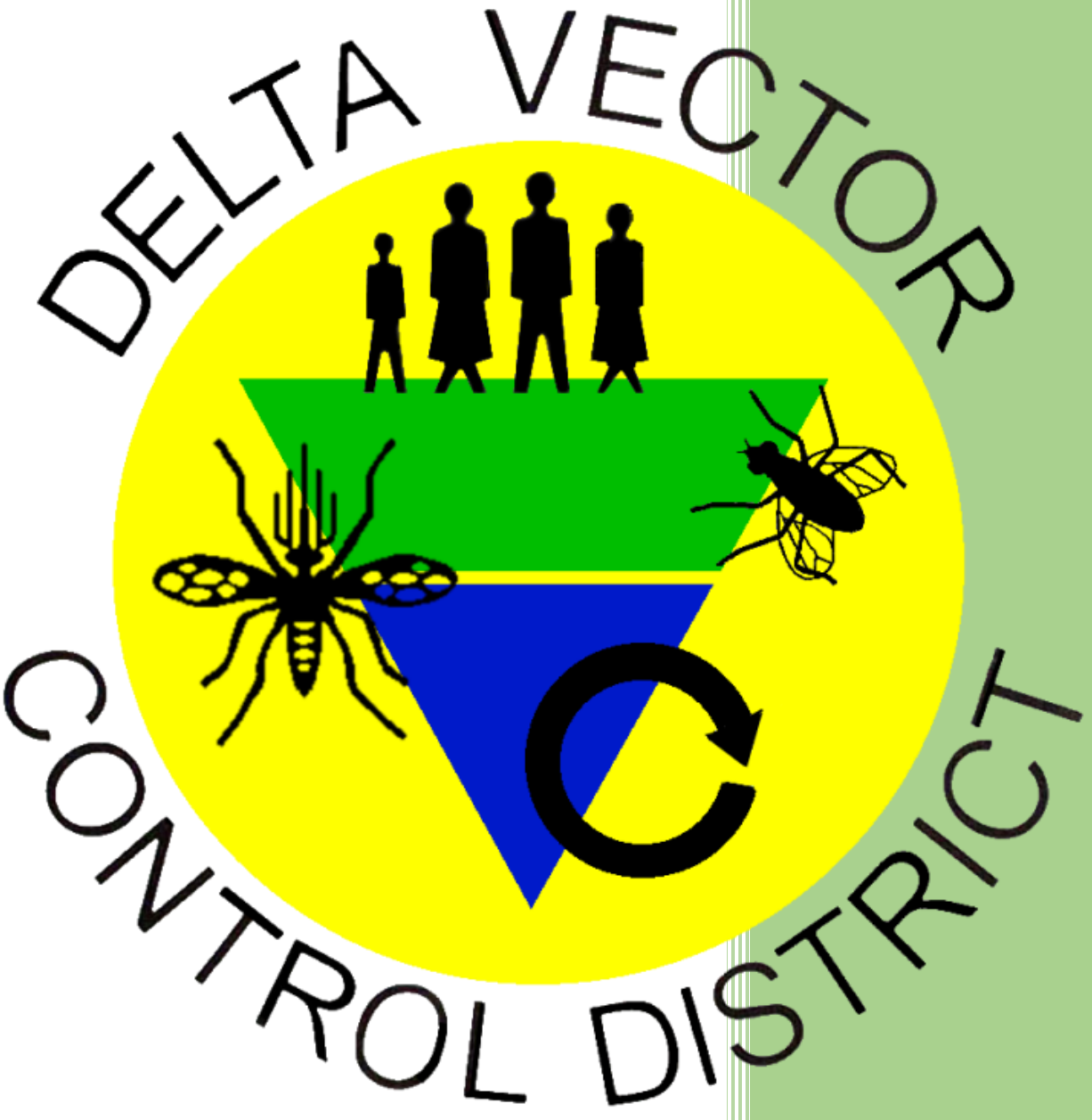
2018

The Delta Vector Control District Annual Report



Dear Residents,

This is the 2018 annual report for Delta Vector Control District, serving northwestern Tulare County. We are pleased to compile this report for your viewing, showing the work that was completed in the 2018 season and presenting issues and plans for improvement in the coming years.

It is a pleasure to be of service to you. Delta Vector Control District strives to be the finest and most responsive governmental organization you have ever encountered. Our employees are well trained, professional, and caring. As an organization, we are committed to providing effective, courteous, and timely service to you. We are problem solvers, willing to work hard to address and solve any vector problem you may be experiencing. The District prides itself on its consistent and dedicated work, while continuously attempting to improve existing programs and develop new ones. This year has brought a variety of new accomplishments and new challenges.

The 2018 mosquito season saw the implementation of the District's first Invasive Aedes Response Plan, after the rediscovery of the *Aedes aegypti* mosquito within the District in 2017. Lessons learned from 2018 will translate into a new and improved plan in 2019.

Our public education and outreach program also saw vast improvements in 2018, leading to increased public awareness of the District's role and the services that we offer. We celebrated this accomplishment with an increase in service requests, the likes of which the District hasn't seen in nearly ten years.

We also discovered the need for an improved fish program and have started to plan for an additional building to help the District grow into the future.

We look forward to the challenges and successes we will face in the future and thank you for standing with us through them in our efforts to make northwestern Tulare County a safer and healthier place to live, work, and raise a family.

Sincerely,

Michael W. Alburn, District Manager

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ABOUT THE DISTRICT

Vision Statement

The Delta Vector Control District will be the authority for vector control and vector-borne disease prevention in Tulare County.

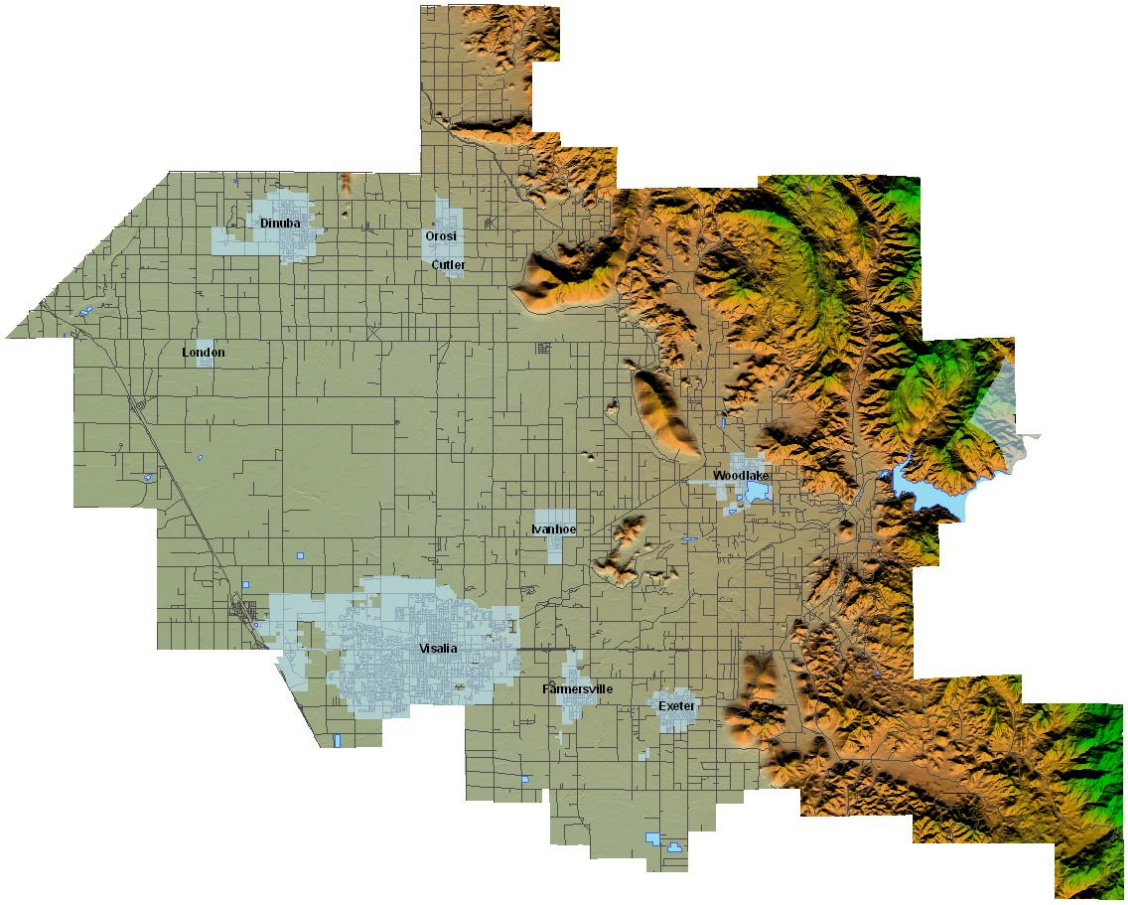
Mission Statement

> *"The Delta Vector Control District is committed to protecting the public's health from vector-borne disease and discomfort by delivering exceptional services which preserve and enhance the quality of life and desirability of the area in order to make Tulare County a safe place in which to live, work and raise a family."*

Goals

- Provide continual surveillance of mosquitoes to determine the threat of disease transmission and annoyance levels.
- Use safe integrated pest management methods to keep mosquito populations suppressed.
- Promote cooperation and communication with property owners, residents, social and political groups, and governmental agencies.

Delta Vector Control District Boundaries



History

In 1904, the first recorded mosquito control efforts in California were under the direction of UC professors and focused on salt-marsh mosquitoes in the San Francisco Bay marshlands. By 1908 malaria was devastating the Central Valley, which led to the adoption of the "Mosquito Abatement Act" across California in 1915. This act has since been incorporated into the California Health and Safety Code, Division 3, which forms the basis for the creation, governing powers, and functions of Mosquito and Vector Abatement and Control Districts today.

Delta Mosquito Abatement District was founded in 1922, covering 16 square miles – which at the time was the entire city of Visalia and some adjacent suburban areas. The District was formed in large part due to the efforts of the Visalia Woman's Civic Club to eliminate malaria, the most prominent disease of the time.

From 1922 to 1973, the District underwent some significant changes. Between 1922 and 1958, Delta Mosquito Abatement District annexed a total of six additional land expanses into the service area, ending with 712 square miles, the same area covered today. In 1946, headquarters were moved to its present-day location on Houston Avenue. The last improvement came in the form of a name change in 1973 to "Delta Vector Control District" to better reflect the services provided by the District.

In 2011, work began on a new laboratory facility to aid efforts to minimize disease risk. Another building will hopefully be added in 2019 to house the expanding laboratory program and assist with biological control efforts.

Delta Vector Control District is an independent special District which means that it is not part of the Tulare Country governmental system and is responsible directly to the people that it serves. The District prides itself on being accountable, accessible and efficient in conducting vector control activities. The District is governed by a Board of Trustees, each trustee appointed by one of the incorporated cities or for the county at large within the District's boundaries. Board members may serve multiple terms and are highly dedicated to this community service. Board meetings are held at 7:00 pm on the second Wednesday of each month at 1737 West Houston Avenue, Visalia, in the boardroom of the Lourenco Laboratory, and members of the public are welcome.

2018 Board of Trustees

President

Greg Gomez: City of Farmersville, first appointed 02/17, current term ending Dec 31, 2019

Secretary

Belen Gomez: City of Woodlake, first appointed 10/03, current term ending Dec 31, 2020

General Trustees

Larry Roberts: City of Dinuba, first appointed 01/11, current term ending Dec 31, 2020
Rosemary Hellwig: City of Exeter, first appointed 02/11, current term ending Dec 31, 2019
Kevin Caskey: County at Large, first appointed 03/16, current term ending Dec 31, 2020
Michael Cavanaugh: City of Visalia, first appointed 03/18, current term ending Dec 31, 2021
Linda Guttierrez: County at Large, first appointed 05/18, current term ending Dec 6, 2019

Delta Vector Control District

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instagram.com/deltavcd

Administration
Michael W. Alburn, *District Manager*
Sheri Davis, *Administrative Assistant*
Mark Dynge, *Systems Administrator*

Laboratory
Mir Bear-Johnson, MS, *Scientific Program Manager*
Jesse Erandio, *Biologist & Microbiologist*
Crystal Grippin, MSPH, *Biologist & Public Education Outreach Officer*
Mark Nakata, *Biologist & Biological Control Supervisor*
Seasonal Staff: (1) *Laboratory Intern I &* (5) *Laboratory Technician I*

Operations
Paul D. Jobe, *Superintendent*
Darin Dula, *Foreman & Mechanic*
Rick Alvarez, *Supervisor of House Mosquito Program*
Paul Harlien, *Vector Control Technician III-Mechanic*
Tim Christian, *Vector Control Technician III-Mechanic*
Bryan Ruiz, *Vector Control Technician III*
Ryan Toney, *Vector Control Technician III*
Jorge Lopez, *Vector Control Technician II*
Sergio Tovar, *Vector Control Technician II*
Seasonal Staff: (9) *Vector Control Technician I*

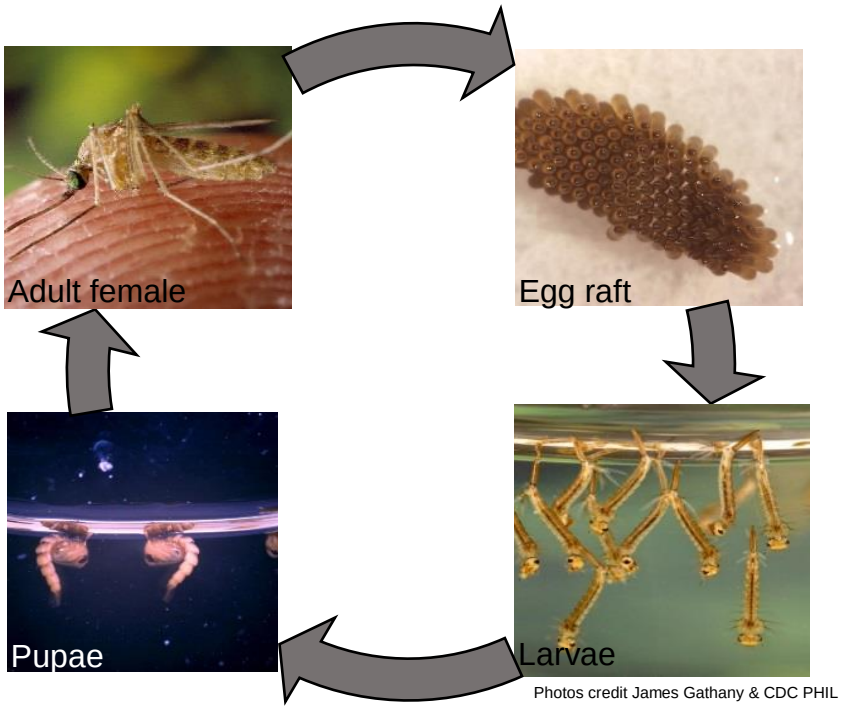
Special thanks to Taylor Tushar, MSc, the previous Scientific Program Manager.

Shop
Three employees with Automotive Service Excellence certification work at the District. They maintain twenty-five trucks, two flatbed trucks, three trailers, one car, two jeeps, three ARGOs, one ATV, a bobcat, an Interceptor utility vehicle, an A-1 mister, seventeen solo backpack sprayers, ten Hudson cans, twenty-eight spray tanks, eight Chapin cans, five Maruyama backpack sprayers, two Maruyama liquid sprayers, two herd seeders, one Polaris tank, thirteen truck oil tanks, one Colt hand fogger, and two Beecomist foggers.

Additionally, the shop and laboratory collaborate to update and maintain mosquito surveillance traps throughout the year.

Mosquito Species in the District

Mosquitoes are a type of fly in the taxonomic order of *Diptera* and family *Culicidae*. These insects are no bigger than a half inch with each species having unique characteristics and adaptations based on their preferred environmental conditions.



Photos credit James Gathany & CDC PHIL

Figure 1. Mosquito life cycle (*Culex quinquefasciatus*).

All mosquitoes undergo the same four stage life cycle: egg, larva, pupa, and adult. The first three stages of the life cycle are sometimes referred to as the immature stages. Mosquito eggs, laid on or next to water, hatch into larvae which must remain in water to stay alive. Larvae, sometimes called wigglers based on their movement, consume nutrients from the water. After undergoing four molts, or instars, larvae molt into pupae. Pupae, sometimes called tumblers, are a non-eating aquatic life stage after which the adult mosquito emerges. The entire mosquito life cycle, from egg to adult mosquito, can take as little as 5-7 days depending on weather and environmental conditions.

Adult mosquito lifespan varies, depending on conditions and species, averaging approximately one month. While adult male mosquitoes drink nectar exclusively, female mosquitoes require a blood meal as a source of protein to produce eggs and continue the life cycle. Thus, only female mosquitoes are capable of being vectors for disease.

Culex quinquefasciatus, *Culex tarsalis*, and *Culex stigmatosoma* are considered the main vectors of West Nile virus (WNV), St. Louis encephalitis virus (SLEV), and Western equine encephalitis virus (WEEV) within the District. *Culex* species, generally, prefer to bite at dawn or dusk and preferentially feed on birds, although they will bite humans opportunistically or when abundance is very high. *Culex* are usually active from March until November, depending on the temperatures during the year. Most overwinter as adults, finding warmer structures in which to remain dormant, but they may be observed during winter months when disturbed by human activity.

The southern house mosquito, *Culex quinquefasciatus*, is a brown or tan mosquito which prefers to breed in stagnant water that is rich with organic compounds, and therefore usually has an unpleasant odor. These mosquitoes are most often found breeding in unmaintained swimming pools, catch basins, dairy pits, or stagnant irrigation puddles.

The western encephalitis mosquito, *Culex tarsalis*, is a brown mosquito with a distinctive median white band on its proboscis, chevrons on the underside of its abdomen, and striped legs. This mosquito can be found in water sources that are similar to, but cleaner than, those of *Cx. quinquefasciatus*. While *Cx. tarsalis* is most often found in fresh irrigation water, this mosquito can also be found breeding alongside *Cx. quinquefasciatus* in suburban swimming pools.

The foul water mosquito, or *Culex stigmatosoma*, is also a brown mosquito with a distinctive median white band on its proboscis, striped legs, and white triangles on the underside of its abdomen. Without a microscope it is very difficult to differentiate *Cx. stigmatosoma* from *Cx. tarsalis*. As its nickname implies, this species prefers much more polluted waters than either of the other *Culex* species. This mosquito is most often found breeding in dairy pits, sewer farms, and other areas with extremely stinky water.

The tule mosquito, or *Culex erythrothorax*, is a less capable vector of WNV, SLEV, and WEEV and is usually found in lower numbers throughout the District. This mosquito has an orange-brown thorax and breeds predominately in water sources with tule, which is a type of plant also known as bulrushes. Unlike most other *Culex* species, *Cx. erythrothorax* overwinter as fourth instar larvae.

The District is also home to native *Anopheles* and *Culiseta* species, as well as both native and invasive *Aedes* species. Of these, the native *Anopheles* and invasive *Aedes* species are capable of transmitting diseases to humans. However, currently none of these diseases are endemic within the District.

Photo Credit James Gathany; CDC PHIL

Anopheles species

The three most common species of *Anopheles* in the District are *Anopheles freeborni*, *Anopheles franciscanus*, and *Anopheles punctipennis*. Although not currently a disease threat in California, malaria can be transmitted by these mosquitoes. They tend to be most active after dusk and into the early evening hours. These mosquitoes tend to be slightly larger than *Culex* species and will feed preferentially on mammals, including humans. While they will readily enter homes to feed, they will not breed indoors. *Anopheles* species usually breed in algae-rich water and may be present in algae pockets along slow-moving rivers or streams. Although these species are not currently disease threats, they are aggressive biters and can be a large nuisance threat in warmer months when they are active.

Culiseta species are unlike the other mosquitoes in that they can be active in the winter. Some species are primarily active in the winter or early fall and other species are active year-round. *Culiseta* mosquitoes are the largest comparatively and prefer to feed on mammals at dawn and dusk. They are less aggressive than the *Anopheles* or *Aedes* species but are still considered a nuisance species. *Culiseta incidens*, *Culiseta inornata*, and *Culiseta particeps* are all found both in traps and breeding alongside *Culex* species in a variety of water habitats throughout the District.

Photo Credit CDC PHIL

Aedes species

There are several native *Aedes* species within the District, including *Aedes melanimon*, *Aedes nigromaculis*, *Aedes vexans* and *Aedes sierrensis*. These mosquitoes prefer to bite mammals and tend to be aggressive day biting mosquitoes, although they will bite into dusk when the opportunity

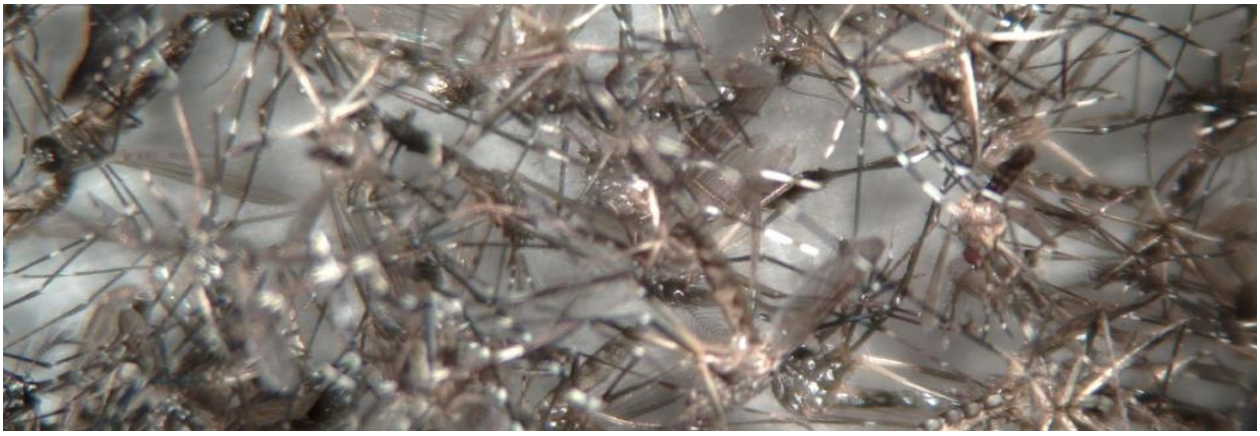
presents itself. Out of these four species, all but *Ae. sierrensis* are considered floodwater mosquitoes, which means they lay their eggs on ground which will later flood. In this District, flooding is usually a result of irrigation or watering crops and pastures. Large quantities of these mosquitoes may hatch off at the same time, leading to impressive volumes of mosquitoes if not controlled properly.

Ae. sierrensis mosquitoes, or western tree hole mosquitoes, can transmit canine heartworm. As the nickname implies, this mosquito is most often found breeding in tree holes, which may be difficult to find and treat.

Photo Credit James Gathany, CDC PHIL

Aedes aegypti

Tulare County also houses the invasive yellow fever mosquito, *Aedes aegypti*. This mosquito has been found throughout the District and is an extremely aggressive day biting mosquito. Unlike the other species which prefer any type of mammal, *Ae. aegypti* prefer to feed on humans and can even breed inside homes when given the opportunity. These mosquitoes are known as 'container breeders' due to their preference for man-made containers over floodwater or tree holes. They have been found in pots, plant trays, bromeliads, animal watering dishes, tarps, tires, bird baths, decorative figurines, fountains, vases, toys, yard drains, rain water containers, ash trays, trash, watering cans, and more. While *Ae. aegypti* prefer small, cryptic fresh water sources, they have also been found in foul water sources when fresher water was not as readily available. Their eggs are resistant to desiccation and cling to the sides of containers, allowing people to unwittingly move them throughout the District. Although not inherently infected with any disease, this species is a public health concern due to its ability to transmit yellow fever, dengue, chikungunya, and Zika.



THE IMPORTANCE OF INTEGRATED VECTOR MANAGEMENT

The goal of Delta Vector Control District is, always, to minimize disease risk to residents and decrease nuisance level from these vectors. This is accomplished by utilizing Integrated Vector Management (IVM) which is an ecosystem-based strategy that relies on a combination of techniques including public outreach, vector surveillance, biological control, physical control, and chemical control. This allows us to minimize the risk to human health, nontarget organisms, and the environment, while targeting the organisms capable of transmitting disease or being a nuisance. At Delta, staff are cross-trained as part of the IVM program so that they can easily resolve all vector problems they come across.

Source Surveillance

Untreated or neglected swimming pools are a major source of suburban breeding for *Culex quinquefasciatus* mosquitoes within the District and can vary greatly year to year. As such, a flight is contracted out every spring to take aerial photos of the District. These photos are used to compile a list of green swimming pools or other large unmaintained bodies of water that are potential breeding sources. This list, as well as reports of green pools throughout the year, is given to the House Mosquito Program to check and control as needed.

Delta Vector Control District has recently implemented an unmanned aircraft system (UAS) program to augment its mosquito control efforts through aerial photography of green swimming pools. For the UAS program, a certified remote pilot flies a Phantom 4 Pro quadcopter to identify new potential breeding sources in areas with high traps counts. The remote pilot in command, or flight supervisor, is certified by the Federal Aviation Administration to operate small UAS, or drones, under the 14 Code of Federal Regulations Part 107.

On July 20, 2018, the UAS program was first implemented in northern Farmersville following an increase in trap count to 587 mosquitoes per trap, with no known untreated sources in the area. At an altitude of 400ft, the two-hour drone operation immediately identified 5 overlooked green swimming pools for field technicians to service. Mosquito trap counts in northern Farmersville decreased the following week to 105 mosquitoes per trap, which also decreased the risk of mosquito-borne disease transmission. The District will continue to optimize its UAS program to provide quick and cost-efficient methods to support public health.

Mosquito and Vector Surveillance

Surveillance is an essential component of any IVM program and falls under the duties of the District's laboratory staff, who are dedicated to ensuring the reliability and timeliness of results. The District's surveillance program consists of the West Nile Virus Surveillance Program and the Invasive *Aedes* Surveillance Program, each of which consists of a series of fixed-location traps surveyed on a weekly basis with an additional rotation of approximately 20 strategic traps set weekly as needed. Mosquitoes capable of transmitting WNV, SLEV or WEEV are pooled from both surveillance programs and tested for disease, with the laboratory providing test results the next workday after initial collection.

In 2018, gravid traps, encephalitis virus surveillance (EVS) traps, and Biogents Sentinel (BG) traps were used to collect mosquitoes.

The gravid trap is used for the fixed-location component of the WNV Surveillance Program, with this trap predominately attracting female *Culex quinquefasciatus* who are looking for a water source to oviposit, or lay eggs.

Gravid Trap


EVS Trap

The EVS trap, predominately catches host-seeking female mosquitoes who are attracted to carbon dioxide emitted from the dry ice that is used as bait. The EVS trap is mostly used in the WNV Surveillance Program as strategic trap sets, although it is sometimes used in response to specific service requests. This trap targets mosquitoes that bite birds or larger mammals due to its placement on a pole that is three to five feet off the ground.


BG I Trap

The BG trap predominately attracts host-seeking female mosquitoes, as well, using a chemical lure and carbon dioxide, produced by the reaction of sugar and yeast in water, as bait. This trap is located on the ground and is most likely to catch the invasive *Aedes aegypti* mosquito. There are two versions of this trap.


BG II Trap

With these traps, the District collected over 148,000 mosquitoes during 10,951 trap nights from fixed and strategic locations. All mosquitoes were identified to species and counted by laboratory staff. Female mosquitoes of any species capable of transmitting WNV, WEEV, or SLEV from the same trap were pooled, ten to fifty female mosquitoes per tube, and tested for virus. Invasive species were also pooled and sent to university researchers who will test the samples for chemical resistance and genetic markers. This data will help guide the District in future attempts to control invasive mosquitoes.

Areas with high abundance or disease were reported to the operations staff to help guide their control efforts and ensure that no breeding locations had been overlooked.

West Nile Virus Surveillance Program

Delta Vector Control District has been conducting mosquito surveillance in the cities of Visalia, Exeter, Farmersville, Dinuba, Woodlake, Ivanhoe, and Cutler-Orosi since the areas were incorporated into the District. After the emergence of WNV in the region, trapping changed to focus on mosquitoes that vectored WNV and on their breeding sources. From 2004 to 2012, WNV trapping focused on vectors in mainly rural environments. However, in 2013, surveillance efforts shifted to include suburban environments, using semi-structured gravid trap site configurations to guide the trap locations. These configurations consisted of fixed gravid trapping sites within a mile section of suburban area, surveyed on a two-week rotation, coupled with weekly random or information-driven trapping events. In 2016, the surveillance program increased to 172 fixed gravid trapping sites, one trap within each quarter mile of suburban area surveyed on a weekly basis, with the weekly random or information driven EVS trapping events still taking place.

Fixed-Location Gravid Trapping Survey:

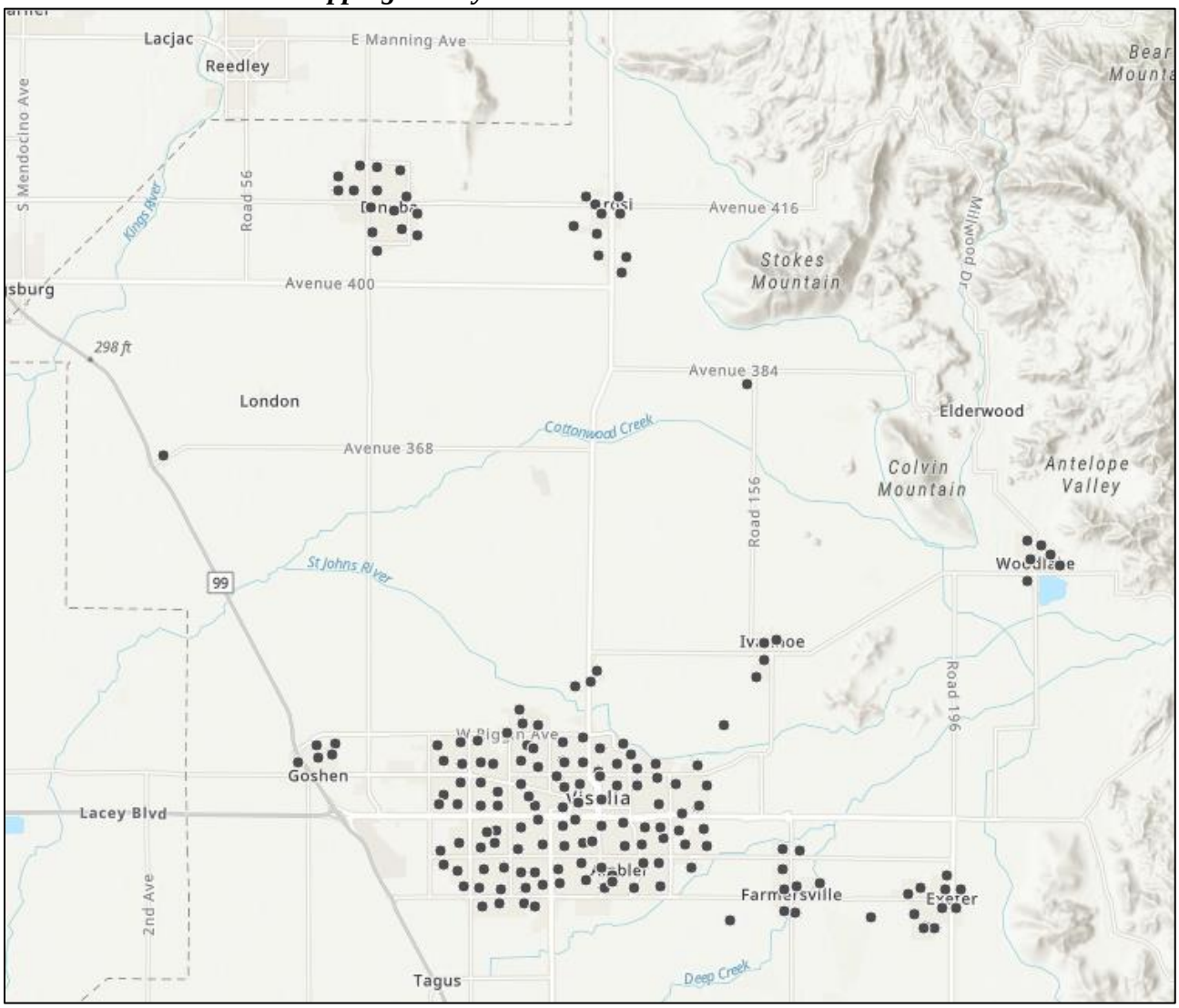


Figure 2. Location of the 172 gravid traps set weekly from April 2nd through October 5th, 2018.

In the 2018 surveillance season, fixed gravid traps operated weekly from April 2nd through October 5th. Traps were set one per quarter mile of suburban area. During this trapping period, 79,083 adult mosquitoes were collected with eight species represented.

Species	Abundance
Culex quinquefasciatus	78,052
Culex tarsalis	613
Culex stigmatosoma	266
Aedes aegypti	93
Culiseta incidens	50
Anopheles freeborni	6
Culiseta inornata	2
Culiseta particeps	1

Table 1. Abundance of mosquito species collected from gravid traps in 2018.

The infusion used in gravid traps is specifically designed to attract *Culex quinquefasciatus* and as such they are preferentially trapped, making up 98.70% of the caught mosquitoes.

City	Average number of mosquitoes collected per gravid trap per trap-night
Farmersville	39.73
Dinuba	29.98
Woodlake	27.25
Exeter	19.44
Ivanhoe	19.37
Goshen	15.76
Cutler-Orosi	14.92
Visalia	14.32

Table 2. The average number of mosquitoes collected per trap-night from a gravid trap in each city within the District.

Average numbers of mosquitoes collected per trap-night from gravid traps is calculated for comparison between cities within the District. In 2018 the average number of mosquitoes collected in gravid traps per trap-night was 22.60, with Farmersville having the highest average with 39.73 and Visalia the lowest with 14.32. Farmersville high average was, in large part, from northern Farmersville high counts due to swimming pools that turned green after the initial aerial flight and was corrected after the UAS flight in July.

The average number of mosquitoes collected per trap night in 2017 was similar, at 21.14. However, compared to 2017, Visalia, Cutler-Orosi and Goshen all experienced fewer *Cx. quinquefasciatus* mosquitoes on average, with Exeter experiencing a very similar number. In contrast, Ivanhoe, Dinuba, Woodlake, and Farmersville had increased numbers compared to the 2017 season.

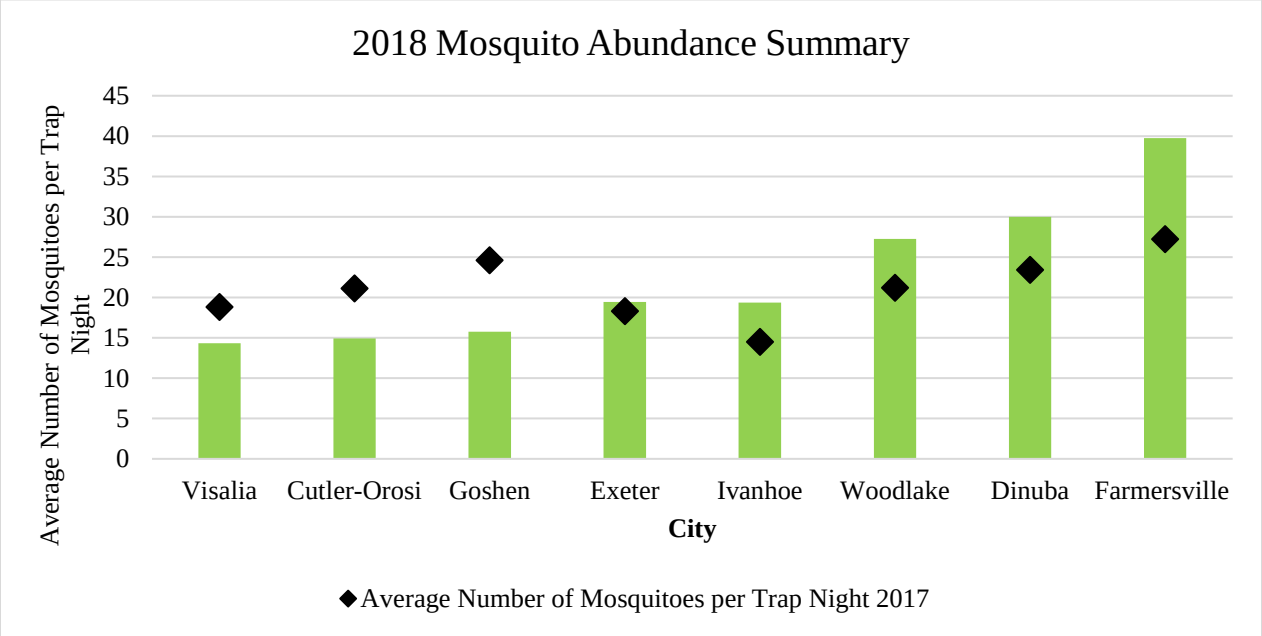


Figure 3. Average number of mosquitoes collected per trap night in each city within the District from gravid traps in 2018 compared to the same from 2017.

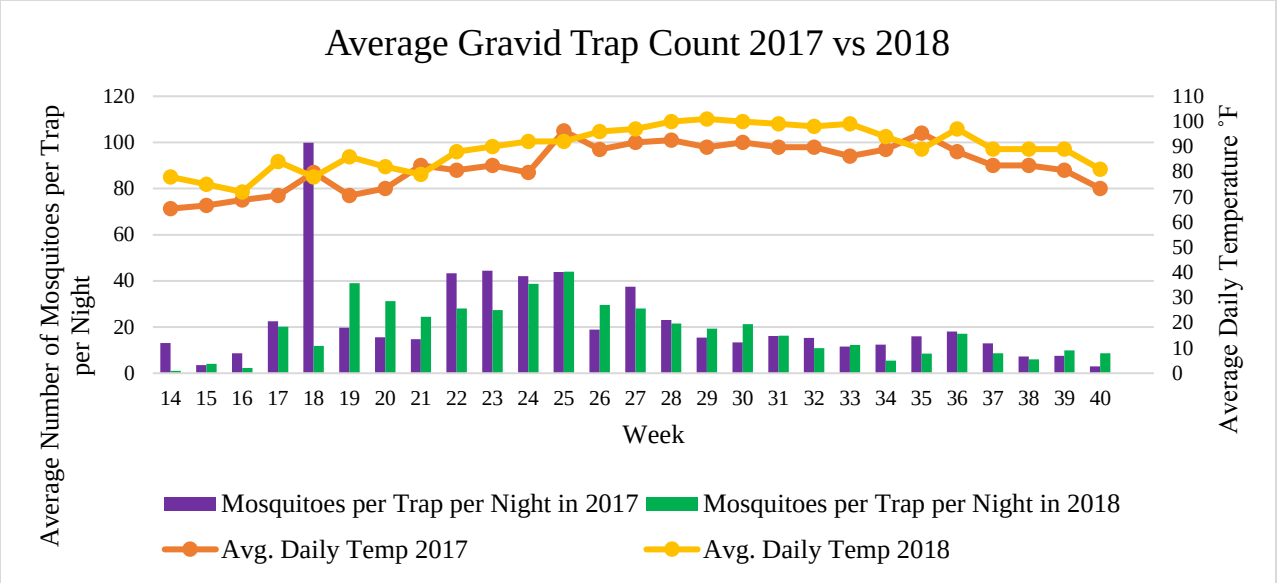


Figure 4. Average number of mosquitoes collected per trap, per night, by disease week. Data from 2017 and 2018 are represented, as are the average daily temperatures for those years.

For the most part, gravid trap counts were comparable to last year's counts, despite average temperature being slightly warmer, overall, throughout 2018.

Encephalitis Virus Surveillance/Strategic Trap Sets:

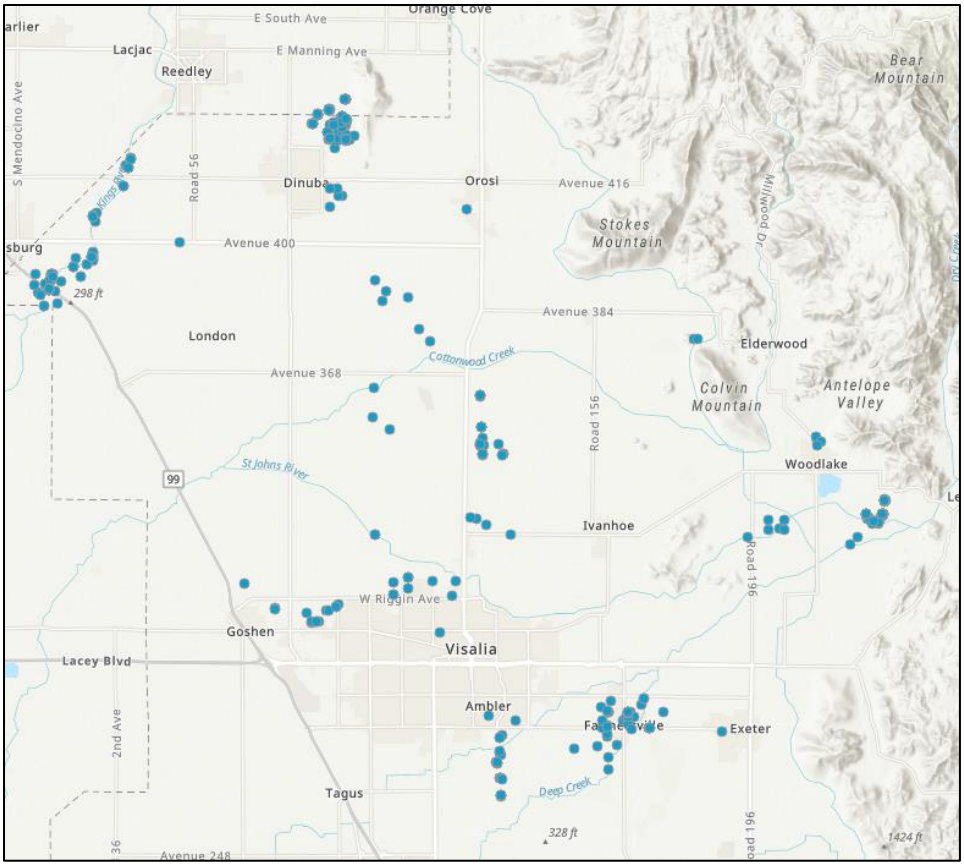


Figure 5. Placement of the EVS trap sets throughout the District in 2018.

In 2018, 393 Encephalitis Virus Surveillance (EVS) traps were set in the District, slightly more traps than in the 2017 season. During the collection period, 35,907 mosquitoes were trapped with fifteen different mosquito species present. The highest single trap count within the District was 711 mosquitoes collected north of Visalia along Dairy Avenue.

Species	Abundance	Percentage of collection
Culex quinquefasciatus	13,771	38.35%
Culex tarsalis	11,493	32.01%
Culex stigmatosoma	5,536	15.42%
Culex erythrothorax	2,637	7.34%
Anopheles freeborni	1,271	3.54%
Aedes vexans	841	2.34%
Anopheles franciscanus	217	0.60%
Anopheles punctipennis	54	0.15%
Aedes nigromaculis	42	0.12%
Aedes sierrensis	19	0.05%
Culiseta particeps	16	0.04%
Aedes aegypti	2	0.01%
Culiseta incidens	5	0.01%
Culiseta inornata	2	0.01%
Aedes melanimon	1	0.003%

Table 3. Total abundance and percentage of total collection of each species of mosquito collected from EVS traps in 2018.

The EVS traps collected significantly higher numbers of *Culex stigmatosoma* in 2018 compared to 2017. This was likely due to the highest counts coming from sites near dairies and orchards with lots of organic material to stagnate any standing water. This species represented 15.4% of all collections in 2018 versus 2.5% of all collections in 2017.

Invasive *Aedes* Surveillance Program

With the rediscovery of *Aedes aegypti* in 2017, first in Visalia followed by Farmersville and Exeter, the District decided to implement another surveillance program to better monitor this

invasive mosquito. Based on the District's successful WNV surveillance program, the 2018 Invasive *Aedes* Surveillance Program consists of 60 fixed-location BG traps set weekly, one per square mile of suburban area, with an additional 20 strategic BG traps per week to better identify possible breeding sources or to follow up on a service request. Unlike the native species of mosquitoes which prefer larger bodies of water, or more obvious ones such as unmaintained swimming pools, the *Ae. aegypti* mosquito prefers small cryptic locations, which makes finding the breeding sources increasingly difficult.

Invasive Aedes Fixed Site Surveillance:

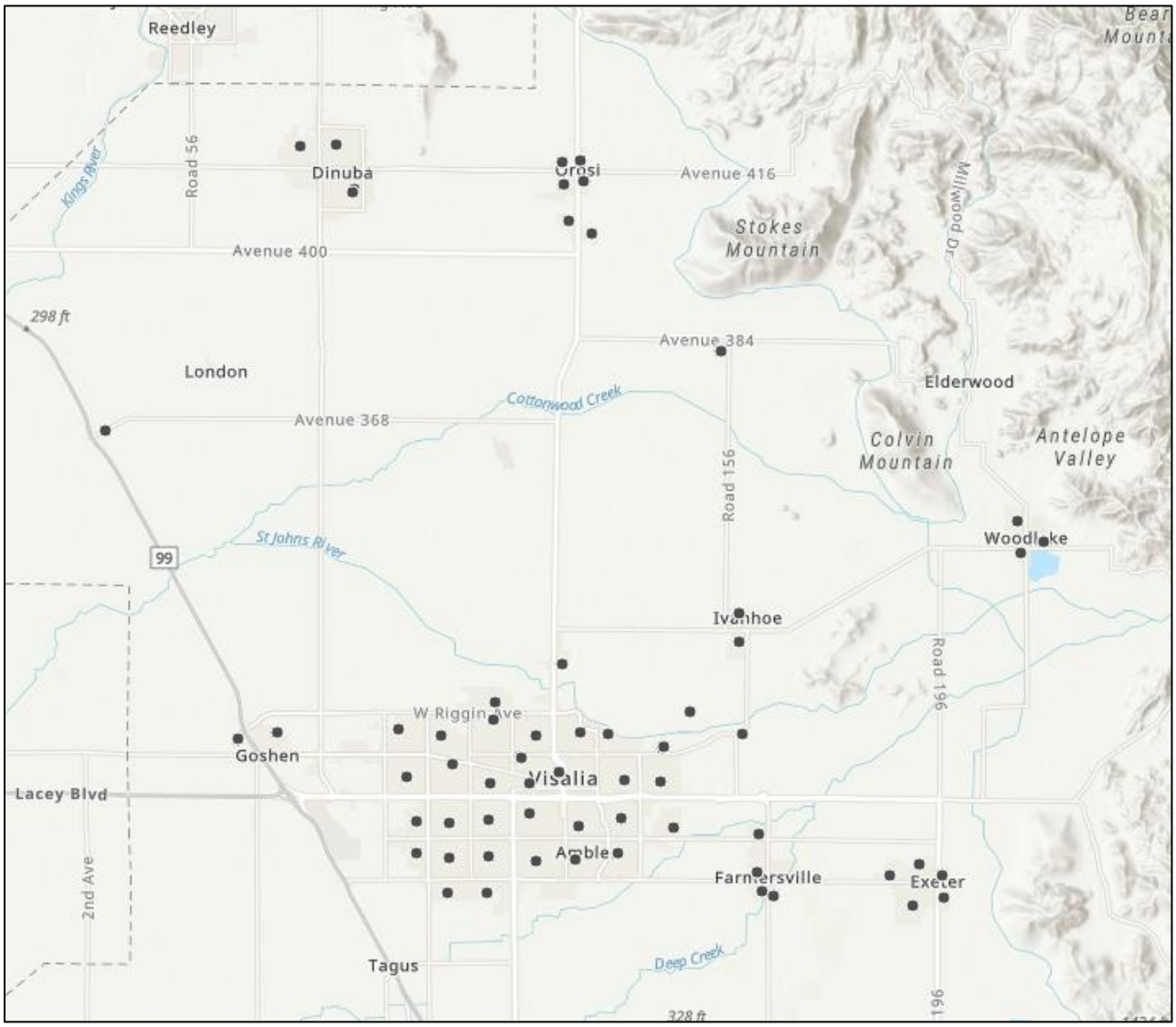


Figure 6. Placement of the 60 BG traps in fixed sites used from May 3rd to October 5th, 2018.

During the 2018 surveillance season, 60 BG traps operated weekly from May 3rd through October 5th at fixed trap locations. During the trapping period, 23,573 adult mosquitoes were collected with six species represented. Despite BGs being the gold-standard for trapping *Aedes aegypti*, 88.63% of the mosquitoes caught were *Culex quinquefasciatus* with only 4.01% being *Ae. aegypti*. This is not unexpected as *Cx. quinquefasciatus* are still the most abundant mosquito within the District.

Species	Abundance
Culex quinquefasciatus	20,893
Culex tarsalis	1,621
Aedes aegypti	945
Culiseta incidens	54
Culex stigmatosoma	47
Anopheles freeborni	13

Table 4. Abundance of mosquito species collected in fixed BG traps in 2018.

Invasive Aedes Strategic Trap Set Surveillance:

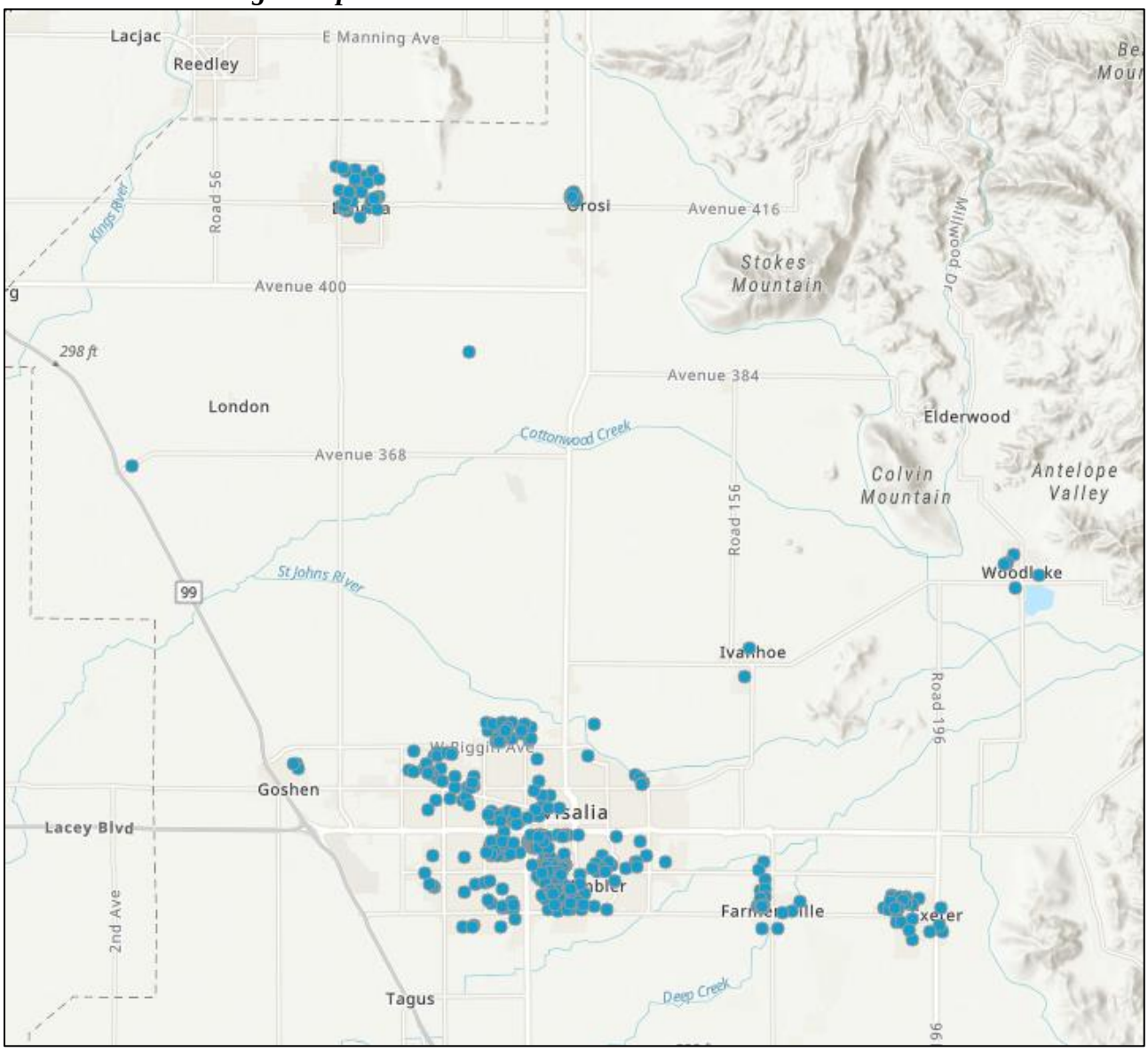


Figure 7. Placement of the BG strategic trap sets throughout the District in 2018.

From March 28th through November 13th, 398 strategic BGs were set. During the trapping period, 9,407 adult mosquitoes were collected with six species represented.

Species	Abundance
Culex quinquefasciatus	7,797
Aedes aegypti	1,088
Culex tarsalis	487
Culiseta incidens	18
Anopheles freeborni	11
Culex stigmatosoma	5

Table 5. Abundance of mosquito species collected in strategic BG traps in 2018.

Because strategic traps are set where *Ae*. *aegypti* are believed to be present, the invasive species made up a larger percentage of the collections, approximately 11.57% of the entire collection, compared to the 4.01% from routed traps. *Cx*. *quinquefasciatus* are still more numerous in the district, however, and even in the strategic trap sets made up 82.89% of the entire collection, with some strategic BG traps only catching *Cx*. *quinquefasciatus*.

Aedes aegypti From All Traps:

A total of 2,129 adult *Ae*. *aegypti* were collected from all trap types. Per trap type, 95.5% of all collections were from BG traps, 4.4% from Gravid traps, and 0.1% from EVS traps. The first *Ae*. *aegypti* of 2018 was collected May 1st from Exeter from a routed BG trap. The highest *Ae*. *aegypti* trap count for a single trap night was 48 mosquitoes from Dinuba, collected with a strategic BG.

City	Total number *Aedes aegypti* from all traps	Percentage of *Aedes aegypti*
Visalia	1,513	71.13%
Dinuba	267	12.55%
Farmersville	120	5.64%
Exeter	114	5.36%
Cutler-Orosi	99	4.65%
Goshen	6	0.28%
Woodlake	5	0.24%
Ivanhoe	3	0.14%

Table 6. Total number of *Aedes aegypti* mosquitoes collected per city from all traps in 2018.

Over seventy percent of all *Ae*. *aegypti* were collected in Visalia, with Dinuba being the next most abundant city at 12.55% of the collection.

In total, 1,624 BG trap sets were utilized during the 2018 surveillance season, a dramatic increase from the 270 BG trap sets from 2017. It should be noted that while BGs were set for two nights in 2017, they were set for only one night in 2018 to preserve batteries and optimize coverage.

In addition to routed and strategic adult surveillance, door-to-door yard inspections were conducted following high trap counts or service requests to collect immature specimens. The surveillance program found specimens from Visalia, Dinuba, Cutler-Orosi, Goshen, Exeter, Ivanhoe, Woodlake, and Farmersville.

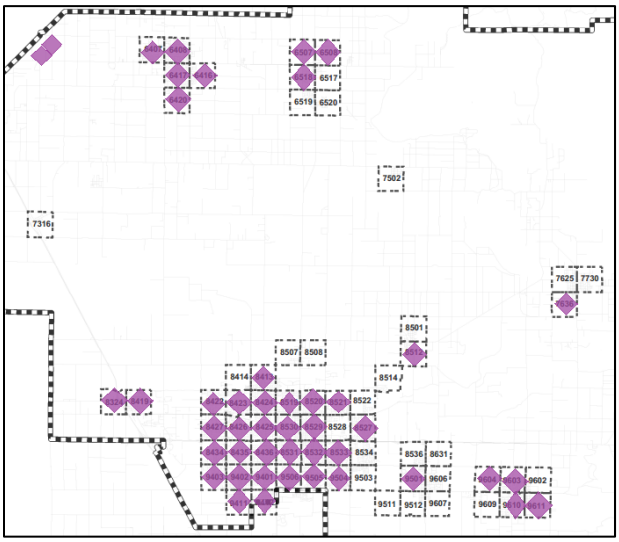


Figure 8. Mile sections where traps caught *Aedes aegypti* in the District in 2018 (purple diamonds).

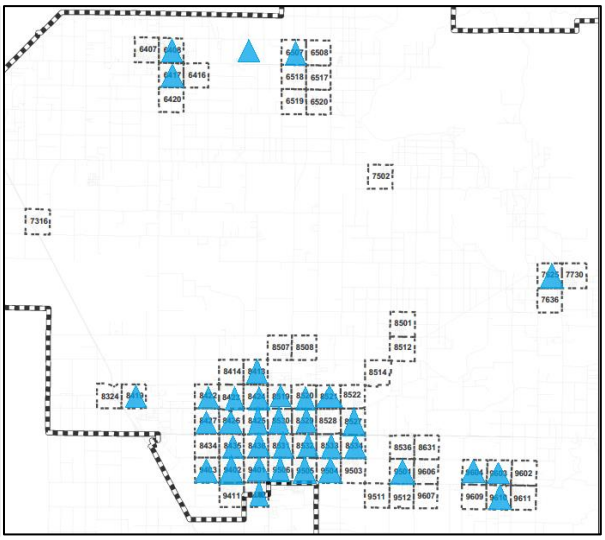


Figure 9. Mile sections where inspections were conducted for *Aedes aegypti* in the District in 2018 (blue triangles).

The maps of where *Ae*. *aegypti* were caught and where inspections took place are not identical, since service requests often generated an inspection independent of trap count, but low trap counts did not always generate an inspection.

Aedes aegypti Inspections & Door-to-Door Education:

A total of 730 individual properties were inspected in 2018, with a total of 934 inspections being completed. District-wide, a total of 27.95% of the inspected homes were breeding *Aedes aegypti* mosquitoes.

City	Individual properties	Total inspections	Percentage breeding
Visalia	575	739	27.13%
Dinuba	81	105	25.93%
Exeter	35	40	37.14%
Farmersville	22	29	31.82%
Cutler-Orosi	13	14	30.77%
Rural[1]	2	4	100%
Goshen	1	2	100%
Woodlake[2]	1	1	0.00%
Total	**730**	**934**	**27.95%**

[1] Rural service requests were followed with trapping, and inspections were only conducted when *Aedes aegypti* had been caught in the traps, hence the 100% inspection rate.
[2] An inspection took place in Woodlake following a request, but no breeding was found, and the trap set the following day found no *Aedes aegypti* in the area, so no further inspections were conducted.

Table 7. The number of individual properties and total inspections that were completed per city in 2018 to look for the *Aedes aegypti* mosquito. Individual properties refer to single locations that were inspected at least once, whereas total inspection considers the reinspection(s) that may have taken place on an individual property.

Generally, re-inspections took place when *Ae. aegypti* breeding was found on the property, unless the breeding source was eliminated during the first inspection. When *Culex* breeding was found, the source was treated and placed on the reinspection list for the field technicians.

Of the inspections performed, 526 properties were never found to be breeding, and 204 were breeding at least once. As seen in figure 10, 83% of the breeding properties fixed and maintained their problematic source(s) after the initial educational visit. However, 12% required two educational visits before changes were seen and 5% required more than two educational visits. The highest total number of visits for a single household was six, occurring on two separate properties, with breeding being found five of those times.

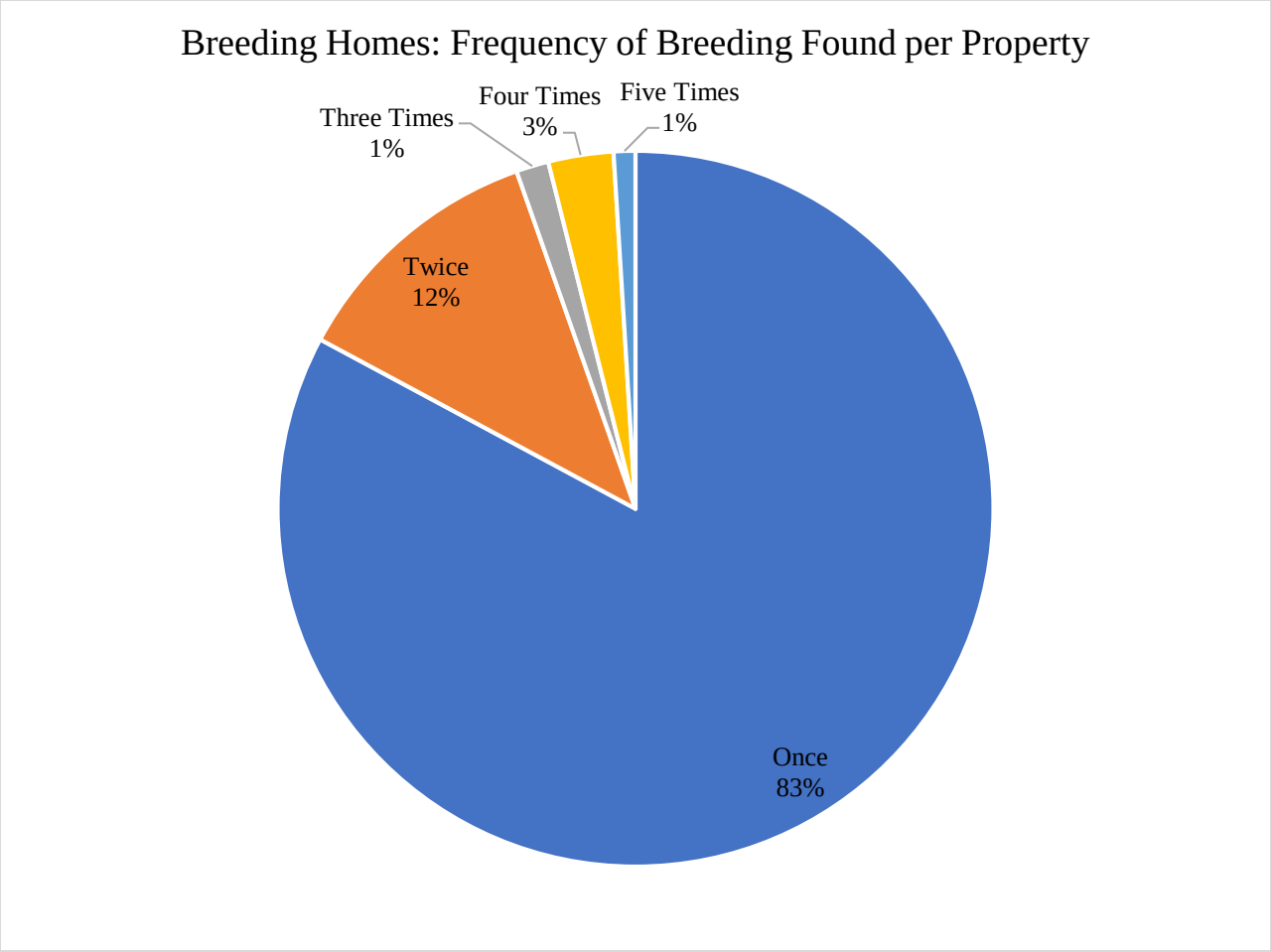


Figure 10. The frequency of breeding found on a specific property amongst the properties that were breeding throughout the District in 2018.

Although the reduction in breeding after subsequent visits indicates that the education campaign was successful, this success may not result in long-term behavior changes. Several properties in the Beverly Glen region required re-education in 2018 despite the substantial amount of time spent on education in that neighborhood in 2017.

Disease and Mosquito Testing

In 2012, following completion of the new laboratory facility, the District began on-site testing of mosquito pools and dead birds for virus, allowing a quicker turnaround time from trapping to

knowledge of disease presence, which helps to better guide the control program. Initially, only WNV test results were reported to the California Department of Public Health (CDPH) but the program is now capable of testing and reporting WNV, SLEV, and WEEV. Every year, the District maintains these testing capabilities by passing the annual proficiency panel implemented by CDPH and distributed by the Davis Arbovirus Research and Training (DART) Lab.

2018 Proficiency Panel:

The proficiency panel was ordered and successfully passed before the beginning of the 2018 season, allowing the District to report all the positive mosquito samples to CDPH.

The 2018 panel included two known positive samples and six unknown samples, consisting of unknown quantities, of inactivated viruses and mosquito slurry. The unknown samples and ten-fold dilutions of the known samples were tested using the normal RNA extraction and Real-Time Polymerase Chain Reaction protocol. Finding resultant cyclic threshold (Ct) scores that were consistent with the values found by DART indicated a passing result.

In 2018, twelve districts participated in the proficiency panel. The charts below show the finalized results complied by DART for all participating agencies. Delta Vector Control District is abbreviated as DLTA.

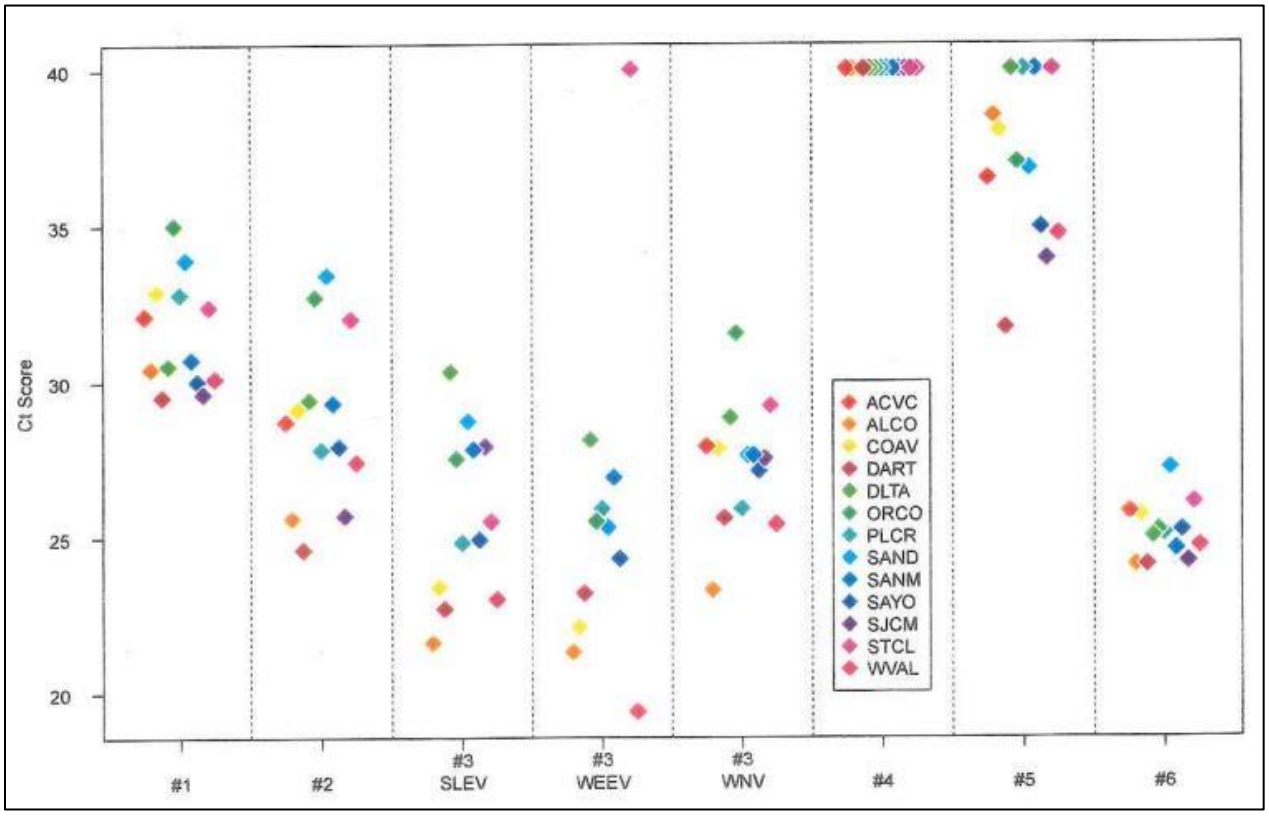


Figure 11. Cyclic threshold (Ct) scores for the unknown simulated mosquito pools. Each color represents an agency, and values of 40 indicate negative test results. Unknown sample #3 was infected with WNV, SLEV, and WEEV.

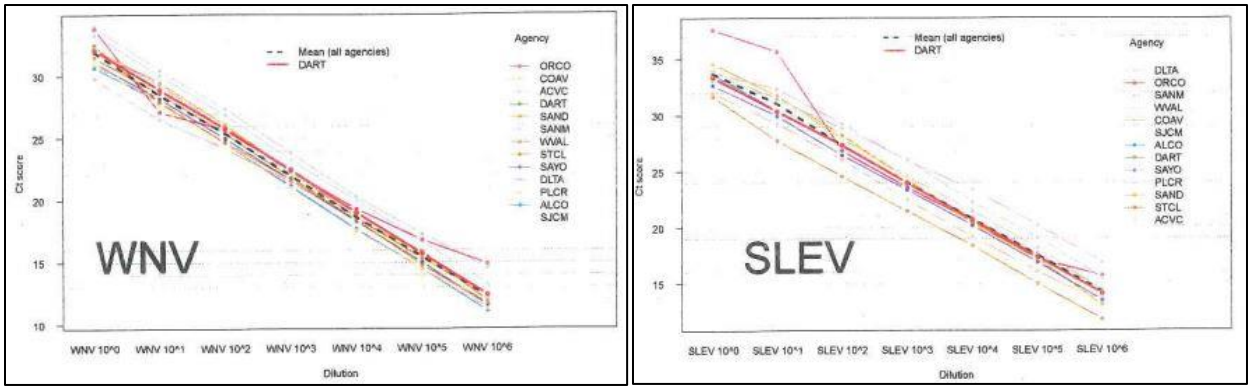


Figure 12. Cyclic threshold (Ct) scores for the 10-fold dilution series for WNV and SLEV. Lines show variation in Ct scores and slopes for individual agencies.

WNV & SLEV:

In 2018, the laboratory tested 3,836 mosquito pools, with 65 confirmed WNV positives and 138 SLEV positive samples. In comparison, in 2017, 2,844 mosquito pools were tested, with 575 confirmed positive for WNV and 30 confirmed positive for SLEV. So, while the overall number of pools tested increased by nearly a thousand, the WNV positives dropped significantly and the SLEV positives increased significantly.

The first WNV positive sample was collected on June 20th, from north Exeter and the last WNV positive sample was collected on September 24th from east Dinuba.

City	WNV IR	Pools	WNV positives	Number of tested mosquitoes
Dinuba	1.16	341	12	10,549
Cutler-Orosi	0.65	117	2	3,095
Farmersville	0.55	306	6	11,038
Goshen	0.54	65	1	1,865
Visalia	0.21	1,766	10	47,205
Exeter	0.19	192	1	5,300
Ivanhoe	0.00	81	0	2,067
Woodlake	0.00	131	0	3,888

Table 8. The season long infection rate (IR) for WNV from each community within the District in 2018.

The District-wide infection rate (IR) for WNV was 0.5919 in 2018, down from 7.8708 in 2017. The IR is a measurement of the risk of an infection within a population. Our IR is calculated by dividing the number of positive mosquito pools by the total number of mosquitoes tested. A higher IR indicates an increased risk for humans as well as mosquitoes. City specific IRs can be seen in Table 8.

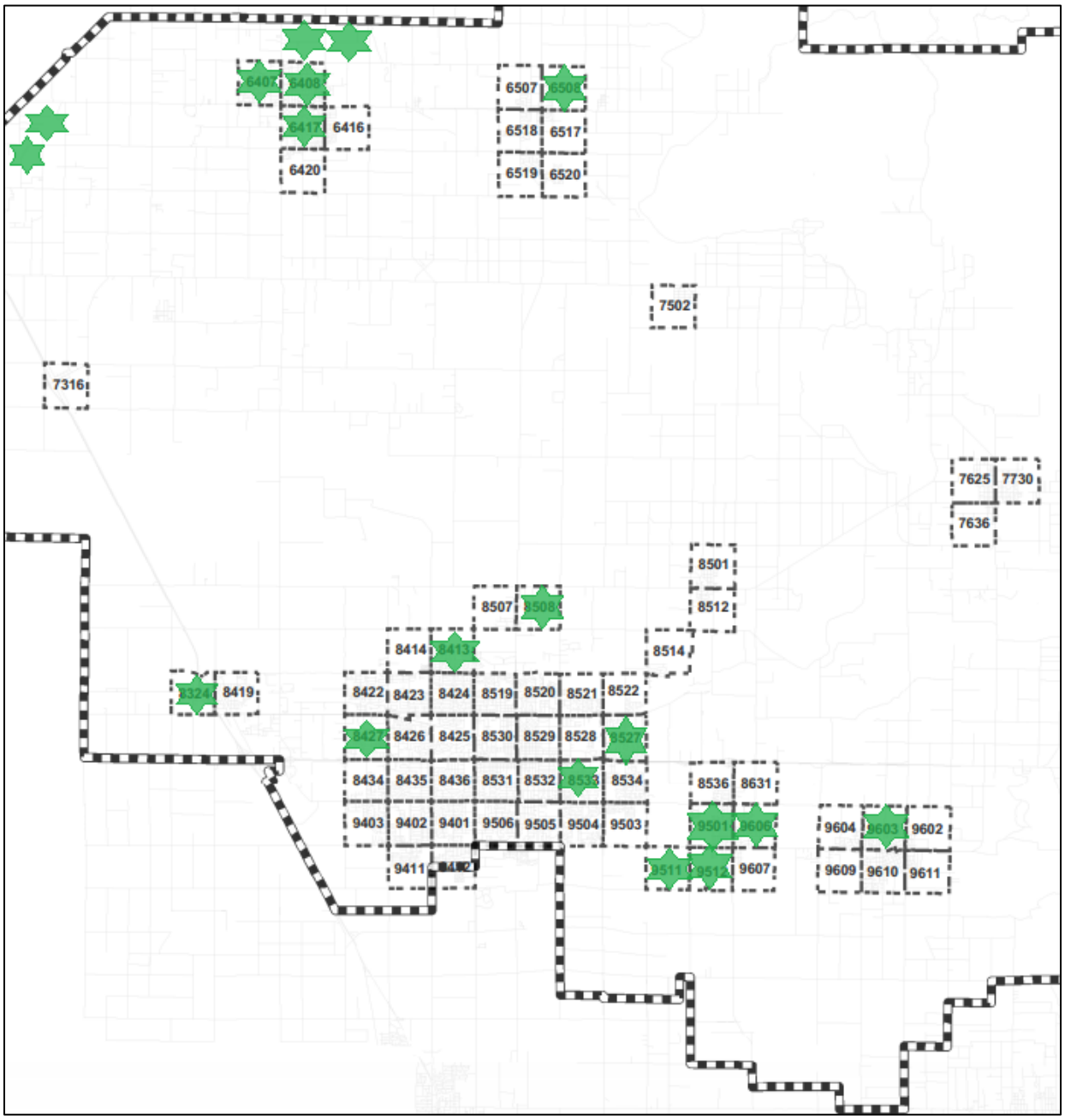


Figure 14. A map of the District with mile sections in which at least one mosquito pool tested positive for WNV.

The Tulare County Health and Human Services Agency (HHSA) reported one human case of WNV within District boundaries in 2018 and a total of eight human cases of WNV from within Tulare County. All the cases were confirmed by the California Department of Health.

Comparatively, there were seven human cases of WNV within the District in 2017, and a total of thirteen within Tulare County. There were no human cases of SLEV reported in either 2018 or 2017. Human cases of mosquito-borne diseases are reported to the District to help guide control efforts and are reported in compliance with HIPAA, lacking personal identification information.

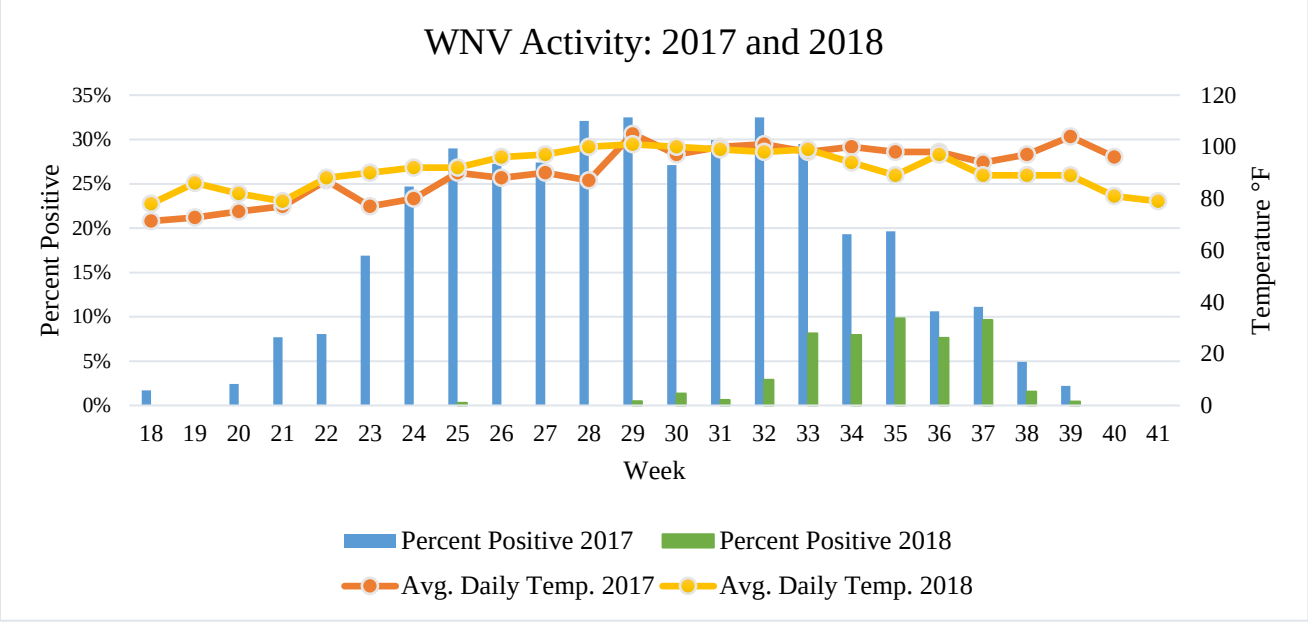


Figure 13. The West Nile virus (WNV) positive percentage of tested mosquito pools from 2017 and 2018 by disease week, with the average daily temperatures included for comparison.

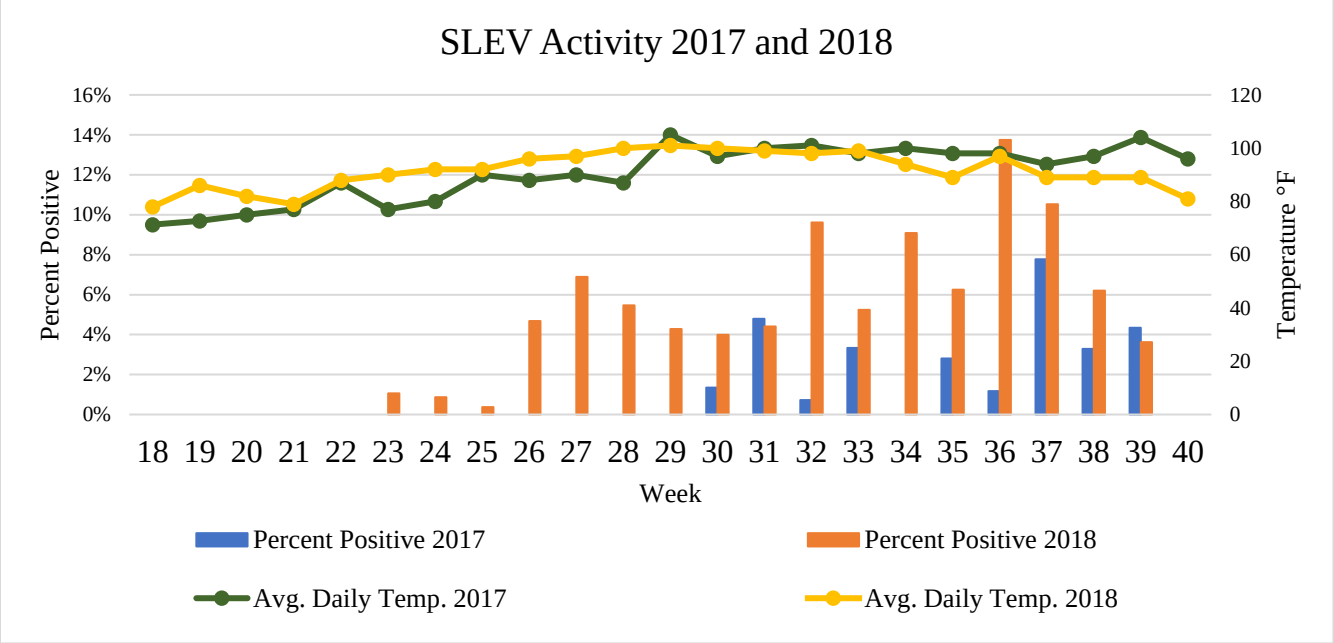


Figure 16. The St. Louis encephalitis virus (SLEV) positive percent of tested mosquito pools from 2017 and 2018 by disease week, with the average daily temperatures included for comparison. Testing for SLEV did not take place until week 28 in 2017.

The first SLEV positive sample was collected on June 4th, from south Visalia and the last positive SLEV sample was collected on September 27th, from north Dinuba. The season wide IR for SLEV for the entire District was 1.41. City specific IRs can be seen in Table 9.

City	SLEV IR	Pools	SLEV positives	Number of tested mosquitoes
Visalia	2.27	1,766	107	47,205
Goshen	1.07	65	2	1,865
Cutler-Orosi	0.65	117	2	3,095
Farmersville	0.54	306	6	11,038
Dinuba	0.28	341	3	10,549
Exeter	0.00	192	0	5,300
Ivanhoe	0.00	81	0	2,067
Woodlake	0.00	131	0	3,888

Table 9. The season long infection rate (IR) for SLEV from each community within the District in 2018.

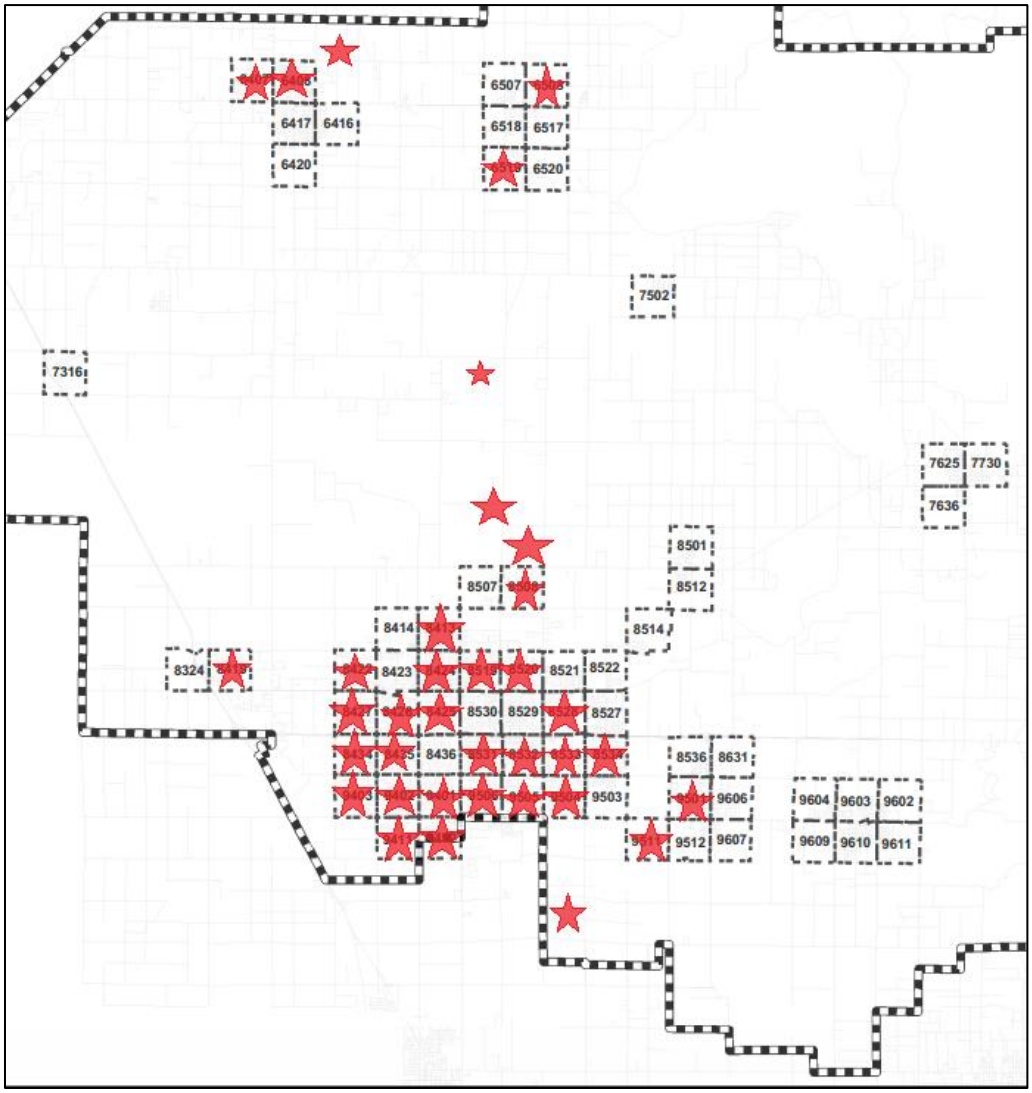


Figure 15. A map of the District with mile sections in which at least one mosquito pool tested positive for SLEV.

The 2018 season overall saw less disease than 2017. There was an increase in SLEV pools from the previous year, but a significant decrease in the WNV positive pools. In addition, the first positive pools for WNV were seen in week 25 of 2018, when they are normally seen five or more weeks earlier. The highest percent positive of any disease in a single week in 2018 did not exceed 15%, whereas it exceeded 30% in 2017.

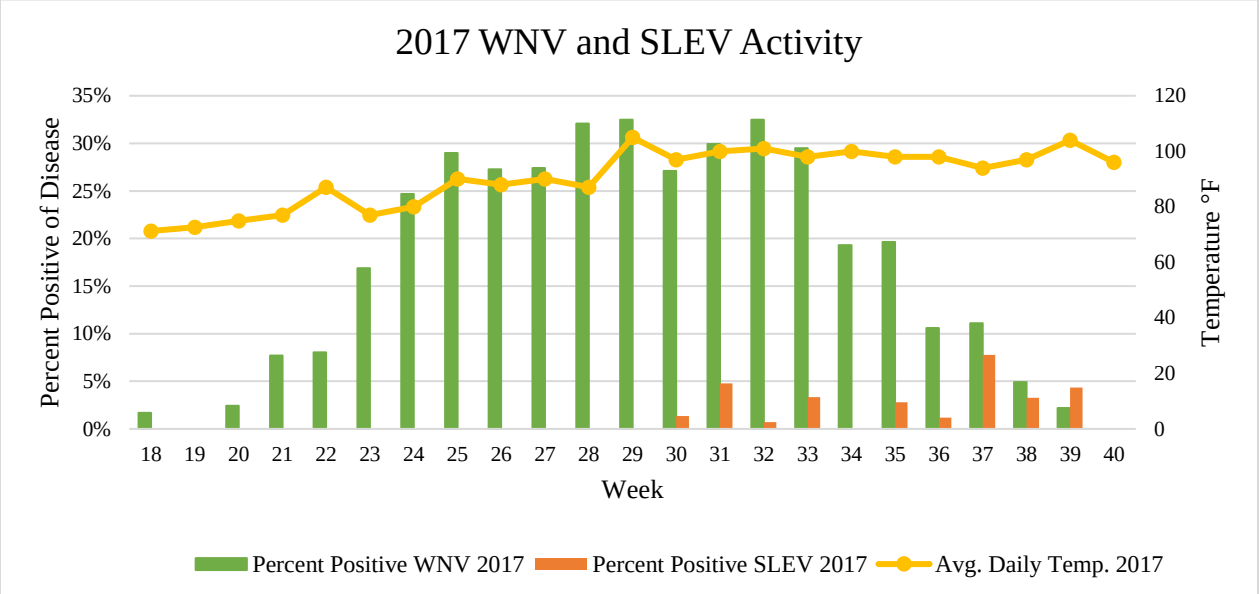


Figure 17. Comparison of positive pools for WNV and SLEV in 2017. Average daily temperature from 2017 is included for reference.

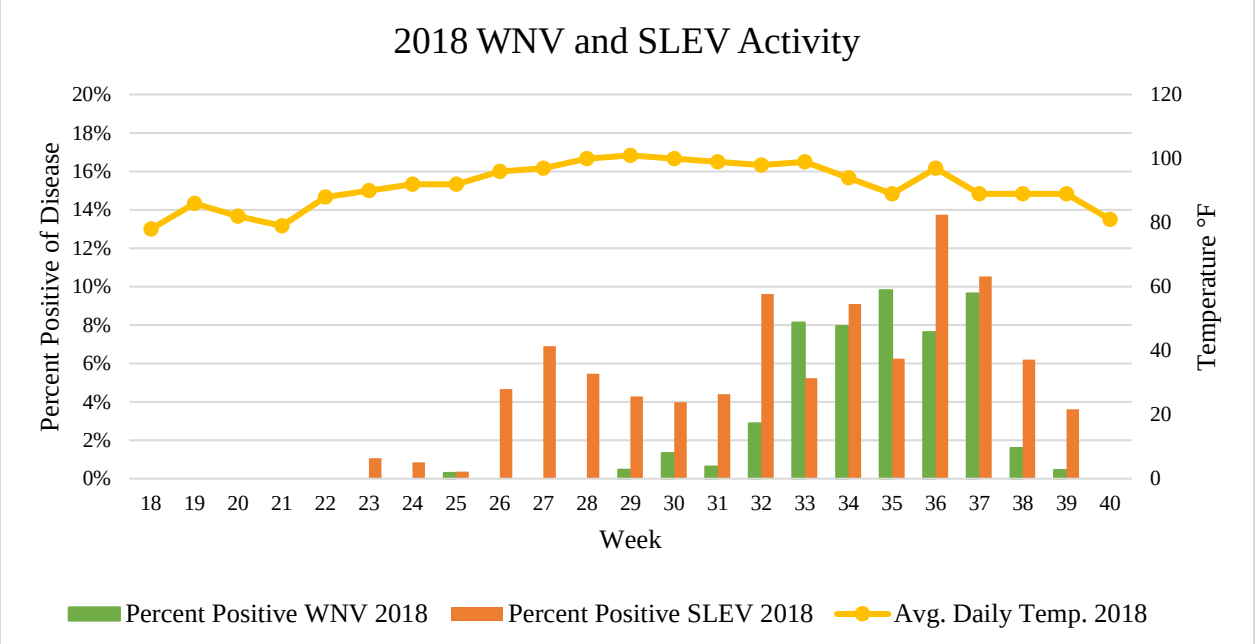


Figure 18. Comparison of positive pools for WNV and SLEV in 2018. Average daily temperature from 2018 is included for reference.

Dead Birds:

Humans are not a reservoir host of WNV, SLEV, or WEEV and cannot transmit any of these diseases to a mosquito if bitten. Birds, however, are reservoir hosts to all three viruses, and can experience mortality from these diseases, specifically WNV. As such dead birds that are reported to the District or to CDPH through their WNV dead bird hotline are collected by technicians and tested alongside mosquito pools. If mosquito numbers are low in an area, a dead bird carcass may be the only indication available to the District that there is WNV within that area, and as such, all testable dead birds are tested and reported by the District.

In 2018, 39 bird carcasses were reported to the District, but only nine were testable. Birds are only considered testable if they have died within the past twenty-four hours, have no obvious physical trauma that led to death, and are of an accepted species for testing. Of the nine tested birds, none were positive for any virus.

Other Viruses:

Although the District is not currently capable of testing for mosquito-borne viruses other than WNV, SLEV, and WEEV, there is still a protocol in place if any other virus did emerge within our population. Any human case within the county of a mosquito-borne disease is reported by the Tulare County HHSA to the District, whether the case was acquired locally or while traveling. This is especially important for diseases that can be transmitted from an infected person to a mosquito and then to another person, which include malaria, dengue, chikungunya, yellow fever, and Zika. The District will then begin surveillance and control efforts based on the information given, including collecting mosquito samples and sending them to DART for disease testing.

In 2018, the District was not notified of any human case for any other viruses within District boundaries.

Biological Control

Biological control refers to any control effort in which a natural predator, parasite or pathogen is used to target the vector. At Delta Vector Control District, *Gambusia affinis*, or the mosquitofish, is the preferred biological control agent to take a bite out of immature mosquito populations.

Mosquitofish are an effective predator of mosquito larvae and are a great alternative to chemical control. However, they are not a native fish to California and thus cannot be released in any waterway that connects to waters of the US or where native species may be present. As such, these fish are mainly used in holding basins, ornamental ponds, unmaintained pools, watering troughs, water reservoirs, and dairy ponds throughout the District. Mosquitofish readily adapt to their environment, multiply quickly, and can consume massive numbers of mosquito larvae. These fish are small, with adult females usually measuring less than 2.5 inches and adult males under 1.5 inches. They vary in color, depending on their immediate environment, from a light silver to a darker olive green.

The District currently utilizes three runways and two nursery tanks to treat and hold fish. In the winter, the runways and tanks are emptied for cleaning and the remaining fish are deposited in holding basins and ponds throughout the District. In spring, fish traps are set in the basins and ponds to repopulate the District's mosquitofish supply. Before being distributed, the fish are tested and, if possible, treated for flukes and other parasites that they may be carrying.

It is becoming increasingly difficult to stock the mosquitofish runways with the amount of fish necessary for efficient control. In 2018, only two fish sources could be used to stock the runways because of the high density of parasites found in the fish from all other sources. The high demand for mosquitofish, especially early in the season, requires a more reliable fish management system.

The solution is to start breeding mosquitofish as many other vector control districts already do. This will alleviate the stress of finding fishing sources in the field and allows for additional control over the quantity and quality of available mosquitofish. This will directly benefit the District since an adequate stock of healthy mosquitofish will be ready to distribute year-round to treat mosquito sources. In 2019, the District plans to add an additional building which will house a facility to breed and grow mosquitofish.

Over a hundred locations received fish in 2018. Technicians distributed fish to 59 locations, and homeowners picked up fish from the District for the remaining 45 locations. Mosquitofish are free to the public within the District and can either be picked up at the Houston Avenue facility or taken to the homeowner, at their request. Fish were stocked in irrigated pastures, irrigation ponds, troughs, fountains, ponds, private sources, schools, commercial sources, flood control basin, sewer treatment ponds, pools, and sloughs. The most common number of fish taken per distribution was twenty-four, but numbers ranged from four to two-hundred.

The District is looking forward to being able to breed mosquitofish in the future and cutdown on the delay in distributing mosquitofish in coming years.

Physical Control

Physical control refers to environment management to eliminate or reduce mosquito breeding habitats and is conducted year-round. During winter and early spring in 2018, technicians worked on path maintenance to improve site access for treatments later in the season. They also cleared brush and weeds along creeks, dairy ponds, drain ditches, and other aquatic sources throughout the District to reduce stagnant water pools. Throughout the year, field technicians also check for any blockages in moving water which may create shallow pools or otherwise stagnant water that can breed mosquitoes.

The District houses seventy-five dairy and waste water lagoon sites, of those fifty-four (72%) have opted in for the Weed Program. In 2018, those fifty-four sites were treated a total of 668 times with herbicides to control plant growth that would have facilitated the breeding of mosquitoes. Some of those sites were later treated to control mosquito larvae, while others simply required ongoing weed control to prevent mosquito breeding.

Additionally, physical control is used during the season by draining pools and fountains. Because of water restrictions, many homeowners are unable to drain their pools or water features, even when filled with rain water, when they become unable to maintain them. In these situations, the District will attempt to help the resident receive a waiver to empty their water source and stop mosquito breeding. In 2018, the District helped drain fewer than ten pools. Smaller water features were also drained.

Given the small cryptic breeding sites of the invasive *Aedes aegypti*, and its high resistance to most adulticides, physical control is the most effective means to limit mosquito breeding. In 2018, laboratory staff would often make small physical alterations to yards to limit existing or potential

breeding sources during inspections. This most often consisted of removing, overturning, or filling plant trays with sand or dirt as well as assisting homeowners in draining fountains and birdbaths. Laboratory staff also cleared debris and rubbish stuck in front of drainage pipes, that had caused water to pool and become heavy breeding sources.

Chemical Control

Chemical control is used by the District when biological or physical control is not feasible, with a focus on larvicides first and adulticides only if larvicides do not work or disease risks are elevated. Larvicides target immature mosquitoes while they reside in aquatic habitats whereas adulticides are intended to reduce adult mosquito populations. Any product used by the District has been registered with the California Environmental Protection Agency and is applied with strict adherence to the pesticide label instructions. Products may be applied weekly to annually, depending on a variety of factors including but not limited to water temperature, mosquito species, organic content, instar stage, and presence of predators.

Larvicides

The District prefers to use larvicides when possible, as preventing the existence of adults eliminates them as both a disease threat and a nuisance. In 2018, there were a total of 5,528 larvicide applications performed by the District. Larvicides used by the District fall into the categories of biorationals, insect growth regulators, and surface films.

Biorational products are products derived from natural sources and include Bti (*Bacillus thuringiensis israelensis*), Bs (*Bacillus sphaericus*), and spinosad. Bti, an OMRI rated larvicide, is a bacterium that damages the gut lining when ingested by mosquito larvae, leading to death. Bs, like Bti, is a bacterium that leads to the death of mosquito larva once ingested. Both Bti and Bs have a very low toxicity to non-target organisms. Spinosad, produced by soil bacteria, acts on the nervous system of mosquito larvae but is slightly more toxic to aquatic larval stages of other species. Resistance to biorational products is lower than that of other chemical control methods, and as such these are the products used most often by the District. In 2018, 2,934 applications were made with these chemicals, making up 53.08% of all larvicidal treatments.

Insect growth regulators act as synthetic hormones, disrupting the ability of larvae to pupate into adults. Methoprene-based products are used by the District when necessary. These larvicides were used a total of 1,471 times, making up 26.61% of the larvicidal applications.

Surface films are the only chemical control method that target both larval and pupal stages of mosquitoes. Pupal stages of mosquitoes do not eat and as such are not controlled by most larvicides. Alcohol and oil-based products inhibit the ability of both pupae and larvae to rest at

water surfaces to breath and results in suffocation of immature mosquitoes. Surface films can interfere with other forms of aquatic life and application must be done carefully. A total of 1,123, or 20.31% of all larvicidal applications in 2018 were made with surface films.

Adulticides

The District applies adulticides when larval control has failed, and the existing mosquito populations pose an increased nuisance or disease threat to residents. The District currently uses natural pyrethrins (a chemical compound derived from chrysanthemum flowers) as well as synthetic pyrethroids. Treatments are applied with backpack sprayers or as ultra-low volume (ULV) fogs by a truck mounted sprayer. Applications typically take place before dawn, or sometimes after dusk, to maximize contact with target mosquitoes and minimize effect to nontarget organisms. These chemicals break down rapidly in sunlight and as such are considered non-persistent and have low toxicity to humans.

There were six locations that were treated with adulticide in 2018, using approximately 5.7 gallons of chemical over the course of seven days. The first treatment was in late June with the last treatment taking place in early October.

In 2018, the District partnered with Dr. Anthony Cornel of UC Davis for pesticide resistant testing. In the future, the laboratory will be able to conduct these tests using mosquitoes raised in the insectary. The insectary is currently only being used to identify collected larvae and monitor the efficacy of treated larvae samples brought in from the field. It is important for the District to remain up to date on the possibility of resistance as chemical resistance will threaten the efficacy of products, potentially including ones that are not currently being used, and decrease the ability of the District to respond swiftly to disease threats within the community.

Working with Residents

The District offers many services to residents, including but not limited to:

- Collecting dead birds for disease testing
- Trapping and identifying mosquitoes
- Providing mosquitofish for water sources
- Educating homeowners about vectors
- Presenting to schools or groups about vectors
- Investigating mosquito presence
- Treating breeding sources
- Inspecting yards for breeding
- Treating backyard pools
- Identifying other arthropods

Service Requests

Delta Vector Control District provides ongoing preventative control work and surveillance as well as a variety of services directly to residents upon request. Service requests may be anonymous if the resident desires. Service requests traditionally fall into five categories: requests for fish, requests for an inspection, reporting of mosquito presence, reporting a source, and other. The "other" category includes non-mosquito vector complaints, requests to identify arthropod specimens, and any other requests.

In 2018, there were a total of 553 service requests with reports of mosquito presence making up over half of all service requests (see table 10).

2018	Fish	Inspection	Mosquito	Source	Other	Total
January	0	4	1	0	0	**5**
February	0	3	0	0	0	**3**
March	0	5	0	2	0	**7**
April	7	11	7	11	2	**38**
May	1	9	6	16	0	**32**
June	5	9	6	6	0	**26**
July	3	21	9	14	1	**48**
August	2	22	49	11	1	**85**
September	3	24	92	15	1	**135**
October	2	19	101	18	1	**141**
November	1	4	15	9	0	**29**
December	0	3	0	1	0	**4**
Total	**24**	**134**	**286**	**103**	**6**	**553**

Table 10. Number of Service Requests for 2018 by month and category.

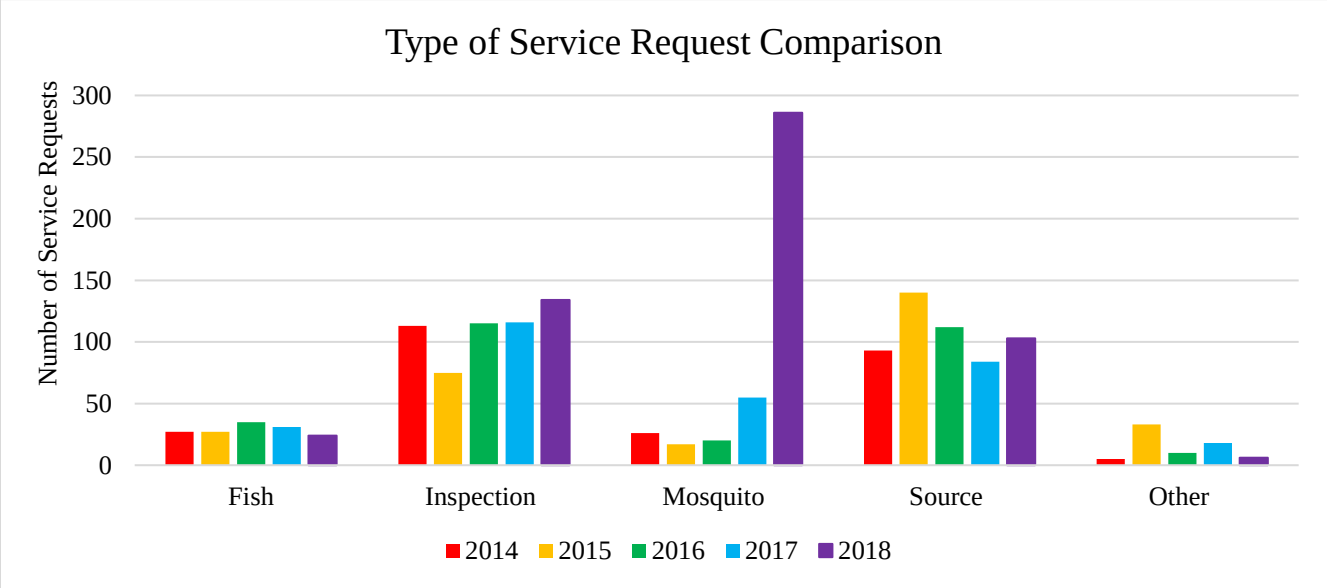


Figure 19. Comparison of the total number of different types of service requests for the past five years.

Service requests overall sharply increased by 45.03% compared to 2017 and by 38.41% over the Districts five-year average. This increase is likely due in large part to the *Aedes aegypti* mosquitoes

which expanded across the District in 2018. This can be seen by the increase in reports of mosquito presence or breeding in 2018, especially starting slightly later in the season when *Ae. aegypti* are most active (see figure 19 and table 10). In contrast, the amount of service requests has remained relatively stable for other categories over the same period.

Public Outreach

The goal of public outreach is to increase resident participation in preventing nuisance biting and vector-borne disease by teaching residents how to reduce mosquito breeding sources and to use personal protection measures appropriately. Outreach is conducted through a variety of communication channels including newspaper, radio and bus ads, social media, and in-person participation at community events.

Although the District has been participating in small outreach events for years, 2018 kicked off the new outreach program. Changes to the program aimed to increase public engagement and education regarding both the native and invasive mosquito species. Outreach focused largely on encouraging residents to report the presence of invasive *Aedes* mosquitoes or unusual mosquito activity to the District and given the increasing number of service requests involving mosquito presence, it is likely that the message was transmitted well.

Radio advertisements were run on four English and two Spanish speaking stations within the District and print advertisements were placed in the Visalia Times-Delta. Additionally, the Delta Vector Control District Facebook, www.facebook.com/DeltaVectorControlDistrict, and Twitter,

www.twitter.com/deltavcd, were revitalized and an Instagram, www.instagram.com/deltavcd/, account was created to improve outreach among residents. As always, the best place to go for information is the Delta website, www.deltavcd.com, but please follow the District on social media for tips and tricks regarding mosquito prevention, event announcements, and any planned chemical treatments. Additionally, the website has a map of the District, showing where current disease positive mosquito pools have been collected. The map was updated in 2018 to be more interactive, timely, and easier to read.

The District also participated in a variety of outreach events in 2018, speaking to over six hundred individuals across ten events. Events took place in Dinuba, Exeter, Farmersville, Visalia, and Woodlake and varied from community movie nights to neighborhood watch meetings to health fairs. District staff also, at the invitation of educators, visited two schools and presented to the students. If you have an event in your community or neighborhood that you would like a Delta Vector Control District representative to attend, please feel free to contact the District. The staff are always interested in increasing the District's involvement in the communities of the area.

One-on-one education, either by a biologist or technician, also took place following every initial yard inspection to inform the resident of both potential and active breeding sources and how best to avoid mosquito bites. When residents weren't present for inspections, information was left with the inspection packet along with encouragement to call if there were any questions.

In 2019, the District plans to focus its message on how individual homeowners can prevent breeding on their property with special emphasis on common breeding sources found during the 2018 season.

FINANCIAL STATEMENTS

For the year ending June 30th, 2018

	Budgeted Amounts			Variance with Final Budget Positive
	Original	Final	Actual	(Negative)
REVENUES				
Property taxes:				
Current secured	$ 2,074,122	$ 2,037,385	$ 2,122,870	$ 85,485
Current unsecured	115,239	112,901	123,819	10,918
Prior secured	64,420	45,144	40,881	(4,263)
Prior unsecured	2,645	2,323	7,872	5,549
State homeowner's property tax relief	19,720	19,720	19,470	(250)
Pass through income	302,414	293,383	313,922	20,539
Interest income	46,188	52,023	52,811	788
Charges for current services	4,302	4,302	3,652	(650)
Other governmental income	1,583	-	-	-
Gain on sale of assets	-	-	-	-
Assessments	758,425	758,425	756,435	(1,990)
Other income	35,276	34,236	49,293	15,057
Total revenues	3,424,334	3,359,842	3,491,025	131,183
EXPENDITURES				
Current:				
Salaries & employee benefits	2,100,207	2,100,207	2,089,652	10,555
Services and supplies	558,228	554,228	559,707	(5,479)
Debt service	369,536	1,448,190	1,448,190	-
Capital outlay	98,455	98,455	36,969	61,486
Total expenditures	3,126,426	4,201,080	4,134,518	66,562
Excess (deficiency) of revenues over (under) expenditures	297,908	(841,238)	(643,493)	(197,745)
Net change in fund balance	$ 297,908	$ (841,238)	(643,493)	$ (197,745)
Fund balance, July 1, 2017			4,327,419	
Fund balance, June 30, 2018			$ 3,683,926	

	General Fund	Adjustments	Statement of Net Position
ASSETS			
Cash and cash equivalents	$ 3,756,055	$ -	$ 3,756,055
Accounts receivable	1,089	-	1,089
Capital assets, net of accumulated depreciation	-	2,796,510	2,796,510
Total assets	3,757,144	2,796,510	6,553,654
DEFERRED OUTFLOWS OF RESOURCES			
Pension deferrals	-	822,595	822,595
Other post employement benefits deferrals	-	66,789	66,789
Total deferred outflows of resources	-	889,384	889,384
LIABILITIES			
Accounts payable	49,626	-	49,626
Accrued expenses	9,400	-	9,400
Payroll liabilities	14,192	-	14,192
Other post employment benefits liability	-	95,523	95,523
Due in one year:			
Compensated absences	-	65,455	65,455
Due in more than one year:			
Compensated absences	-	43,636	43,636
Net pension liability	-	1,945,947	1,945,947
Total liabilities	73,218	2,150,561	2,223,779
DEFERRED INFLOWS OF RESOURCES			
Pension deferrals	-	186,708	186,708
Other post employment benefits deferrals	-	183,841	183,841
Total deferred inflows of resources	-	370,549	370,549
FUND BALANCE/NET POSITION			
Fund balance:			
Unassigned	3,683,926	(3,683,926)	-
Total fund balance/net position	3,683,926	(3,683,926)	-
Total liabilities and fund balance/net position	$ 3,757,144		
Net position:			
Invested in capital assets, net of related debt		2,796,510	2,796,510
Unrestricted		2,052,200	2,052,200
Total net position		$ 4,848,710	$ 4,848,710