



## 2022 Arbovirus Activity Summary\*

January 2024

Williamson County and Cities Health District  
Integrated Vector Management Program  
Division of Epidemiology and Disease Surveillance

**\*Finalized state-wide data of human arboviral conditions has not been released from the Texas Department of State Health Services as of the creation of this report. State-wide numbers of human arboviral conditions shown in this report are preliminary and will be finalized upon the release of 2022 case closeouts. Non-human data (mosquito, avian, equine, sentinel chicken) is final and reflected within this report.**

## Introduction

Viruses transmitted by mosquitoes are referred to as arthropod-borne (arbo) viruses. The Williamson County and Cities Health District's (WCCHD) Integrated Vector Management (IVM) Program conducts mosquito surveillance throughout Williamson County during the months of May through November, the time of which mosquitoes are most active. The purpose of mosquito surveillance is to identify virus presence within the mosquito populations, so it can be used as a warning signal for potential human infection and allow WCCHD and affected municipalities to respond in accordance with the appropriate action(s).

In terms of arbovirus activity in 2022, WCCHD reported:

- 1 human case of West Nile virus (WNV)
- 4 mosquito samples positive for WNV
- 3 human cases of dengue virus (all travel-related)

As noted in Table 1, no other arboviruses were reported in 2022.

Table 1) Year-End Arbovirus Activity Summary, Williamson County, TX, 2022

Arbovirus	Mosquito Pools	Avian	Equine	Sentinel Chicken	Human				
					Febrile Illness	Neurologic Illness	Severe Dengue	Deaths	PVD <sup>2</sup>
Chikungunya									
Dengue <sup>1</sup>					3				
Eastern Equine Encephalitis									
St. Louis Encephalitis									
West Nile	4					1		1	
Zika									

Note: Arboviral testing in mosquito populations limited to WNV, St. Louis Encephalitis, and Eastern Equine Encephalitis in 2022. Routine surveillance/testing is not conducted on sentinel chickens or avian populations in Williamson County. Equine species are only tested when ill.

<sup>1</sup> Case was travel related.

<sup>2</sup> PVD- presumptive viremic blood donors are people who had no symptoms at the time of donating blood through a blood collection agency, but whose blood tested positive when screened for the presence of an arbovirus (WNV or Zika virus). Some PVDs may develop symptoms after donation. PVD's are not considered cases until they meet the case definition requirements of that condition.

## Methods

The IVM Program at WCCHD maintained Centers for Disease Control and Prevention (CDC) gravid traps (figure 1) throughout 20 static Williamson County locations. This was a 25% increase in static trapping due to the addition of four pilot trap locations in 2022. Each week, the traps are set in the early afternoon and collected the following morning. Collected mosquitoes are then transported to the Texas Department of State Health Services (DSHS) Laboratory in Austin where they are counted, identified, pooled (grouped) by species, and select vector species are tested for various arboviruses using multiplex Polymerase Chain Reaction (PCR). The multiplex PCR assay tests for the presence of West Nile virus (WNV), St. Louis encephalitis virus (SLEV), and Eastern Equine Encephalitis virus (EEEV) in pools of select *Culex* (*Cx. quinquefasciatus*, *Cx. tarsalis*, *Cx. restuans*, *Cx. nigripalpus*, *Cx. salinarius*, and *Cx.*

*melanconion*) mosquitoes. Testing for EEEV was added in 2022, while testing for Western Equine Encephalitis virus was discontinued.

**Figure 1) CDC Gravid Mosquito Trap**



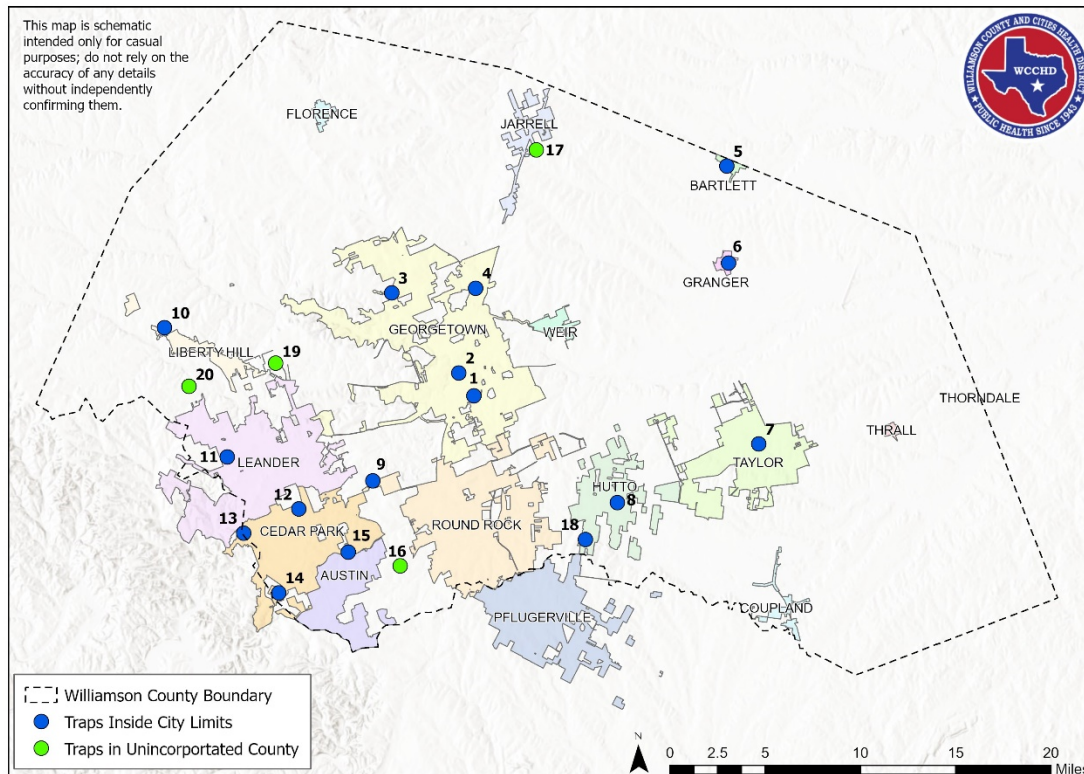
A total of 634 mosquito pools from 510 traps were tested in 2022 (Table 2). Routine multiplex PCR testing of *Aedes* mosquitoes was discontinued in 2021 but is available by DSHS upon request, in the event of case investigation(s). Each week, approximately 20% of samples will be additionally tested using virus isolation by cell culture. This process is used to monitor for any emerging arboviruses in the mosquito population. Results from laboratory testing are sent directly to WCCHD to maintain and respond accordingly based on results received. Virus-positive mosquito pools are immediately communicated to WCCHD, and action(s) are recommended to the affected municipality under the guidance of the IVM Program Lead. Recommendations of control can range from verbal/written alerts to physical and/or biological and/or chemical control. Methods of control used in 2021 included: health alerts via social media, signage placed in vicinity of positive trap sites, increased testing/traps, and use of larvicide applications.

**Table 2) 2022 Mosquito Trapping Summary**

<b>City (# primary traps)</b>	<b>Mosquito Traps Submitted</b>	<b>Mosquito Pools Tested (PCR)</b>
<b>Bartlett (1)</b>	27	36
<b>Cedar Park (4)</b>	106	132
<b>Georgetown (4)</b>	111	142
<b>Granger (1)</b>	26	29
<b>Hutto (2)</b>	49	57
<b>Leander (1)</b>	28	43
<b>Liberty Hill (1)</b>	24	28
<b>Taylor (1)</b>	24	27
<b>Unincorporated County (4)</b>	115	140
<b>Grand Total</b>	<b>510</b>	<b>634</b>

Traps were set in the cities of Bartlett, Cedar Park, Georgetown, Granger, Hutto, Leander, Liberty Hill, Taylor, and unincorporated areas of the county (Figure 1). The pilot traps (#16-20) placed in 2022 were in Hutto and three other locations, in unincorporated Williamson County. The traps are placed in low/high intensity urban areas or residential park habitats. Traps numbered 1-16 displayed in Figure 1 have remained static since 2018. Depending on the location of each trap, 1 to 2 expanded traps may be placed in response to a WNV-positive mosquito pool. Expanded trapping occurred in Cedar Park and Georgetown. While surveillance is conducted by WCCHD, each individual municipality is responsible for their own mosquito control. In 2022, WCCHD maintained a contingency contract with Vector Disease Control International for mosquito adulticide services in the event mosquito control was requested by a municipality.

**Figure 2) Mosquito Trap Locations, Williamson County, 2022**



## Overview of Arboviruses

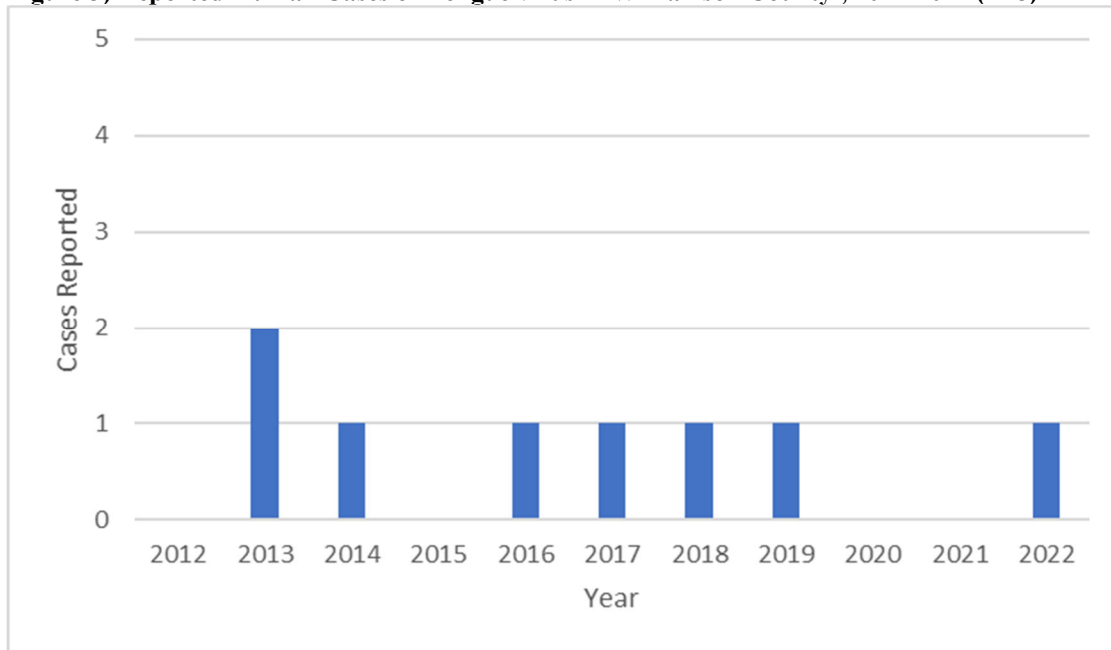
### Chikungunya Virus

Chikungunya virus (CHIKV) is an alphavirus that is transmitted by *Aedes aegypti* and *Aedes albopictus* mosquitoes. This virus is maintained between mosquito and humans. Outbreaks have been known to occur in Africa, Asia, and the Pacific and Indian Oceans. CHIKV was first found in the US in 2013 in the Caribbean. While it is not uncommon to have travel-acquired infections, there are occasionally locally acquired cases of CHIKV in Texas. No CHIKV activity was reported in Texas in 2022.

## **Dengue Virus**

Dengue virus (DENV) is a flavivirus that is transmitted to by *Aedes aegypti* and *Aedes albopictus* mosquitoes. This virus is maintained between mosquito and humans. This virus is established in more than 100 countries throughout the world, with almost 40% of the world's population at risk of infection. Dengue virus has 4 serotypes, so it is possible one person can contract DENV up to 4 times. Subsequent infection can potentially result in more severe illness. Travel related cases are not uncommon in Texas, and there is occasional intermittent local transmission of DENV in south Texas. In 2022 there were 35 human cases of dengue reported in Texas, 3 of which were Williamson County residents. All cases of dengue in 2022 in Texas were travel related.

**Figure 3) Reported Human Cases of Dengue virus in Williamson County<sup>1</sup>, 2012-2022 (n=8)**



1. Williamson County dengue cases reported have all been travel related.

## **Eastern Equine Encephalitis Virus**

Eastern equine encephalitis virus (EEEV) is an alphavirus that is mostly circulated between *Culiseta melanura* mosquitoes and birds in swamp habitats. EEEV is a rare illness among humans as the primary vector feeds almost exclusively on birds. There are some instances of bridge vectors that can lead to infection in humans and other mammalian hosts, but these occurrences are rare in Texas and the US. The large majority of the EEEV cases in humans are reported from the northeast US (CDC). There are parts of northeast Texas with habitat suitable for EEEV transmission, with occasional reports of EEEV positive horses and antibody-positive sentinel chicken flocks. Due to increased viral activity, EEEV was added to the multiplex panel for routine surveillance in 2022. One horse was reported EEEV positive in Texas in 2022. Williamson County has no documented incidences of EEEV.

## **Saint Louis Encephalitis Virus**

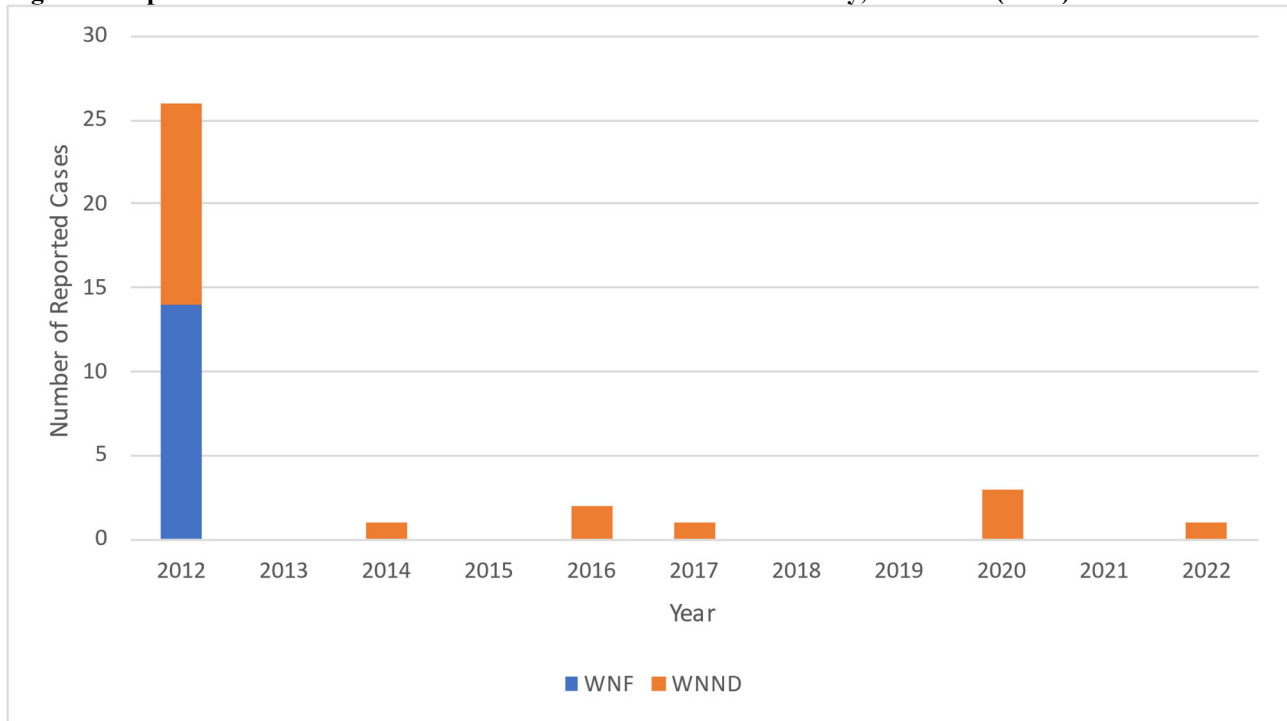
St. Louis encephalitis virus (SLEV) is a flavivirus that is maintained between mosquitoes and birds. *Culex* species are the primary vector for SLEV. SLEV can be found year-round in Texas.

It is not uncommon to see reports of SLEV in mosquitoes from southern/southeastern/western Texas counties. DSHS reported 1 human SLEV case and 2 positive mosquito pools in 2022. Williamson County has no documented incidences of SLEV.

### West Nile Virus

West Nile virus (WNV) is a flavivirus maintained primarily by *Culex* mosquitoes and birds. WNV is endemic in Texas and circulates throughout all continents in the world except Antarctica. WNV was first identified in the United States in New York in 1999. It was not until 2002 that WNV became a notifiable condition in Texas. A large outbreak of WNV occurred in 2012 in Dallas County, prompting the need for increased mosquito surveillance throughout the state. In 2012, Williamson County had 26 human WNV disease cases reported (Figure 2). The following year, WCCHD piloted a mosquito surveillance program in Georgetown, and it has since expanded to include 20 mosquito traps across the county.

**Figure 4. Reported Human Cases of West Nile Virus in Williamson County, 2012-2022 (n=34)**



\*West Nile Fever- WNF

\*West Nile Neuroinvasive Disease- WNND

One human case of West Nile neuroinvasive disease (resulting in death) was reported in Williamson County in 2022, in addition to 4 WNV-positive mosquito samples. The onset date of the human case occurred in MMWR week 46. Additional information on the single human case is limited to protect patient confidentiality. Additional passive human surveillance for WNV include reports of presumptive viremic donors (PVD) by blood collection agencies. PVD's are individuals who had no symptoms at the time of donating blood through a blood collection agency, but whose blood tested positive when screened for the presence of an arbovirus (WNV or ZIKV). While PVDs' are not considered cases, should they develop symptoms consistent with

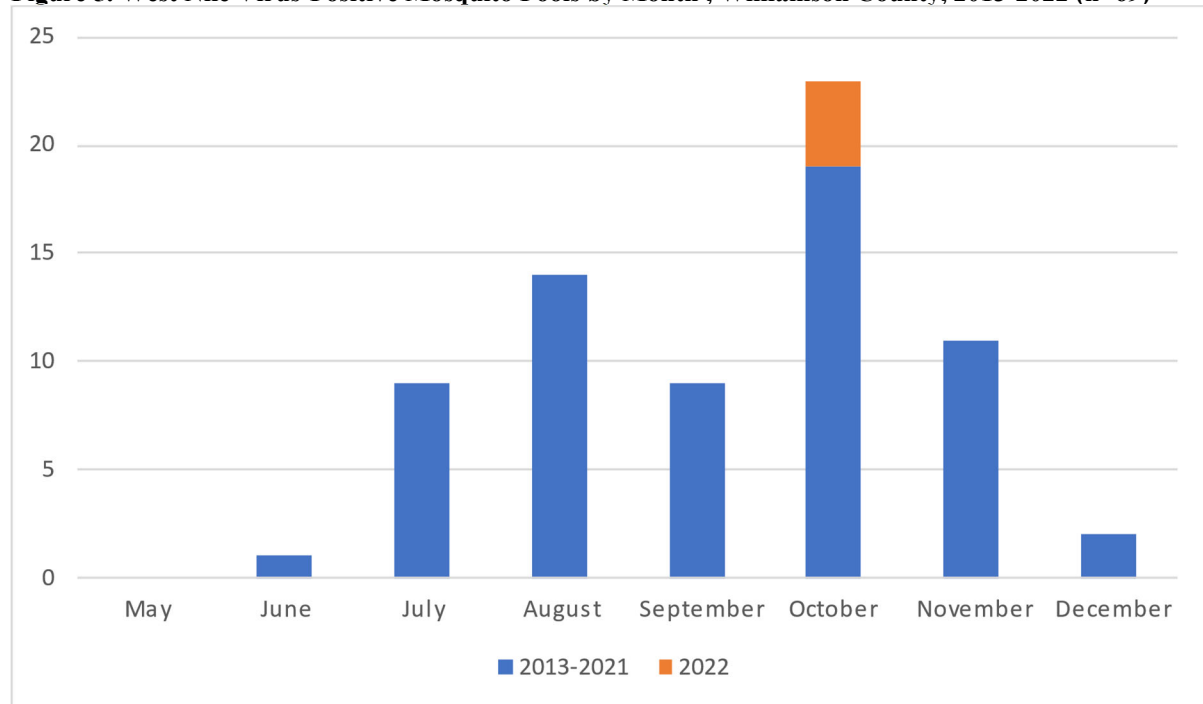


WNV within 14 days of their positive screening, additional testing is warranted to confirm infection. No PVDs were identified in Williamson County in 2022.

Williamson County typically observes peak WNV activity in the mosquito population in the later part of the trapping season, with 52% of positive mosquito pools collected after September (Figure 5). In 2022, WNV-positive mosquito samples were only detected in October (MMWR weeks 40 and 41) in traps from Cedar Park (2) and Georgetown (2), respectively. It was also noted that these WNV-positive mosquito samples occurred during peak mosquito activity, with average trap abundance being 130 in week 40 and 76 in week 41. Increases in mosquito abundance typically occur after rain events, and in 2022 there were extensive drought conditions throughout the summer months.

In response to virus-positive mosquito pools, affected cities increased awareness of WNV through social media, signage in community parks, and increased larviciding and source reduction operations. No adulticide missions were conducted in 2022.

**Figure 5. West Nile Virus-Positive Mosquito Pools by Month<sup>1</sup>, Williamson County, 2013-2022 (n=69)**



1. Routine mosquito surveillance conducted May-November. The December value was detected following continued surveillance operations following a positive sample in the final week of November 2021.

Statewide\*, DSHS reported a total of 410 mosquito pools (72.9% decrease from 2021), 1 bird (90% decrease from 2021), and 10 horses (11.1% increase from 2021), that were positive for WNV. Additionally, DSHS reported a total of 36 human cases of WNV (5 WNF, 31 WNND) and 12 presumptive viremic donors of WNV. This was a 53.2% decrease in human cases from 2021. Most of the human cases of WNV reported in 2022 were from El Paso and Montgomery Counties (61.1%). Overall, there was a decrease in WNV activity in 2022 across state that was also reflected in Williamson County.

\*Statewide data is preliminary until certified by DSHS.

## **Zika Virus**

Zika virus (ZIKV) is a flavivirus that is transmitted to humans by *Aedes aegypti* and *Aedes albopictus* mosquitoes. First discovered from the Zika Forest in Uganda, ZIKV has caused occasional outbreaks in tropical locations of Africa, the Pacific Islands, and Southeast Asia. The first instance of local transmission in the Americas was in 2015 in Brazil. In 2016, locally acquired infections of ZIKV were found in the Caribbean, Latin America, and southern tips of Florida and Texas. ZIKV is unique from the other arboviruses in that it has been known to cause birth defects and pregnancy complications in women infected during gestation, and this is currently the only known arbovirus that can be transmitted sexually.

An outbreak of ZIKV occurred in Texas in 2016 resulting in 315 human cases, 6 of which were locally acquired by infected mosquitoes, and 2 cases of sexually transmitted infection (DSHS). During the 2016 ZIKV outbreak, 5 travel associated human cases of ZIKV were identified in Williamson County. It is not unusual to see travel associated ZIKV cases along with occasional local transmission in south Texas near the Mexico border. No incidences of Zika (human or mosquito), have been reported since 2016.

## Limitations

The effects of the pandemic have continued to delay the release of finalized state-level data for arboviral surveillance for years 2020-2022. The data collected locally in 2022 will be reflected on the DSHS 2022 Arbovirus Report once it is released. An addendum will be added to this document to correct any data inconsistencies identified.

Action thresholds for adult mosquito control were introduced in the 2022 season. These thresholds used entomological indicators to assess human risk of WNV and guide adult mosquito control recommendations to stakeholders. The thresholds were based on 2017-2021 local mosquito surveillance data.

Usual limitations pertaining to mosquito surveillance include trap malfunctions/vandalism, weather events, or lack thereof. Trap malfunctions noted in 2022 included battery failure/disconnection, motor failure, and water evaporation from traps. It is also important to note that mosquito surveillance is not conducted throughout all of Williamson County. A lack of virus-positive mosquito pools is not indicative of a lack of arboviral transmission in those areas. Expanding mosquito surveillance throughout Williamson County would provide more insight on arboviral activity in the county.

## Next Steps

WCCHD added four new traps in pilot locations in 2022 (1 in Hutto and 3 in unincorporated Williamson County). Following the conclusion of the 2022 surveillance season, two of the four traps will continue in the 2023 season (traps 17 and 18) and traps 19 and 20 will be relocated to new areas. Placement of new traps is dependent on staffing and funding of the IVM Program.



A part-time IVM technician was also added in March 2022. Historically, a seasonal technician was employed from May-November to assist with trap operations. This addition will be able to provide an entry-level vector control professional for WCCHD. Unfortunately, the part time position was vacated in August of 2022, and replaced with a temporary employee. WCCHD will return to a seasonal staff in 2023, and when funds allow, pursue a full-time surveillance employee to maintain year-round mosquito surveillance and control in Williamson County.

## Acronym Table

AMCA	American Mosquito Control Association
CDC	Centers for Disease Control and Prevention
CHIKV	Chikungunya virus
DENV	Dengue Virus
DSHS	Department of State Health Services
EEV	Eastern equine encephalitis virus
IVM	Integrated Vector Management
MMWR	Morbidity and Mortality Weekly Report
PCR	Polymerase chain reaction
PVD	Presumptive viremic donor
SLEV	St. Louis encephalitis virus
ULV	Ultra-low volume
WCCHD	Williamson and Cities Health District
WEEV	Western equine encephalitis virus
WNF	West Nile fever
WNND	West Nile neuroinvasive disease
WNV	West Nile virus
ZIKV	Zika virus

## Resources

[AMCA Best Management Practices for Integrated Mosquito Management](#)

CDC Chikungunya Virus webpage: <https://www.cdc.gov/chikungunya/>

CDC Dengue Virus webpage: <https://www.cdc.gov/dengue/>

CDC Eastern Equine Encephalitis webpage: <https://www.cdc.gov/EasternEquineEncephalitis/>

CDC Saint Louis Encephalitis Virus webpage: <https://www.cdc.gov/sle/>

CDC West Nile Virus webpage: <https://www.cdc.gov/westnile/>

CDC Zika webpage: <https://www.cdc.gov/zika/>

DSHS Arboviral Diseases Webpage: <https://www.dshs.texas.gov/idcu/disease/arboviral/>

WCCHD IVM webpage: [https://www.wcchd.org/healthy\\_people/mosquitorisks.php](https://www.wcchd.org/healthy_people/mosquitorisks.php)

## Acknowledgments and Data Sources

Williamson County and Cities Health District Integrated Vector Management Program, DSHS Arbovirus-Entomology Laboratory, DSHS Zoonosis Control Branch, medical providers, and veterinarians.