021	08/05/2021		Wisdom TC (5481-520)	1:128	0.0	0.0	0.4	16.0
	08/19/2021		Wisdom TC (5481-520)	1:128	0.0	0.0	0.4	18.0
	08/27/2021		Wisdom TC (5481-520)	1:128	0.0	0.0	0.3	12.0
Total Wisdom TC Applied:								112.0

Month	Date	Municipality	Chemical	Mix Ratio	Trip Miles	Spray Miles	Spray Acres	Gallons Sprayed
LO Coal Creek @ Dillon Rd Applications								
July 2021	07/15/2021		Wisdom TC (5481-520)	1:128	0.0	0.0	0.1	6.0
	07/22/2021		Wisdom TC (5481-520)	1:128	0.0	0.0	0.1	6.0
<i>Total Wisdom TC Applied:</i>								<i>12.0</i>
<i>LO Coal Creek @ Dillon Rd Totals:</i>					<i>0.0</i>	<i>0.0</i>	<i>2.8</i>	<i>140.0</i>
<i>Grand Totals:</i>					<i>0.0</i>	<i>0.0</i>	<i>2.8</i>	<i>140.0</i>