2020 ANNUAL REPORT

SACRAMENTO-YOLO MOSQUITO & VECTOR CONTROL

Sacramento-Yolo
MOSQUITO & VECTOR
CONTROL DISTRICT

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PLEASE NOTE THAT SOME OF THE PHOTOS INCLUDED IN THIS REPORT WERE TAKEN BEFORE COVID-19 MASK USAGE AND SOCIAL DISTANCING RECOMMENDATIONS BECAME A MANDATE.

Dear Residents, Colleagues & Friends

We are pleased to present the 2020 Annual Report for the Sacramento-Yolo Mosquito and Vector Control District. We are happy that once again the District was able to successfully protect our community and the residents we serve against mosquitoes, West Nile virus (WNV), invasive mosquitoes and other threats to public health. This report describes the work performed by the District.

2020 will be a year that we will never forget. While it started out very similarly to previous years, things changed rapidly with the introduction of Covid-19. It was a time of constant adjustments and ongoing challenges as we quickly adapted our District operations to abide with shelter in place orders, wearing masks and complying with ever changing recommendations regarding the safety of our employees, while still offering mosquito control services to all of our residents. Despite the stressful circumstances and trials ahead, we successfully adapted and were effectively able to continue with most of our work despite the varying recommendations set forth by health and government officials.

In 2020 we also continued to detect the invasive mosquito Aedes aegypti within District boundaries. On September 15th, invasive Aedes were first detected in Winters. This was the first detection of invasive mosquitoes in Yolo County. The initial finding of a single mosquito in a gravid trap quickly became the biggest infestation of invasive mosquitoes in the entire District. Unfortunately, after extensive surveillance and trapping efforts from our lab staff, invasive mosquitoes were found to be breeding in many homes throughout the entire city. Our field technicians conducted public outreach and intense door-to-door inspections canvassing the whole town looking for larval sources and adult mosquitoes. In response to the extensive finding of both immature and adult mosquitoes, the District conducted many treatments directly in the backyards of residents, as well as larviciding and adulticiding treatments throughout the whole town. A few weeks later, in Sacramento County, invasive mosquitoes were also detected in various areas of Arden. Door to door inspections, enhanced surveillance, public outreach and mosquito control treatments also took place in the area. While invasive mosquitoes were initially discovered in Citrus Heights in 2019, this year none were detected. After an intense season with invasive mosquitoes, as temperatures cooled, mosquito populations declined and the last time Aedes aegypti mosquitoes were detected was in November.

The 2020 mosquito season was a mild one for WNV activity with significantly lower levels than in previous years. Ongoing public information and outreach campaigns disseminated mosquito prevention messages encouraging public participation in reporting dead birds and common mosquito breeding sources. The laboratory closely monitored all mosquito activity by trapping, sorting and collecting mosquito samples to determine WNV activity and where it was concentrated. When the disease reached levels that posed a threat for increased virus transmission to the public, control operations responded by conducting ground spraying to quickly and effectively decrease the abundance of mosquitoes. Field technicians also spent time looking for and treating routine mosquito breeding sources, inspecting thousands of catch basins throughout our two counties and responding to service requests from the public. Mosquitofish were utilized in various urban, rural and agricultural areas as a natural method of controlling mosquitoes and our ecological management department worked closely with various entities and residents to reduce mosquito populations.

As we move forward with ongoing uncertainty regarding Covid-19 and the impact it will have on our communities and residents, our dedication and commitment stands firm to continue offering the best mosquito control program to the people of Sacramento and Yolo counties.
If you have any questions please visit our website at www.FIGHTtheBITE.net or call us at 1-800-429-1022.

Sincerely,

Gary Goodman
District Manager

Sincerely,

Jayna Karpinski-Costa
2020 President, Board of Trustees

History

In 1915, the California Legislature adopted the "Mosquito Abatement Act" (now incorporated into the California Health and Safety Code, Division 3) which formed the basis for the creation, function and governing powers of Mosquito Abatement Districts.

On June 18, 1946, the Sacramento County-Yolo County Mosquito Abatement District was formed by joint resolution of the Board of Supervisors for Sacramento and Yolo counties. The driving force behind the formation of the District was the public's need for protection against mosquito-borne diseases and relief from serious pest nuisance.

In July of 1990, the District Board voted by resolution to change the name of the District to the Sacramento-Yolo Mosquito and Vector Control District to better reflect the expanded services and responsibilities the District assumed regarding ticks, yellow jackets and other vectors.

The District is governed by a Board of Trustees, each appointed by one of the incorporated cities or one of the counties within the District's boundaries. Board meetings are held at 10:00 am on the third Tuesday of each month in Elk Grove.

2020 Board of Trustees Officers

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Administrative Office, Public Information, Control Operations, Fisheries and Laboratory
Sacramento County

8631 Bond Road
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Control Operations
Yolo County

1234 Fortna Avenue
Woodland, CA 95776
Phone: 1-800-429-1022
Fax: 530-668-3403

Personnel

Manager: Gary Goodman
Assistant Manager: Samer Elkashef
Administrative Manager: Janna McLeod
Program Coordinator: Steve Ramos
Senior Administrative Assistant: Raj Badhan
Administrative Assistant: Kellee Prasad

Laboratory

Laboratory Director: Marcia Reed
Biologist: Sarah Wheeler
Vector Ecologist: Debbie Dritz
Microbiologist: Kara Kelley
Laboratory Technicians: Courtney Chagolla, Joy Drake, Paula Matney, Stanley Roberts, Marilou Thomas, Marti Towery, Nicholas Tremblay
Laboratory Assistant: Kylie Letamendi

Fisheries

Fisheries Supervisor: Tony Hedley
Field Technicians: Vincent Luu, Grant White

Public Information & Education

Public Information Officer: Luz Maria Robles

Ecological Management

Ecological Management Supervisor: Marty Scholl
Ecological Management Technicians: Robert Fowler, Guy Kachadorian

Mapping & Information Technology

Mapping/Systems Coordinator: Ruben Rosas
Information Technology Administrator: Dan Fisher

Shop

Supervisor: Tom Price
Mechanics: Ben Weisenberg, Don Henson

Mosquito Control Operations
North Sacramento County

Supervisor: Kevin Combo
Field Technicians: Nick Ascarrunz, Ron Burkhouse, Tyler Carlson, Whitney Clack, Timothy Guimont, Ken Harris, Katie Kirkham, David Smith, Timothy Yuen

Mosquito Control Operations
South Sacramento County

Supervisor: Demetri Dokos
Field Technicians: Jeff Anderson, Jonas Leuluaialii, Brian McGee, Phillip Merritt, Jacob Pascual, John Snell, Richard Speakman, Kevin Valone

Mosquito Control Operations
North Yolo County

Supervisor: Michael Fike
Field Technicians: Garrett Bell, Jason Lloyd, Zeb Middleton, Mark Pipkin, Jake Vigna

Mosquito Control Operations
South Yolo County

Supervisor: Garth Ehrke
Field Technicians: Dan Bickel, Brett Day, Will Hayes, Frank Mendez, Soda Sanouvong, George Santiago

Mosquito Control Operations
Catch Basin Crew

Supervisor: Ryan Wagner
Field Technicians: Shan Badhan, Douglas Camero, Max Fike, Jay Geigle, Ben Guimont, Eric Guimont

Integrated Pest Management

Mosquito and vector control are based on scientifically planned management tactics and control strategies that reduce the abundance of target pests in a timely manner. This method is commonly referred to as "Integrated Pest Management" (IPM). This comprehensive program incorporates five basic methods: public information and education, mosquito and vector surveillance, biological control, physical control, and microbial and chemical control.

Public Information & Education

The District's outreach program educates and informs the public about mosquito and West Nile virus prevention methods through an extensive advertising and media campaign. District messages are also disseminated to the public by participating in a variety of community events, health fairs, presentations to schools and community organizations as well as partnerships with local groups.

Mosquito & Vector Surveillance

The District closely monitors mosquito activity, climate change and arbovirus activity by testing mosquitoes, sentinel chickens, wild birds and ticks for the presence of pathogens, parasites or arboviruses. This research and surveillance information helps guide efficient control of vectors and vector-borne diseases in Sacramento and Yolo Counties.

Biological Control

Biological control is the use of specially chosen living organisms to control a particular pest. This chosen organism might be a predator, parasite, or pathogen which will attack the harmful insect resulting in a desired reduction of pest population levels. The most common biological tool against immature mosquitoes in California are mosquito-eating fish such as the mosquitofish, ***Gambusia affinis*** and the Guppy, ***Poecilia reticulata***. When introduced to a mosquito breeding source, these fish quickly adapt, multiply and become numerically capable of sustaining an effective control level.

Physical Control

Physical control (environmental management) is achieved by altering the ecological components of the pest's environment such as: promoting effective drainage, controlling emergent vegetation, promoting appropriate timing of irrigation, and encouraging mosquito reduction best management practices in urban, agricultural, and conservation areas. By managing aquatic sources, opportunity for mosquitoes to develop is eliminated.

Microbial & Chemical Control

Microbial and chemical control are the prudent use of specific microbials and chemical compounds (insect growth regulators and insecticides) that reduce mosquito populations. These materials are applied when other methods are unable to maintain mosquito numbers below a level that is considered tolerable or when emergency control measures are needed to rapidly disrupt or terminate the transmission of disease to humans and animals. These products and application methods used are registered for public health use by the California Department of Pesticide Regulation, as well as California Environmental Protection Agency, and are designed to minimize non-target effects. Larvicides target immature mosquitoes; adulticides are chemicals that reduce adult mosquito populations.

Public Information & Education

The District's award winning public information and education department strives to raise awareness of mosquitoes and of vector-borne diseases such as WNV, Zika, dengue and chikungunya. This is done through extensive media coverage obtained on television, radio, print and various news websites using an aggressive advertising campaign which includes radio and television advertisements in English and Spanish, extensive social media, outdoor creative ads and online digital ads. The District's media strategy also includes participation in various radio and television public affairs shows and television programs used to disseminate District messages. Two additional elements important to the department are community outreach and the school program. The District hosts information booths at several community events throughout Sacramento and Yolo counties where educational materials are disseminated and the public receives information about available District services. Another element of outreach is the school program which includes year round classroom presentations and an annual spring Fight the Bite Contest for all students and schools within Sacramento and Yolo counties.

In 2020, due to Covid-19, many of the traditional public outreach and education activities came to an abrupt halt in March when a shelter in place order took effect. To reinforce the District's role as an essential service, we quickly put together a short video describing how the District would be operating moving forward. This gave us an avenue to reaffirm our commitment to protect public health by continuing with service requests, home service inspections, surveillance and other District services and programs while still following Covid guidelines to ensure the safety of our employees and our residents.

In 2020, the invasive mosquito species, *Aedes aegypti* was detected for the first time in Yolo County in the City of Winters. A press release was issued immediately to inform the public and a door to door response was initiated where District technicians educated residents on how to prevent these mosquitoes on their property. Residents received brochures, repellent and a door hanger with information and prevention tips. Since the infestation of invasive *Aedes* was intense, we partnered with the local newspaper to generate media coverage and encourage residents to sign up for our email notifications regarding our mosquito control response and treatments. We also launched a social media and print ad campaign to further disseminate information regarding invasive mosquitoes. In addition, we collaborated with city hall and local elected officials to disseminate information via the city website, newsletters, and social media. Repellent was delivered to the chamber of commerce and delivered to businesses. Invasive mosquitoes were also detected in the Arden area of Sacramento County and very similar outreach efforts were conducted.

Further Outreach Activities

SCHOOL AND COMMUNITY PRESENTATIONS

In 2020 plans to enhance our school program and outreach to children included rolling out our Fight the Bite assemblies to various schools in the area. Unfortunately, due to the pandemic, we were only able to hold 4 assemblies before home distance learning began. Zoom became a popular outlet as a way for people to come together and we were able to successfully conduct a few meetings to neighborhood associations and community service groups in this manner.

COMMUNITY EVENTS

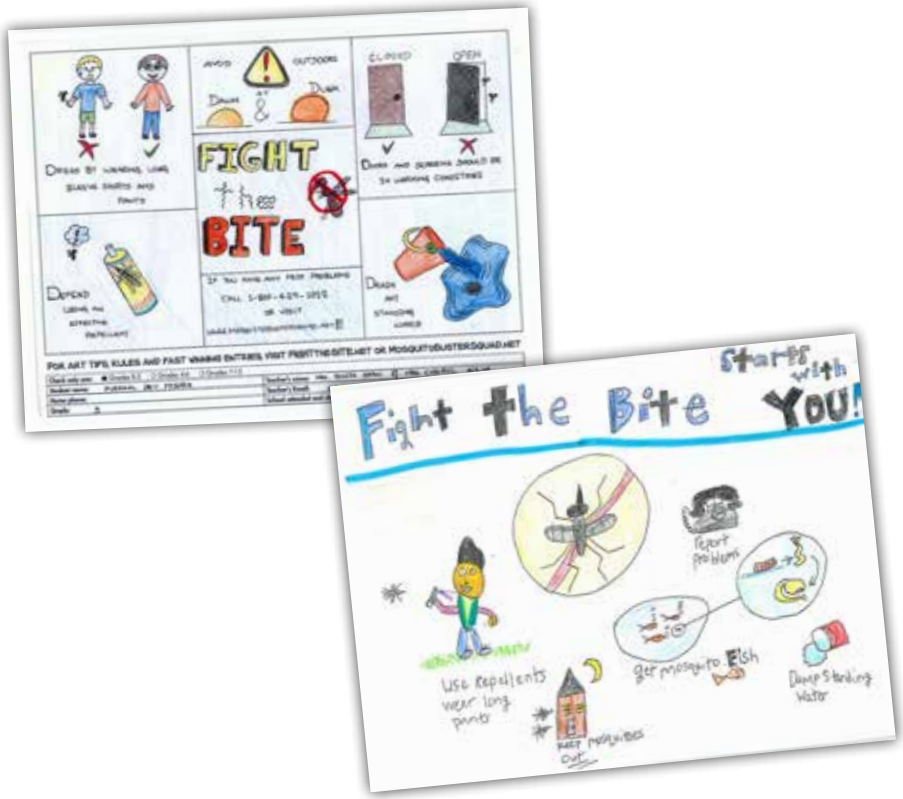
The District typically participates in a variety of community events throughout the year, however in 2020, the only in-person event that we were able to attend was Duck Days in February before the pandemic began. We provided repellent to a few neighborhood organizations that held socially distanced food truck events or community clean ups to provide to their volunteers.

FIGHT THE BITE CONTEST

Despite the pandemic, our annual Fight the Bite Contest was able to continue. Contest fliers were disseminated and students in grades K-12 were asked to create artwork encouraging the audience to practice one or all of the District D's of Mosquito Prevention. Winners were selected and announced during Mosquito Awareness Week in April.

REPELLENT DISTRIBUTION

An important component of the education and outreach program is to promote the use of mosquito repellent as a way to have the public protect themselves from mosquito bites. The District offers free mosquito repellent wipes for agencies and community organizations to use during outdoor evening activities. In 2020, field technicians delivered boxes of repellent to agencies that serve homeless populations, parks and recreation departments, senior centers and businesses. To request mosquito repellent you may send an email to info@fightthebite.net.



Mosquito & Vector Surveillance

The laboratory provides the following technical information to help guide efficient control of vectors of diseases in Sacramento and Yolo Counties:

- Surveillance of mosquitoes
- Encephalitis virus surveillance
- Surveillance for other mosquito-borne diseases
- Tick and Lyme disease surveillance
- Surveillance of bees and wasps
- Identification of arthropods of public health significance
- Pesticide resistance testing and management
- Research and special projects

Surveillance of Mosquitoes

Mosquito surveillance is an essential component of the District's Integrated Vector Management (IVM) program and a considerable amount of effort is devoted to it. The District's surveillance program consists of a systematic approach for locating areas with high mosquito abundance and mosquito-borne disease activity over time and space. The laboratory collects and analyzes data on seasonal changes in relative abundances of mosquito species, monitors geographic and environmental distribution patterns of mosquito species, determines maximum and minimum risk periods of public exposure to mosquito-borne diseases, and evaluates mosquito control activities. The data collected are combined with data from previous years and provide information on the dynamics of mosquitoes and mosquito-borne diseases within the District's surveillance area.

In 2020, our District collected over 233,144 mosquitoes in fixed sites throughout Sacramento and Yolo Counties for mosquito abundance calculations. The mosquitoes collected were identified to species and counted by our laboratory technicians. The District used two types of traps for collection of abundance data — District "Locker" traps and Gravid traps. Both trap types were set in representative sites in both counties and were used to gather information on the distribution of all mosquito species and to monitor populations of mosquito species of concern. Data was interpreted in the context of historical records and mosquito abundance and compared to a 5-year average.

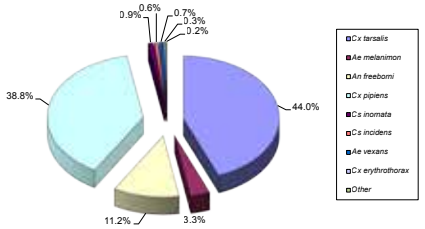
The District Locker traps capture host-seeking mosquitoes that are attracted to carbon dioxide emissions. The second type, the Gravid female trap, attracts female mosquitoes that are seeking to lay eggs in water rich in organic material. The organic water mixture is made of ground alfalfa, hog chow pellets and Brewer's yeast and is allowed to ferment before being used in the trap.

In addition to the mosquito species found in Sacramento and Yolo Counties, District technicians are also trained to recognize any exotic or introduced species, if present, in any of the thousands of samples they collect each year.

LOCKER TRAPS

The District used a total of 23 Mosquito Locker traps in 2020 in Sacramento and Yolo Counties. A total of 132,124 mosquitoes were collected by these traps, and most (92%) were females. The most abundant species collected were, *Cx. tarsalis*, *Cx. pipiens*, *An. freeborni*, and *Ae. melanimon*.

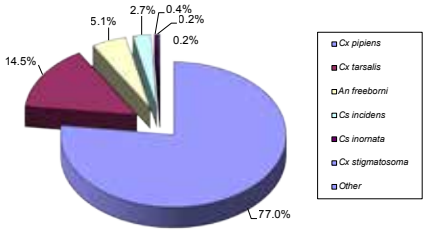
LOCKER TRAP COLLECTION



GRAVID TRAPS

A total of 24 Gravid traps were used in 2020 in Sacramento and Yolo Counties for adult mosquito abundance tracking. A total of 101,020 mosquitoes were collected by these traps, and most (78%) were females. The most abundant species, as expected, was *Cx. pipiens*, followed by *Cx. tarsalis*, *An. freeborni* and *Cs. incidens*. Other mosquito species constituted less than 1% of the total collection.

GRAVID LIGHT TRAP COLLECTION



ADULT MOSQUITO ABUNDANCE TRENDS

All mosquito species are monitored throughout the year, but the District is particularly interested in the abundance of certain species from the standpoint of disease transmission and nuisance. Two *Culex* species, namely *Cx. pipiens* and *Cx. tarsalis*, are considered the main vectors of West Nile virus in Sacramento and Yolo Counties. The abundance of these species is closely monitored and is used in the risk assessment for West Nile virus transmission. *Culex pipiens*, the northern house mosquito, is a medium-sized, brown mosquito, which usually breeds in foul or polluted waters, such as artificial containers, fish ponds, improperly maintained swimming pools, catch basins, septic tanks, dairy drains, waste treatment ponds, etc. It tends to bite in the dusk or early evening hours of the day and feeds mostly on birds, but will also readily bite mammals, including humans. This species peaks in June-July, with high populations maintained through October. Abundance for this species in 2020 was generally higher than the 5-year average.

Culex tarsalis, the western encephalitis mosquito, is also a medium-sized and brownish mosquito, but has a distinctive median white band on the proboscis and white bands on the legs. This species commonly colonizes a wide variety of aquatic sources, such as wetlands, duck clubs, rice fields, and irrigated crops. However, in recent years, it has been commonly found in significant numbers breeding in abandoned or not maintained swimming pools in suburban and urban environments. It is also a bird feeding mosquito that may feed readily on humans, and it is most active at dusk and early hours of the evening. Abundance numbers for *Cx. tarsalis* in 2020 were very closely aligned with the 5-year average.

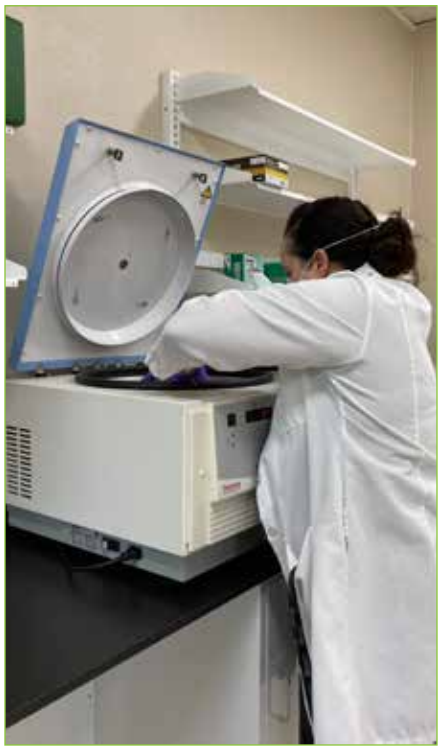
Culex erythrothorax is a distinctive orange to light brown mosquito which inhabits tule pond areas. It does not fly long distances and usually stays near the location of its breeding source. Another *Culex* species, *Cx. stigmatosoma* is a foul water breeding mosquito and has banded legs like the *Cx. tarsalis* mosquito. These mosquitoes can vector West Nile virus, but are not particularly widespread. We also find *Cx. thriambus* in our District's area, but in much smaller numbers. Abundance numbers for *Cx. erythrothorax* and *Cx. stigmatosoma* in 2020 were similar to the 5-year average.

Anopheles freeborni, the western malaria mosquito, is a large mosquito which is most active at dusk, and will readily enter houses. It can be a significant nuisance during its peak population periods. Females feed on most mammals and are most active in the dusk and early evening

hours. This species may be abundant in rice fields, and occurs in clear, seepage water in sunlit algae-laden pools. It usually has a bi-modal population trend with the first peak in early February and a second, much greater peak in August and September, when it can be considered a major pest due to its biting activity. In 2020, *An. freeborni* population counts were higher than the 5-year average from July through September. Other *Anopheles* species found in our area are *An. franciscanus* and *An. punctipennis*.

There are several *Aedes* species of mosquitoes which are also of concern to the District. *Aedes melanimon* and *Ae. nigromaculis* are floodwater mosquitoes. They lay eggs on ground which will become flooded later, either by natural precipitation, flooding, or by agricultural practices. When the fields containing eggs are flooded, large numbers of larvae can emerge and develop rapidly to the adult stage. When this occurs the resulting biting activity on humans and other mammals in the area is significant. For this reason, even though these mosquitoes are not primarily involved in disease transmission, they are a nuisance concern. *Aedes* are day and dusk biting mosquitoes rather than the principally dusk biting type of the *Culex* and *Anopheles* species. Another *Aedes* mosquito of interest found in our District's area is *Ae. sierrensis*, the western treehole mosquito. Unlike *Ae. melanimon* and *Ae. nigromaculis*, this mosquito is involved in disease transmission and is the primary vector of canine heartworm in our area. It is unique in that its natural breeding source is treeholes. This species is difficult to control as there can be numerous trees with treeholes in a given wooded area. In addition, the treeholes can be at varying heights and are cryptic in nature, thus making treatment with mosquito control products difficult, even though the mosquito species itself has a limited flight range. This small black and white mosquito is active during the day as well as at dusk. All of these *Aedes* mosquitoes are primarily mammal biting mosquitoes and can become a significant nuisance. Other less common *Aedes* species that can be found in our area and can be a localized nuisance or concern include: *Ae. washinoi, Ae. vexans, Ae. sticticus,* and *Ae. bicristatus*. *Orthopodomyia signifera* is another mosquito species which can be found in treeholes and sometimes artificial wooden containers in our District's area, but it is not nearly as common as *Ae. sierrensis*.

In addition to the species mentioned above, which are all active primarily during the spring and summer months, the *Culiseta* species mosquitoes are active either primarily in the winter months (*Cs. inornata*) or all year long (*Cs. incidens*). These are large mosquitoes and are primarily mammal biters which commonly feed at dawn and dusk. *Culiseta inornata* and *Cs. incidens* breed in a variety of natural aquatic habitats, with *Cs. incidens* also being adapted to artificial containers and more polluted sources. These mosquitoes are primarily nuisance mosquitoes; however *Cs. incidens* has been suggested as a canine heartworm vector and is a secondary vector of West Nile virus. *Culiseta particeps* is also found in our District area, but is not as common in our traps as *Cs. inornata* and *Cs. incidens*.



Invasive mosquito species are becoming an increasing concern for Districts in California. *Aedes aegypti* (yellow fever mosquito) and *Ae. albopictus* (Asian tiger mosquito) are undergoing a range expansion in California. These mosquito species are container breeders that often make use of anthropogenic water-collecting materials (pots, tires, tarps, and discarded trash) for breeding. These species, like other *Aedes* species, lay desiccation resistant eggs and can be aggressive human biters. They are of special concern because they are often found in close proximity to humans and are known vectors of several important human viruses including: Yellow fever, Dengue, Chikungunya, and Zika. The District detected *Aedes aegypti* mosquito populations of significant size in two new areas in 2020, the city of Winters in Yolo County and in the Arden area of Sacramento County.

In addition to adult mosquito surveillance, the District conducts an intensive immature mosquito surveillance program. Mosquito breeding sources are routinely inspected by field technicians, who are trained to identify the larvae in the field and also bring them to the District's laboratory for further species identification or confirmation. The data provided by this program is used for targeting control efforts and determining their efficacy.

Encephalitis virus surveillance

SENTINEL CHICKENS

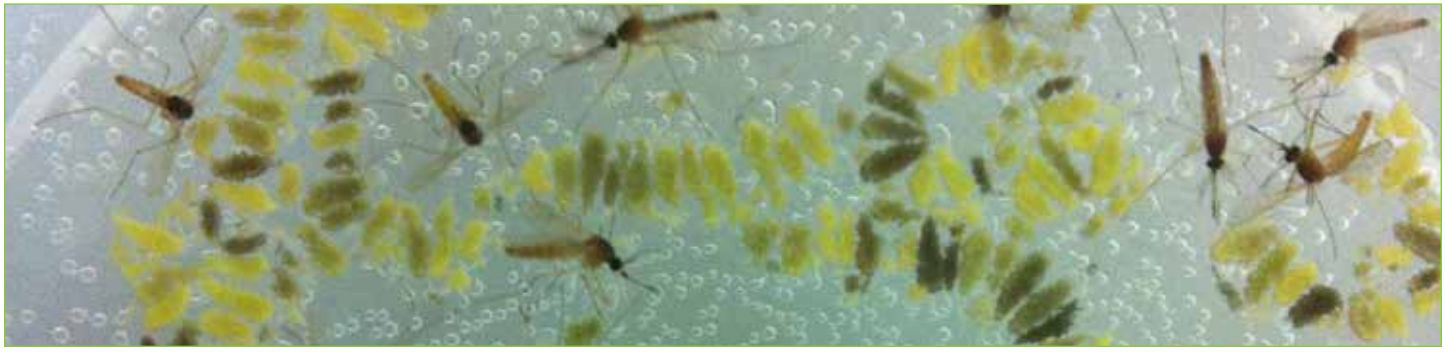
In an effort to use all available surveillance tools and increase the chances of early detection of arbovirus activity, the District uses sentinel chickens as part of the encephalitis virus surveillance program. Chickens usually do not develop symptoms of disease when infected with West Nile virus and are considered dead-end hosts for it, meaning they do not produce sufficient viremia to infect mosquitoes when subsequently bitten by them. More significant to our program, chickens stay inside a coop in a fixed area and the presence of antibodies in their blood indicates local virus transmission. Therefore, they are used by some mosquito control agencies in their surveillance programs and may serve as an early indicator of local arbovirus activity in an area.

In 2020, the District maintained a total of 25 chickens distributed in 5 flock sites within Sacramento and Yolo Counties and an additional flock kept for replacement of positive chickens during the season. Five chickens were kept per flock at a time, and they were replaced whenever their test showed antibodies towards Saint Louis Encephalitis (SLE), Western Equine Encephalitis (WEE), or West Nile virus (WNV). Blood samples were collected from April 23 through October 9. Samples were tested for the presence of antibodies towards SLE, WEE, and WN viruses. The first West Nile virus-positive chicken sample was detected on a collection made on September 9, 2020. At the end of the sampling period, antibody conversions had been found in two of the five flocks with a total of 6 chickens positive for antibodies towards West Nile virus. No seroconversion for other viruses was detected.

2020 SENTINEL CHICKEN TESTS

SACRAMENTO COUNTY			
Flock Location	WEE positive	SLE positive	WNV positive
Tyler Island	0	0	0
Gibson Ranch	0	0	5
Rancho Murieta	0	0	0

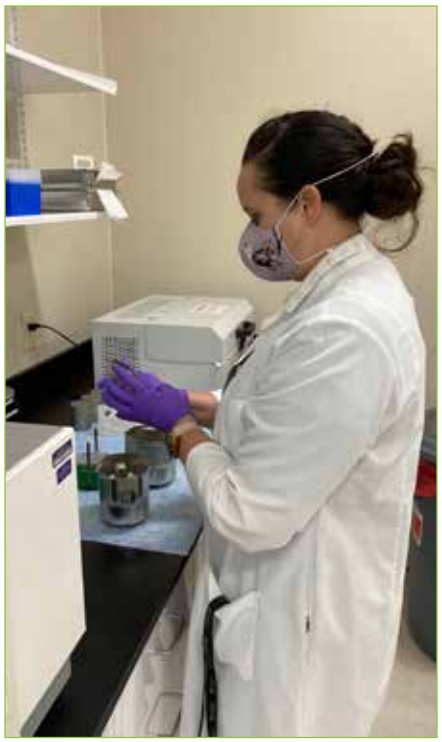
YOLO COUNTY			
Flock Location	WEE positive	SLE positive	WNV positive
Dunnigan	0	0	0
Knights Landing	0	0	1



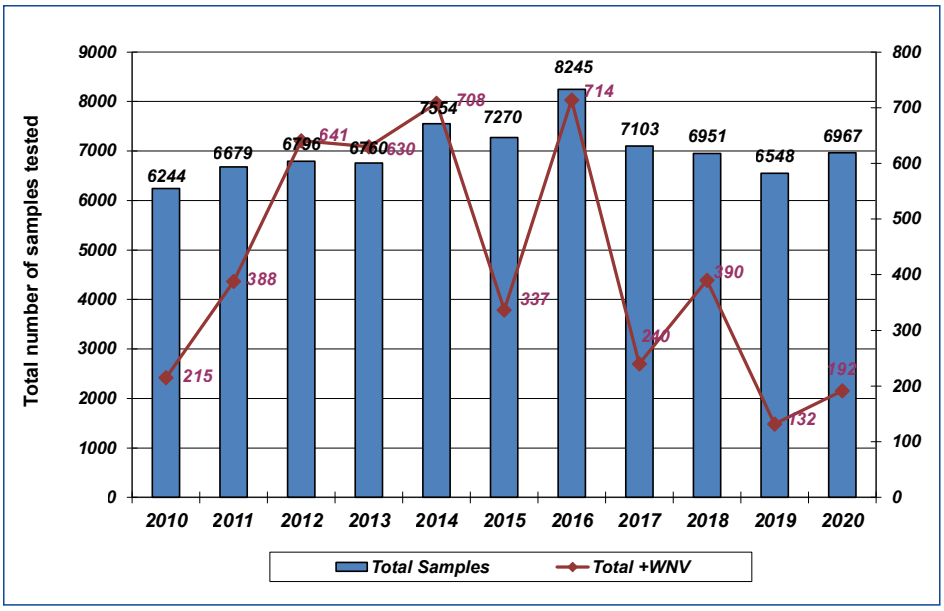
ENCEPHALITIS VIRUS SURVEILLANCE TRAPS

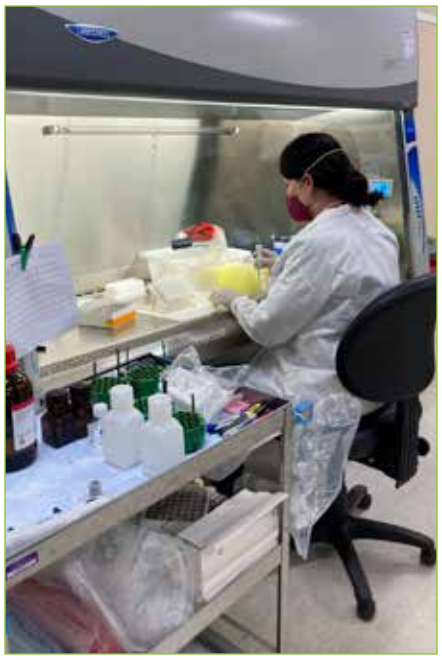
The District uses two types of traps for Encephalitis Virus Surveillance (EVS): dry ice-baited traps and Gravid female traps. These traps are battery-operated and are placed in each specific site and collected the following morning. Samples are then brought to the District's laboratory for processing and the collected female mosquitoes are grouped by species in vials containing one to 50 mosquitoes. Samples of the species of concern are then tested for the presence of SLE, WEE, and WN viruses by TaqMan real-time polymerase chain reaction (RT-PCR).

A total of 220,893 mosquitoes were captured with the two EVS trap types in 2020. Most of the mosquitoes captured were females (96%) and 83% of them were captured in the dry ice-baited traps. A total of 6,967 mosquito samples (of one to 50 female mosquitoes each) were tested by the District in 2020. The first West Nile virus-positive mosquito sample was a sample of *Cx. pipiens* mosquitoes collected on June 9, 2020 from Sacramento County. The last positive sample was collected on October 6, 2020. A total of 192 mosquito samples tested positive for West Nile virus in 2020 –115 from Sacramento County and 77 from Yolo County. No seroconversion for other viruses was detected.



WEST NILE VIRUS ACTIVITY 2010-2020





2013-2020 SUMMARY OF ENCEPHALITIS VIRUS SURVEILLANCE

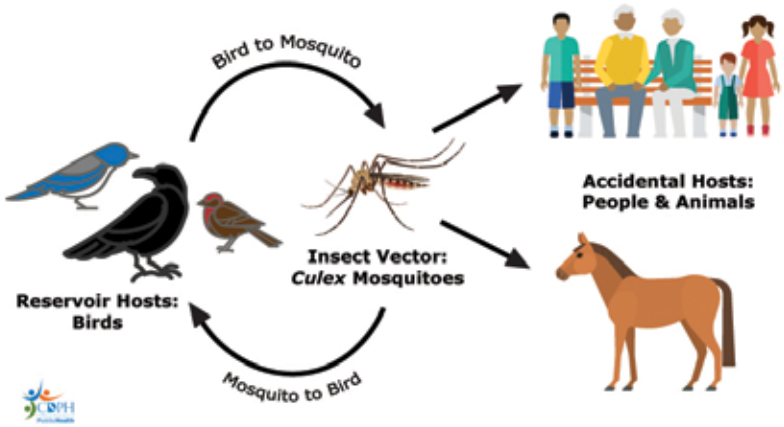
		2013	2014	2015	2016	2017	2018	2020
Mosquito pools	Total tested	6760	7554	7270	8245	7103	6951	6548
	WNV-positive	630	708	337	714	240	390	132
Chicken samples	Total tested (Total no. chickens)	518 (50)	516 (50)	420 (30)	278 (30)	230 (30)	375 (25)	350 (25)
	Seropositive	18	19	8	7	4	10	5

DEAD BIRDS

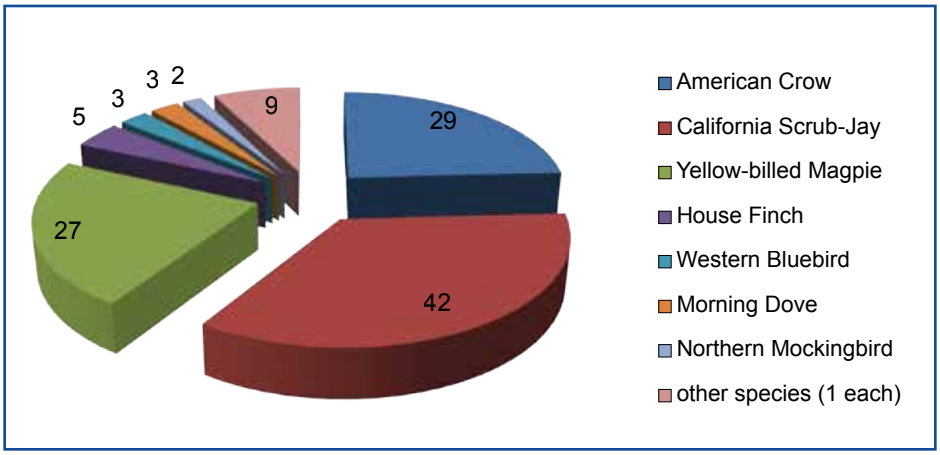
The dead bird surveillance program was established in 2000 by the California Department of Public Health (CDPH) in collaboration with local agencies. Bird mortality can be a sensitive indicator of West Nile virus activity. Dead birds are reported by the public to the WNV hotline (1-877-WNV BIRD, or online at westnile.ca.gov), and are then collected and identified by the local agencies. Our technicians try to collect every dead bird reported to our District. Samples are collected from suitable specimens and tested for the presence of SLE, WEE, and WN viruses by TaqMan real-time polymerase chain reaction (RT-PCR). Often the first indication of virus activity in a certain area comes from reported dead birds, therefore this program is a very important component of our laboratory's surveillance program because it helps the District better allocate resources and focus on areas where virus activity has been detected.

In 2020, 920 dead birds from Sacramento and Yolo Counties were reported to the WNV hotline. A total of 402 dead birds were tested for WN, WEE and SLE viruses and 120 were found positive for WNV (91 from Sacramento County and 29 from Yolo County). Most of the positive dead birds were California Scrub-Jays (42) and American Crows (29), followed by Yellow-billed Magpies (27), House Finch (5). Various other bird species constituted the remaining 17 of the total WNV-positive birds tested.

WEST NILE VIRUS TRANSMISSION CYCLE

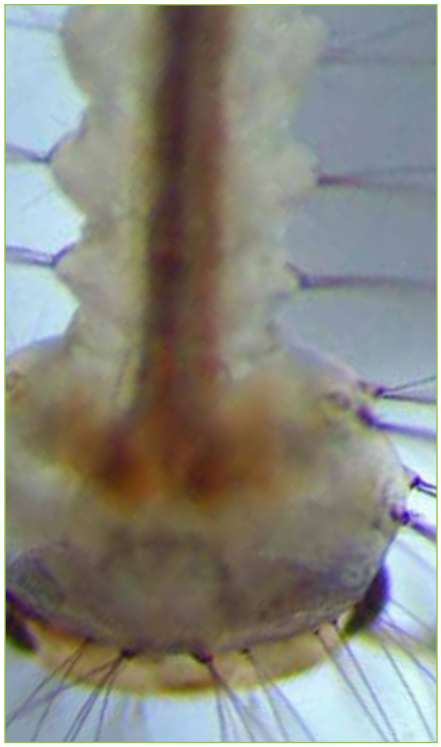


WNV POSITIVE DEAD BIRDS 2020



Surveillance for Other Mosquito-Borne Diseases

In addition to encephalitis virus surveillance, the District's laboratory conducts surveillance for other mosquito-borne diseases, such as Canine heartworm, Malaria, Dengue, Chikungunya, Zika, and others. Canine heartworm is a filarial nematode (*Dirofilaria immitis*) primarily vectored in this region by *Ae. sierrensis*, the western treehole mosquito. The District's field technicians inspect all known sources of this species, but they may be very difficult to find, inspect and treat. In a wooded area there may be hundreds of hidden treeholes at many different heights. The District's laboratory conducts regular surveillance for *Ae. sierrensis* in its routine adult mosquito trapping.



Malaria is a mosquito-borne infectious disease, caused by a protozoan parasite and transmitted to people primarily by Anopheline mosquitoes. In Sacramento and Yolo Counties, there are two species that can transmit the malaria parasite: *Anopheles freeborni* (the western malaria mosquito) and *An. punctipennis* (the woodland malaria mosquito). Malaria cases are reported to the District by the Sacramento and Yolo County Health and Human Services Departments. After receiving the report, the District laboratory responds by trapping mosquitoes in the area surrounding each malaria case. The captured mosquitoes are then brought to the laboratory for identification, and all female Anopheline mosquitoes are tested for malaria parasites. In 2020 there were no malaria cases reported to the District.

Dengue, chikungunya, and zika are also diseases caused by viruses transmitted to people by mosquitoes, specifically the invasive species; *Aedes aegypti* and *Ae. albopictus*. Whenever the District receives a report of a case, the laboratory initiates trapping for any of these invasive Aedes species around the reported location. One dengue case and one zika case were reported to the District by the Sacramento County Health and Human Services Departments in January of 2020 and both were related to travel outside of the United States. There were no mosquitoes of concern trapped near these reported cases.

Tick and Lyme Disease Surveillance

Lyme disease, caused by the bacterium *Borrelia burgdorferi*, is primarily vectored in Sacramento and Yolo Counties by the tick *Ixodes pacificus*, also known as the western blacklegged tick. The District's laboratory collects tick specimens from twenty fixed locations from November to May, using a technique called tick-flagging, where a flannel sheet is dragged along the side of a trail. The District also identifies tick samples brought to the laboratory by the public. Ticks are tested by polymerase chain reaction (PCR) with a specific primer and probe set for *B. burgdorferi*. Results are communicated to the surveillance locations and signs are posted to create public awareness of the potential presence of Lyme disease agent and vectors in the area.

2020 LYME DISEASE SURVEILLANCE DATA

YOLO COUNTY	Total Ticks	Pools Tested	Positive Pools	% Positive
Cache Creek – site 1	24	6	0	0
Cache Creek – site 2	171	36	0	0
Camp Haswell	52	13	0	0
Putah Creek – site 1	22	11	0	0
Putah Creek – site 2	72	17	1	14
SACRAMENTO COUNTY	**Total Ticks**	**Pools Tested**	**Positive Pools**	**% Positive**
Ancil Hoffman Park	14	5	0	0
Bannister Park	83	18	0	0
East Lake Natoma	200	43	1	0.5
Folsom Zoo Trail	42	13	0	0
Gold Lake Dr	23	6	0	0
Hinkle Creek	9	6	0	0
Humbug Trail	69	17	0	0
Lower Sunrise	90	20	1	1.1
Mississippi Bar	100	24	1	1
Negro Bar	254	53	0	0
Nimbus Dam	128	26	0	0
Sailor Bar	53	14	0	0
Snipes Park	269	55	2	0.7
Upper Sunrise	113	25	2	1.8
Willow Creek	554	113	10	1.8
TOTALS	**2,342**	**521**	**18**	

Surveillance of Bees and Wasps

The District maintains honey bee swarm traps with swarm trap lures in locations which may give an early indication of arrival of the Africanized honey bees to our counties. The program currently consists of several locations in Yolo County and Sacramento County. No swarms of concern were noted in 2020.

The District's yellowjacket monitoring and control programs were established due to nuisance and safety issues associated with high yellowjacket populations. The program consists of trapping at different times of the year to target different populations of yellowjackets. In the spring, the District initiates apple juice-baited trapping to capture queens before nests can be established. In addition to queen traps, worker traps are set throughout the year. These are baited with heptyl butyrate as the attractant. These traps are set in numerous locations throughout Sacramento and Yolo Counties.

Identification of Arthropods of Public Health Significance

Mosquitoes are vectors of various diseases such as the ones mentioned above, while ticks serve as the main vectors of Lyme disease, Babesiosis and Ehrlichiosis among others, and fleas are potential vectors of the plague. Besides identifying mosquitoes and ticks collected through our surveillance program, our laboratory receives and identifies many other arthropods brought in by the public, such as ants, termites, springtails, mites, solitary and carpenter bees, long-horned beetles, honey bees, yellowjackets and other wasps, spiders, stored product pest beetles, moths, bedbugs, midges and other species of flies.

Pesticide Resistance Management

Pesticides play an important role in mosquito and vector control Integrated Vector Management (IVM) programs. We have to remain wary of resistance to pesticides, which may threaten the efficacy of our current control programs and allow the potential for new and reemerging vector-borne diseases. Therefore, our laboratory performs resistance testing on mosquito samples collected from areas of concern throughout both counties. In order to do that, our laboratory maintains mosquito colonies that have been tested and are susceptible to the active ingredients in the products used by our District. These susceptible reference colonies are used as comparison when testing mosquitoes collected from the field, following resistance testing protocols from the Centers for Disease Control and Prevention (CDC) and recommendations from the Mosquito and Vector Control Association of California.

Research and Special Projects

The laboratory is responsible for performing analyses of the effectiveness of ULV treatments in Sacramento and Yolo Counties. Bioassay cages with live adult mosquitoes and slide spinners that collect pesticide droplets for analysis are used to monitor select spraying events. In addition, our District is involved in many research projects that may directly affect some aspect of our operations, such as ongoing evaluation of control methods and products, and alternative materials and control methods. The District also works closely with researchers from academia and the industry sector on collaborative research projects involving the ecology of West Nile virus in California, effectiveness of treatments, pesticide deposition, evaluation of different products and formulations for mosquito control, and tick-borne diseases.

The District provides immature and adult mosquitoes from the colonies kept on its premises or wild-caught, upon request, to a variety of researchers from the National Institutes of Health (NIH), the California Department of Public Health (CDPH), the University of California, California State University, Industry sector, public schools, and other Mosquito Control Districts throughout the country.

Biological Control

Biological control elements are natural predators, parasites or pathogens that can be used to achieve desired reductions in pest population levels. The Fisheries Department is responsible for breeding mosquitofish and other fish species that prey on mosquito larvae Mosquito-eating fish are readily available for the District's field technicians and to the general public through the service request program.

The District maintains 22 ponds which produce 2,500 to 5,000 pounds of fish annually. Today, the District is one of the largest mosquitofish producing facilities in the nation.

MOSQUITOFISH, *Gambusia affinis*

The most successful biological tool against immature mosquitoes in California is the mosquitofish, ***Gambusia affinis***. When introduced to a mosquito breeding source, the mosquitofish quickly adapts, multiplies and becomes numerically capable of sustaining an effective control level.

The mosquitofish, a live-bearing American fish, is utilized as a predator of mosquito larvae in many diverse aquatic habitats throughout the world. A comparatively small species, the full-grown females are usually less than 2½ inches in total length, while males are typically under 1½ inches. The muted silver and light olive green body color is common to both sexes. In addition, they are able to lighten or darken their body color pigmentation to more closely match their immediate environment.

GUPPIES, *Poecilia reticulata*

The guppy, Poecilia reticulata, has been used for biological mosquito control since World War I. It has been introduced almost all over the world from the areas of tropical South America to which it is indigenous. In many areas, the guppy has provided good control of mosquitoes in highly polluted sources, such as sewage pools, dairy lagoons, chicken ranch ditches and slightly acidic sources. Unlike the mosquitofish, the guppy's ability to reproduce or control mosquitoes is not reduced by low levels of dissolved oxygen and thrive in areas where mosquitofish cannot successfully develop.

Biological Control Distribution

SYMVCD's state-certified mosquito and vector control technicians provided mosquitofish and guppies to residents of Sacramento and Yolo Counties free of charge.

BIOLOGICAL CONTROL DATA FOR 2020

RICE FIELDS STOCKED WITH MOSQUITOFISH

Number of Fields	213
Pounds of Fish*	2,330.375
Acres Stocked	13,189.54

WILDLIFE REFUGES AND DUCK CLUBS STOCKED WITH MOSQUITOFISH

Number of Fields	84
Pounds of Fish	573
Acres Stocked	3,290

SOURCES STOCKED WITH GUPPIES

Number of Sources	0
Pounds of Guppies	0
Acres Stocked	0

MOSQUITOFISH SUPPLIED TO TECHNICIANS

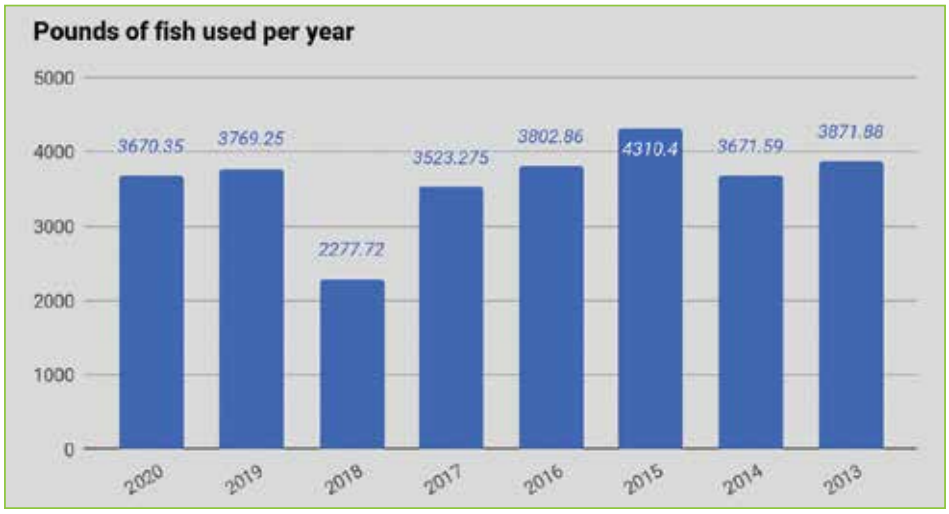
Woodland Facility	217.24
Elk Grove Facility	549.74

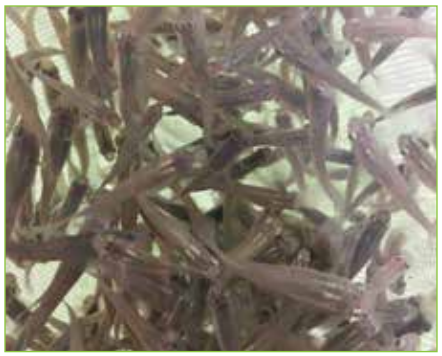
SUMMARY OF ALL MOSQUITOFISH PLANTS IN 2020

Number of Sources	4,111
Pounds of Fish	3,670.35
Acres Stocked	18,870

* 1 pound of fish equals approximately 450 fish.

A COMPARISON OF MOSQUITOFISH USED 2013-2020





Physical Control

The Ecological Management Department manages the physical and cultural control aspects of the District's Integrated Pest Management Program by actively pursuing opportunities to eliminate mosquito development sites. This is accomplished through the implementation of ecologically-based, site specific Mosquito Reduction Best Management Practices (BMPs) that reduce or eliminate the need for chemical control measures and initiates the abatement process in instances of continued Health and Safety Code section §2060 violations. The Department also provides assistance to all District departments on an as needed basis, including additional field and evening ULV applications.

MOSQUITO REDUCTION BEST MANAGEMENT PRACTICES (BMP) MANUAL

In 2020 The Ecological Management Department aggressively pursued landowner implementation of the Best Management Practices (BMP) as outlined in the District's Mosquito Reduction Best Management Practices Manual. This manual provided specific information regarding the District BMP policies, mosquito biology, and various BMPs that can be useful in reducing mosquito populations. Land-use specific sections provided guidance for landowners and land-managers who dealt with programs such as: managed wetlands, stormwater and wastewater systems, irrigated agriculture, rice production, dairies, swimming pools, cemeteries, and tire storage facilities. The Ecological Management Department provided detailed guidance to property owners on how to best implement the BMPs, and in some cases assisted with physical improvements. The BMP manual is available for download at: www.fightthebite.net/programs/ecological-management/.

The BMP manual serves as the basis for all Ecological Management Department programs which fall under four main BMP categories. All projects strive to reduce or eliminate mosquito breeding in Stormwater, Managed Wetlands, Agriculture, or Urban and Industrial sources. Technician zone project requests remain a Department priority; however environmental and regulatory development policies have also become a driving force of project and planning development.

ECOLOGICAL MANAGEMENT PROJECTS IN 2020

The Ecological Management Department handled twenty seven individual work requests in addition to thirteen annual mowing projects. The mowing projects are designed to improve site access for the technician and in many cases provide the necessary base maintenance required for the property owner to continue the required maintenance for the remainder of the year. Each work request was evaluated for implementation of BMPs as outlined in the District Mosquito Reduction Best Management Practices Manual. Landowners were contacted and worked directly with the Department to reduce standing water, mosquito breeding, improve mosquito control product efficacy, and ensured safe technician access. A few sites required the District to perform access projects involving removal of brush and debris to secure safe access to mosquito sources. These mowing and access projects were designed to keep access routes open for mosquito control operations around dairies and other water sources. All projects improved cooperative relationships and site conditions that resulted in mutually acceptable courses of action while upholding the District's responsibilities to protect public health.

PLANNING REVIEW PROGRAM

In 2020, the Ecological Management Department reviewed twenty five development projects from cities, counties, federal and state agencies, requesting the District to offer comments relating to mosquito production. The Department evaluated each plan or project for areas of concerns, and responded to the appropriate agencies with comments where appropriate.

STORMWATER/DRAINAGE PROGRAM

The Department's Stormwater Program continues to monitor the various types of storm water conveyance and treatment facilities. In addition to new development issues, The Department continued to address numerous drainage blockages, access issues associated with dense riparian or vegetated stream banks, and upland mosquito breeding within drainage corridors. Department staff responded to multiple West Nile virus hotspots near stormwater conveyance or stream corridors in 2020.

Flooding due to beaver dams has been an on-going problem for several years and causes significant mosquito breeding development sites to form in flooded pastures or other nearby dry grassy land. While direct population reduction methods (e.g. depredation) are the standard for beaver control, the Ecological Management Department utilizes an integrated approach to reducing the mosquitoes associated with beaver activity. Regular inspection and removal of beaver dams by hand or with equipment is typically the first approach. Due to lower spring flows, beaver issues remained at a minimum for the 2020 season; however existing Clemson Pond Leveler (CPL) leveling devices were maintained in various locations to help manage any pulse flows to keep water contained in existing low flow channels.

The Ecological Management Department worked closely with numerous Federal, State, and local Agencies to remove blockages and vegetation to prevent water from backing up into areas where mosquito breeding would occur.

MANAGED WETLAND PROGRAM

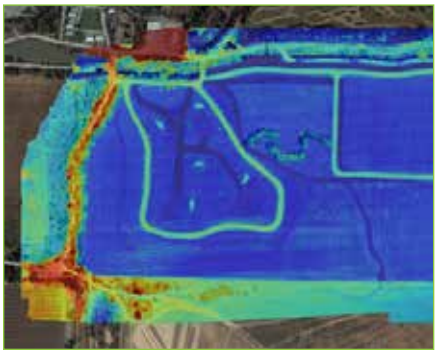
The practice of flooding previously dry land, during the early fall season for the purposes of attracting waterfowl for conservation and recreational purposes creates favorable mosquito development habitat. High temperatures may promote rapid mosquito development as well as amplification of some vector-borne viruses (e.g. West Nile Virus). In addition, dense emergent vegetation and relatively slow speed of flooding during the fall may also increase the numbers of mosquitoes produced, and impede the success of other mosquito control practices such as the use of larvicides and mosquito fish. The District works throughout the year with public and private landowners of waterfowl hunted and other preserved properties to implement BMPs that will reduce mosquito breeding or enhance mosquito control activities during major water events such as early flooding. The District meets annually with wetland managers to develop annual management plans and to coordinate all irrigation and flooding activities.

Staff participated in multiple stakeholder meetings over the year on a variety of local and statewide policy, restoration and wetland management concerns. In addition to promoting the implementation of BMPs, the Department administered the tiered fall flooding cost share program designed to discourage early flooding prior to October 1st of each year.

In 2020, fifteen private and agency owned wetland properties were flooded prior to October 1st and where appropriate, were billed for mosquito control costs under the cost share program. The wetland program requires a significant amount of staff time to properly monitor and respond to site changes that zone technicians experience on a weekly basis throughout the season. Wetland managers routinely request advice from the Ecological Management Department to assist with maintaining their habitat goals while reducing mosquito production.

2020 WETLANDS MOSQUITO CONTROL COST SHARE PROGRAM

FLOODING STARTED ON OR AFTER DATE	PERCENT OF MATERIAL COSTS TO BE PAID BY LANDOWNER UP TO OCTOBER 7TH
Summer-September 17	100%
September 17	50%
September 24	25%
October 1	none



AGRICULTURE PROGRAM

The Department responded to ten technician requests to reduce standing water or improve access in or around irrigated agricultural lands. Often off-site drainage issues are resolved by reducing irrigation runoff, and encouraging sound BMP implementation as outlined in the District's BMP Manual. The department provided spring time mowing of key agricultural sumps and access roads and organized wintertime brush cutting projects to enhance District technician safety and product efficacy. The Department continued to develop and implement the UAS mapping and topographic modeling of agricultural fields and drainages.

URBAN / INDUSTRIAL PROGRAM

Staff inspected most cemeteries within the District on a routine basis using clear siphons as the preferred inspection method. No major violations were noted with minor issues being resolved with brief site meetings with cemetery management. Most Managers were able to treat their vases with Watersorb with the Department helping with the applications where necessary.

PROPERTY ACCESS AND UNMAINTAINED SWIMMING POOL ENFORCEMENT PROGRAM

The District's swimming pool enforcement program involves the Department making numerous attempts to contact pool owners to gain access for the purpose of treating the pool with mosquito larvicides and mosquito fish that offer long term mosquito control. Within this program, District policies direct the Ecological Management Department to pursue legal access and enforcement when all other communication attempts have failed. The Department responded to forty four pool access and enforcement requests from zone supervisors. While most pool entry requests were resolved by contacting the property owners, twenty eight Final Notices were still sent via US certified Mail. The Final Notice letter typically resolves the access issue; however access can sometimes only be gained with the use of a Search and Inspection warrant. Unfortunately due to COVID-19 mandated shutdowns, the Sacramento County Superior Court did not allow for any in person Inspection and Abatement Warrant applications to be filed or heard.

UAS (DRONE) PROGRAM

The District's Unmanned Aerial Systems(UAS) program consists of four FAA Licensed UAS pilots, five imaging UAS units, and two heavy lift larvicide application units. The program provides aerial imagery, precision mapping, surveying, wind speed monitoring, BMP project design analysis, topographic modeling, and UAS based mosquito control applications and support. The Department works closely with the FAA to conduct safe and legal flights throughout the District, and holds numerous airspace and flight waivers.

Departmental staff conducted more than twenty seven imagery flights for a variety of operational needs including the mapping of standing water, aerial treatment block design, fall flooding documentation and topographic modeling for BMP projects with additional analytical support provided by the GIS Department.

In addition to conducting imagery missions, the Department also conducted six pesticide applications utilizing one of the District's heavy lift UAS units. Applications were conducted using granular larvicides over flooded pastures, organic rice fields, fall flooded wetland areas,and rural riparian areas.

The Department partnered with a variety of State agencies, organizations, and software companies to test new UAS technologies over the course of the year. The District conducted flights and software analysis' to test technologies that may provide beneficial to District operations if implemented. Staff participated in multiple continuing education events and conferences regarding the use of UAS technologies in mosquito control and will continue to be involved with industry venues as they become available.

Microbial & Chemical Control

Microbial and chemical control are the use of specific microbials and chemical compounds (insect growth regulators and insecticides) that eliminate immature and adult mosquitoes. They are applied when biological and physical control methods are unable to maintain mosquito numbers below a level that is considered tolerable or when emergency control measures are needed to rapidly disrupt or terminate the transmission of disease to humans. Larvicides target immature mosquitoes. Adulticides are insecticides that reduce adult mosquito populations. All products applied by the District are registered with the California Environmental Protection Agency.

MOSQUITO AND VECTOR CONTROL OPERATIONS

The Sacramento-Yolo Mosquito and Vector Control District provides year-round mosquito and vector control services to the residents of Sacramento and Yolo Counties. The two counties combined comprise 2,013 square miles of urban, commercial and agricultural land. The District is divided into 27 geographical zones, with state-certified technicians responsible for all aspects of mosquito and vector control in each zone, from larval surveillance to treatment.

The primary goal of field technicians is to manage mosquito populations so they do not pose a significant health risk to the public. To achieve this, field staff conduct year round inspections of various types of mosquito breeding sources. When breeding sources are found, the technicians will apply a larvicide or mosquitofish to take care of the problem. When WNV activity or high abundance numbers are detected in any given area, technicians conduct ground treatments with truck mounted foggers and back packs in order to quickly reduce adult mosquito populations. When WNV activity is spread over large urban areas, aerial applications may also be conducted in order to protect public health. Aerial spraying over known agricultural sources that produce mosquitoes are also performed in order to reduce nuisance mosquitoes and/or respond to WNV activity.

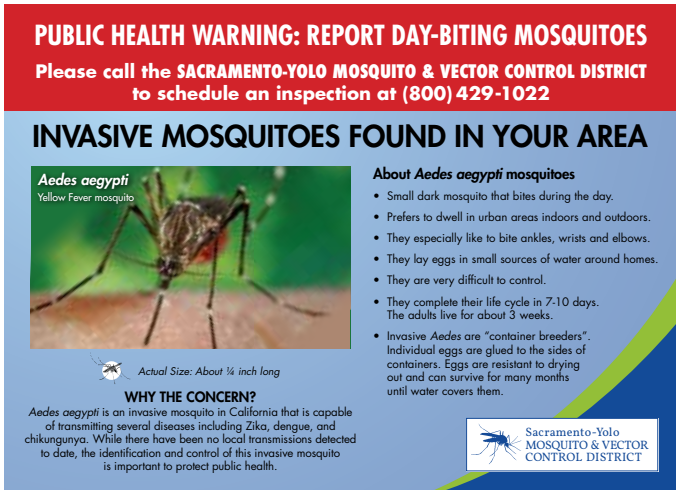
Technicians respond to year-round home service requests which include general inspections, treating neglected swimming pools, delivering and stocking mosquitofish where they are needed, and looking for and treating yellowjacket.

Control operations staff work closely with all other District departments. Field technicians assist with education and outreach efforts by participating in community events and giving classroom presentations. They support the Laboratory surveillance program by picking up dead birds and collecting larvae. They lend a hand to the Ecological Management program by completing brush cutting projects and ditch cleaning whenever necessary. Staff also update zone work books, calibrate field vehicles and winterize all necessary equipment.

The District's primary goal is to protect public health by managing immature and adult mosquitoes so they do not present a significant health risk to our community. In the event mosquito populations pose a threat or become a significant public nuisance, the District will respond by implementing its Mosquito and Mosquito-borne Disease Management Plan. This plan has been approved by the District's Board of Trustees. The following page outlines the District's response plan.

DETECTION OF INVASIVE *AEDES AEGYPTI* MOSQUITOES

In September 2020 Yolo County had its first detection of the invasive mosquito, *Aedes aegypti,* when a gravid trap set by the District laboratory captured an invasive mosquito in the city of Winters. After significant surveillance, an extensive infestation of invasive mosquitoes was detected throughout the city. Immediately, field technicians conducted public outreach and an intense door to door campaign, canvassing the entire town looking for mosquito breeding sources. After finding both immature and adult mosquitoes breeding in multiple locations, a control plan was put into place that included many localized treatments to backyards as well as truck mounted larviciding and aduliticiding. A few weeks after the initial detection of invasive mosquitoes in Winters, *Aedes aegypti* were also found in the Arden Area of Sacramento County. Field technicians responded with outreach, extensive door to door inspections, and ongoing mosquito control treatments in this new detection site. The last time *Aedes aegypti* mosquitoes were detected within District boundaries was in November.



MOSQUITO AND MOSQUITO-BORNE DISEASE MANAGEMENT PLAN

Level I – Normal Season

The District performs routine mosquito, mosquito–borne disease and public health pesticide efficacy surveillance activities. The District also attends community events, provides presentations and distributes outreach material to various community organizations.

Level II – Positive Dead Birds and/or Mosquito Pools

Response is initiated when the District's Laboratory detects a mosquito-borne virus [i.e., West Nile virus (WNV), Western Equine Encephalomyelitis (WEE), St. Louis Encephalitis (SLE)] in mosquito pools or dead birds within the District's boundaries.

Level III – Positive Sentinel Chickens/Animals

A response is initiated when the District's Laboratory detects a seroconversion to a mosquito-borne virus (i.e., WNV, WEE, or SLE) in a sentinel chicken(s) or when the District is notified of a mosquito-borne infected horse or other animal within the District's boundaries.

Level IV – Positive Human Case

A response is initiated when the Sacramento/Yolo County Public Health Laboratory officials notifies the District that a human has locally acquired a mosquito-borne virus (i.e., WNV, WEE, SLE) disease within the District's boundaries.

Level V – Multiple Human Cases, Epidemic Conditions

A response is initiated when County Public Health Laboratory or CDPH officials notifies the District that multiple mosquito-borne virus (i.e., WNV, WEE, or SLE) infections have occurred in humans within a specific area or there is evidence that epidemic conditions exist. The epidemic area is defined as the geographic region in which human cases are clustered (incorporated city, community, neighborhood, or zip code).

CATCH BASIN PROGRAM

The Catch Basin Program was formed in 2005 to address the high volume of catch basins in Sacramento and Yolo counties and the potentially disease-spreading mosquito that prefers to breed in them: the culex pipiens. A catch basin is a chamber, well, or inlet designed to collect water from storm events and urban runoff while also collecting debris to prevent the clogging of sewer systems. The Catch Basin Program's technicians monitor and treat over 300,000 storm drains each year, many of which are only a few feet in front of a residence or place of business and are capable of producing thousands of mosquitoes in a single day.

In 2020, the department undertook its first year using a paper-free system and conducting field work using mobile devices. In addition to eliminating the printing, handling, and storage of thousands of paper maps, this transition also provided the crew an efficient, real-time solution for managing work and sharing information. The Catch Basin Program also organized a field trial revisiting the use of a long-residual larvicide in areas previously restricted to less treatment options.

The department continued the daily use of modified bikes for navigating catch basin maps in areas less accommodating to vehicle access. The crew rode a combined 3,000 miles this season in a variety of locations across both counties, creating many public relations opportunities and saving on fuel and maintenance expenses.

SWIMMING POOL PROGRAM

In 2020, the swimming pool program continued to be a large focus of the Districts urban larval control efforts. Stagnant water in swimming pools was a major concern as one pool alone can produce thousands of mosquitoes and put an entire neighborhood at risk for West Nile virus. Many neglected pool reports came from the general public as well as from aerial images.

2020 MATERIALS USAGE

LARVICIDE MATERIALS	ACRES TREATED	AMOUNT OF MATERIAL	NUMBER OF APPLICATIONS
Agnique MMF	<1	<1	58
Agnique MMF G	<1	5 lbs	11
Agnique MMF G Pak35	<1	<1	7
Altosid Briquete	<1	2 lbs	52
Altosid Liquid and Liquid Concentrate	1,820	24 gal	1,247
Altosid P35	2,086	10,722 lbs	861
Altosid Pellets	21	108 lbs	91
Altosid XR Briquets	<1	7.5 lbs	59
Altosid XR-G	6,086	30,545 lbs	107
Lambda 9.7 CS	17.5	4.9 gal	383
Mosq oil BVA2/Cocobear/Kontrol	223	1,069 gal	1,048
Natular G30	2,930	15,901 lbs	743
Natular G30 WSP	<1	2.5 lbs	20
Natular XRT	3.35	133 lbs	394
Natular2EC	2,102	25 gal	743
OneGuard	1.4	<1 gal	30
Sumilarv 0.5G	2.5	31 lbs	5
Suspend Polyzone/SC	17	4.2 gal	360
Vectobac 12AS	16,194	1,430 gal	3,166
VectoBac GR	15,758	79,086 lbs	189
VectoBac GS	109,245	513,073 lbs	1,652
Vectobac WDG	7,364	1,614 lbs	147
VectoMax FG	469	4,714 lbs	276
Vectomax WSP	8	161 lbs	1,071

LARVACIDE MATERIALS CATCH BASIN	BASINS TREATED	AMOUNT OF MATERIAL	NUMBER OF APPLICATIONS
Agnique MMFG DWSP	1,320	94 lbs	1,320
Altosid Briquets	3,144	37 lbs	3,144
Altosid XR-B	41,592	3,346 lbs	41,592
Natular G30 DWSP	48,688	1,153 lbs	48,688
Natular XRT	27,751	2,447 lbs	27,751
Sumilarv 0.5g	13,620	303 lbs	13,620
Vectomax FG DWSP	29,916	657 lbs	29,916
Vectomax WSP	2,054	46 lbs	2,054

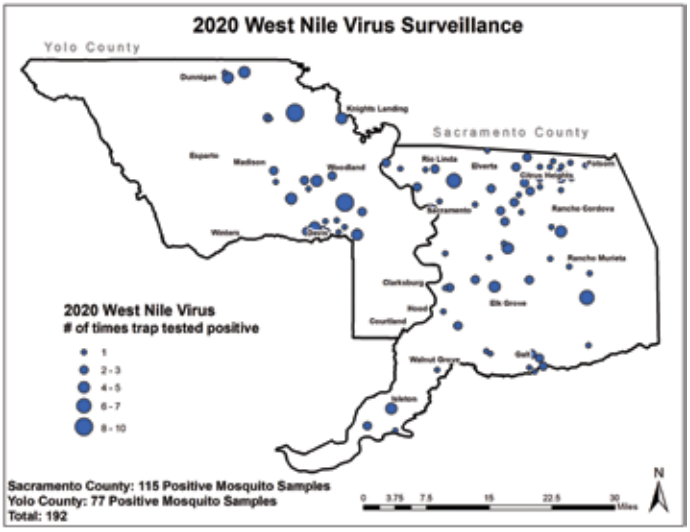
ADULTICIDE MATERIALS	ACRES TREATED	AMOUNT OF MATERIAL	NUMBER OF APPLICATIONS
Organophosphates (Naled)	291,699	1,384 gal	38
Pyrethrins	310,548	1,961 gal	60
Deltamethrin (Adult Mosquito)	83,261	438 gal	371

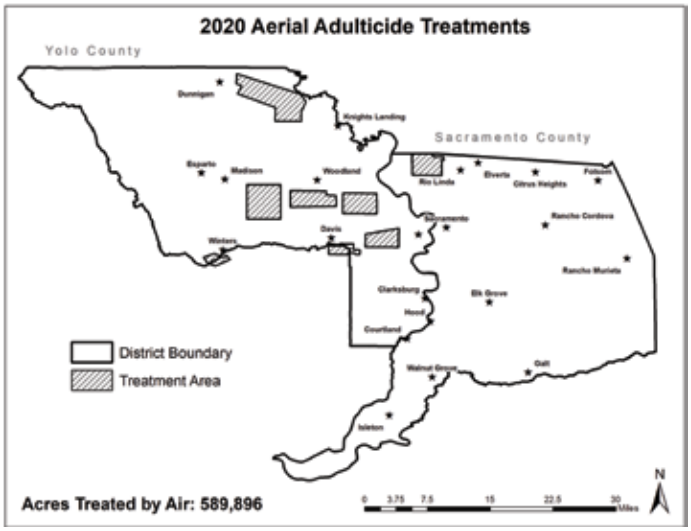
YELLOWJACKET CONTROL MATERIAL	AREA TREATED	AMOUNT OF MATERIAL	NUMBER OF APPLICATIONS
DRIONE	<1	8	78
PT 565+ XLO	<1	<1	49

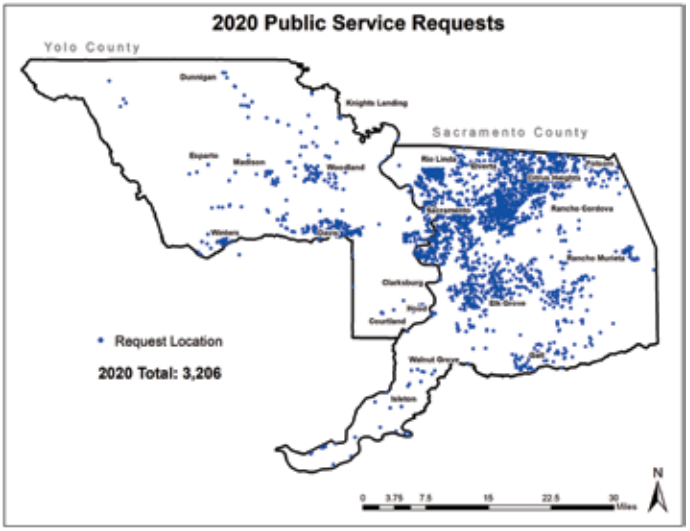
Geographic Information Systems & Information Technology

In 2020 the GIS Department recorded mosquito control treatments to 869,565 acres, which included 20,892 known mosquito breeding sources, 168,190 catch basins, 3,206 requests for service from the public, and 45,363 acres of rice. Besides the EPA registered products, mosquito eating fish were used in 18,870 acres of mosquito breeding habitat. The GIS Department continues to provide spatial analytics and data visualization to evaluate and improve District operations.

The IT Department is responsible for aligning existing and future District goals with cost-effective scalable technology solutions. The Department maintains servers, wired and wireless networks and equipment, workstations, mobile devices, laptops and projectors for District meetings and public presentations. It also oversees web-based database programming, software and peripherals, as well as a virtual private data network and VoIP phone system connecting offices in Elk Grove and Woodland. Each field technician is equipped with truck-mounted laptops with mobile data and custom GIS software.







Administration

The tasks of the administrative personnel of the Sacramento-Yolo Mosquito and Vector Control District involve serving the residents of Sacramento and Yolo Counties as well as the employees of the District. Some of the many duties performed by the department include financial accounting, coordinating the annual audit, accounts payable/receivable, administering staff training programs, maintaining public records, responding to telephone inquiries and reporting to the Board of Trustees. The department strives to provide quality professional service to the public and the employees of the District.

CONTINUING EDUCATION

The District employs vector control technicians certified by the California Department of Public Health. Certificates are renewed every two years after established continuing education requirements are met. The Administrative Department tracks employees' continuing education units and helps organize the District's regional continuing education programs and workshops.

Shop

The District employs three Automotive Service Excellence–certified mechanics at the Elk Grove facility. The shop maintains 98 vehicles, 2 forklifts, 3 Argo all terrain vehicles, 17 quad-runners, 5 John Deere Gator utility vehicles, 14 utility trailers, 2 low-bed trailers, 2 wheel tractors, 1 back hoe tractor, 17 London ULV foggers, 5 Curtis Dyna foggers, 3 Electramist foggers, 2 turbine sprayers, and 1 Acrease 57″ mower.

The shop is also responsible for repairing and installing various types of equipment, including chainsaws, pole saws, weed eaters, hand cans, edge-trimmer, backpacks, spray guns, lab traps, pumps, and other items in need of repair.

Financial Statements

Sacramento–Yolo Mosquito & Vector Control District
Statement of Net Position **June 30, 2020**

	GOVERNMENTAL ACTIVITIES
ASSETS	
Cash and investments	$ 12,337,088
Cash with fiscal agent	1,607,140
Accounts receivable	710,153
Interest receivable	30,439
Inventory	720,667
Capital assets, net of accumulated depreciation	4,251,592
Total Assets	**$ 19,657,079**
Deferred outflows of resources	
Related to net other post employment benefits (OPEB) liability	950,064
Related to net pension liability	5,285,357
Total Deferred Outflows of Resources	**$ 6,235,421**
Total Assets and Deferred Outflows of Resources	**$ 25,892,500**
LIABILITIES	
Accounts payable and other accrued liabilities	$ 522,255
Compensated absences	
Due within one year	225,636
Due in more than one year	160,417
Net other post employment benefits (OPEB) liability	
Due in more than one year	1,790,183
Net pension liability	
Due in more than one year	10,328,549
Total Liabilities	**$ 13,027,040**
Deferred inflows of resources	
Related to net other post employment benefits (OPEB) liability	90,090
Related to net pension liability	3,197,032
Total Deferred Inflows of Resources	**$ 3,287,122**
Total Liabilities and Deferred Inflows of Resources	**$ 16,314,162**
NET POSITION	
Net investment in capital assets	$ 4,251,592
Unrestricted	5,326,746
Total Net Position	**$ 9,578,338**
Total Liabilities, Deferred Inflows of Resources and Net Position	**$ 25,892,500**

Sacramento–Yolo Mosquito & Vector Control District

Statement of Revenues, Expenditures and Changes in Fund Balance

FOR THE YEAR ENDED JUNE 30, 2020

		GENERAL FUND
REVENUES		
Property taxes	$	14,749,120
Interest		195,949
Other tax revenue		988,016
Other revenues		226,515
Total Revenues	**$**	**16,159,600**
EXPENDITURES		
Aircraft services		769,925
Auditing/Fiscal		16,000
Capital outlay		219,918
Communications		69,047
Control operations		31,413
District office expenses		14,949
Ecological management		9,591
Fisheries		24,612
Gas and petroleum		131,094
Geographic information systems		4,253
Information technology		55,018
Insecticides		959,654
Insect growth regulator		1,079,412
Laboratory services		193,056
Liability insurance		145,617
Materials and supplies		10,590
Member/Training		81,314
Microbial		1,317,852
Professional services		179,584
Public information		398,831
Rents and leases		11,149
Safety program		1,980
Salaries and benefits		8,251,917
Structure and grounds		96,209
Utilities		96,818
Vehicle parts and labor		101,415
Total Expenditures	**$**	**14,271,218**
Change in Fund Balance		**1,888,382**
Fund Balance - July 1, 2019		**12,994,850**
Fund Balance – June 30, 2020	**$**	**14,883,232**

Sacramento-Yolo
MOSQUITO & VECTOR
CONTROL DISTRICT

Sacramento County
8631 Bond Road
Elk Grove, CA 95624
Phone: 1-800-429-1022
Fax: 916-685-5464
Web site: www.FIGHTtheBITE.net
Hours: 7:00 am to 3:30 pm

Yolo County
1234 Fortna Avenue
Woodland, CA 95776
Phone: 1-800-429-1022
Fax: 530-668-3403
Web site: www.FIGHTtheBITE.net
Hours: 7:00 am to 3:30 pm

The Sacramento-Yolo Mosquito & Vector Control District is concerned about protecting and preserving the environment. We strive to cut down on waste and use eco-friendly materials wherever possible.

If you must print this electronic version, please help by using recycled paper made from post-consumer waste.