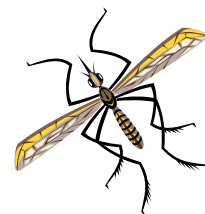




SACRAMENTO-YOLO
MOSQUITO
& VECTOR
CONTROL
DISTRICT



2013 ANNUAL REPORT



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Dear Residents, Colleagues & Friends

We are pleased to present the 2013 Annual Report for the Sacramento-Yolo Mosquito and Vector Control District. Once again, the District successfully protected the residents of Sacramento and Yolo counties against mosquitoes, West Nile virus (WNV) and other threats to public health using a comprehensive Integrated Pest Management (IPM) approach. This report describes the work performed by the District.

In 2013, prevention of West Nile virus and other diseases transmitted by mosquitoes as well as protecting public health continued to be the main goals for our District. We know WNV is well established in our two counties and this year many dead birds and mosquito samples tested positive again for the disease throughout the area. Our District responded by implementing our successful IPM program developed in coordination with the California Department of Public Health. Early in the season, the District's public information and outreach campaign disseminated mosquito prevention messages to all residents and encouraged public participation in reporting dead birds, neglected pools and urged all residents to use an effective mosquito repellent as a protective measure. Our laboratory continued to collect dead birds and monitor mosquito activity by trapping, sorting and testing mosquito samples to see if they were infected with West Nile virus. When the disease was found at levels that posed a threat, the District responded by conducting ground spraying as needed to quickly and effectively decrease the abundance of infected adult mosquitoes that could pose a threat to the public. Our field technicians spent much of their time inspecting various sources where mosquitoes breed and responding to service requests by the public. Our "catch basin/storm drain" program continued monitoring and treating the many thousands of basins that routinely produce mosquitoes in urban areas. Our successful mosquitofish program offered a non-pesticide solution to mosquito problems in various urban, rural and agricultural areas. Lastly, our Ecological Management department collaborated closely with various entities to implement sound water management practices that reduce mosquito populations decreasing the need for pesticide applications.

Throughout the state, 2013 posed a new challenge with the finding of the invasive mosquito species *Aedes aegypti*, a vector for dengue fever that joined *Aedes albopictus* permanently established in southern California since 2011. While neither of these mosquito species were found in our two counties, they are a new public health concern that we must be prepared for.

Our commitment stands firm to provide the best mosquito control services to the residents we serve. If you have any questions about this report or District services, please visit our website at www.FIGHTtheBITE.net or call us at 1-800-429-1022.

Sincerely,



David Brown,
District Manager

Sincerely,



Lyndon Hawkins, City of Elk Grove
2013 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.



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

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Woodland, CA 95776
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Personnel

Manager: David A. Brown
Assistant Manager: Gary Goodman
Administrative Manager: Janna McLeod
Program Coordinator: Marcia Reed
Senior Administrative Assistant:
Raj Badhan
Administrative Assistant: Kellee Brinkman

Laboratory

Laboratory Director: Paula Macedo
Environmental Biologist: Stan A. Wright
Vector Ecologist: Debbie Dritz
Microbiologist: Kara Kelley
Laboratory Technicians: Dave Butler,
Leia Matern, Paula Matney, Stanley
Roberts, Marilou Thomas, Derek Reis,
Marti Towerly
Laboratory Assistant: Sharon Howe

Fisheries

Fisheries Supervisor: Demetri Dokos
Field Technicians: Jeff Fairbanks,
Tony Hedley

Public Information & Education

Public Information Officer:
Luz Maria Rodriguez

Ecological Management

Ecological Management Supervisor:
Marty Scholl
Ecological Management Technicians:
Joe Camacho, Kevin Combo

Mapping & Information Technology

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

Shop

Supervisor: Tom Price
Mechanics: Ben Weisenberg, Don Henson

Mosquito Control Operations North Sacramento County

Supervisor: Gary Forrester
Field Technicians: Ron Burkhouse, John
Fendick, Lisa Fitzgerald, Robert Fowler,
Jeff Gay, Ken Harris, Guy Kachadorian,
Timothy Yuen

Mosquito Control Operations South Sacramento County

Supervisor: Paul Sanders
Field Technicians: Dustin Burkhalter,
Henry Estrada, Brian McGee, Jay Geigle,
Steve Ramos, Richard Speakman,
Kevin Valone

Mosquito Control Operations North Yolo County

Supervisor: Michael Fike
Field Technicians: Garrett Bell, Tim Gee,
Brett Day, Genneen Hughey, Jason Lloyd,
Mark Pipkin

Mosquito Control Operations South Yolo County

Supervisor: Garth Ehrke
Field Technicians: Dan Bickel, Will Hayes,
Frank Mendez, Soda Sanoung, Jake Vigna

Mosquito Control Operations Catch Basin Crew

Supervisor: Randy Burkhalter
Field Technicians: Eric Guimont, David
Smith, Ryan Wagner, Grant White

Integrated Pest Management



Mosquito and vector control is 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 and wild birds 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 is 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 West Nile virus, Western Equine Encephalomyelitis (WEE), St. Louis encephalitis (SLE), canine heartworm, malaria, Babesiosis and Ehrlichiosis. 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, print ads in various languages, outdoor creative ads and online interactive web 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 Design a Calendar Page Contest for all students and schools within Sacramento and Yolo Counties.

All community members are encouraged to prevent mosquitoes and West Nile Virus by practicing the **DISTRICT D'S** of Mosquito Prevention. **DRAIN** any standing water that may produce mosquitoes. **DAWN** and **DUSK** are times to avoid being outside. These are the times when mosquitoes are most active. **DRESS** appropriately by wearing long sleeves and pants when outdoors. **DEFEND** yourself against mosquitoes by using an effective insect repellent, such as DEET, Picaridin or Oil of Lemon Eucalyptus. Make sure you follow label directions! **DOOR** and window screens should be in good working condition. This will prevent mosquitoes from entering your home. **DISTRICT** personnel are available to address any mosquito problem you may be experiencing by calling **1-800-429-1022** or visiting us online at **www.FIGHTtheBITE.net**.



2013 Annual Report

Community Events Attended in 2013

CalPers Resource Fair
Celebrate Natomas
Citrus Heights Sunday Funday
CDCR Employee Awareness Fair
CDFA Health and Wellness Fair
Costco Health & Safety Fair
Courtland Pear Fair
Davis Picnic Day
District tour to senior group
Doggy Dash
DMV Health Fair
Elk Grove Harvest Festival
Earth Day at the Sacramento Zoo
Elk Grove Giant Pumpkin/Harvest Festival
Folsom Family Expo
Franchise Tax Board Health and Safety Fair
Galt Strawberry Festival
Galt Senior Day
Kaiser Health Fair
Kids Day in Woodland
Kids Day and Health Fair at the Mexican Consulate
Independence Day Celebration at the State Capitol
International Kids day
Pacific Rim Street Festival
Rancho Cordova Kids day
Rivercats Fight the Bite Night
Sacramento County Fair (5 days)
Sacramento Earth Day
Secretary of State Health Fair
Univision Dia de Donar Sangre
Winters Youth Day
Woodland Health fair
Yolo County Fair (5 days)
Yolo County Farm Day

Additional Community Event Involvement and Partnerships

Adelante Media
 Bridges After school program
 Cache Creek Lodge
 California Department of Transportation, Caltrans
 California State Fair
 CBS-13
 Cemetery Alliance
 City of Sacramento Neighborhood Services
 Clear Channel Communications
 Creek Week Cleanup
 Crossings KBTU
 Elk Grove Community Garden
 Elk Grove Western Festival
 Entercom Radio
 Entravision Communications
 Family Radio
 Folsom Parks and Recreation
 Forth n Hope
 Galt 4th of July Festival
 Homeless Connect
 KCRA 3
 Loaves and Fishes
 My Sisters House
 Mercy Housing
 National Night Out
 Natomas Golf Tournament
 News 10
 North Highlands Family Night
 Parks and Recreation Departments
 Radio Disney
 Rotary Club of Arden Arcade
 Russian American Media
 SACA Community Center
 Sacramento County Board of Supervisors
 Sacramento Food Bank
 Sacramento News and Review
 Sacramento Salvation Army
 Sacramento Realtors Association
 Sacramento START
 Sacramento Zoo
 Sons in Retirement (various chapters)
 SOAR Senior Health Fair
 SMUD
 Stonelakes Annual Health and Safety Fair
 Tahoe Park Health Fair
 Telemundo 33
 Twin Rivers Unified School District
 Univision 19
 Villa San Juan Night Out
 YMCA
 Yolo County Association of Realtors
 Yolo County Board of Supervisors
 Yolo County Public Health Week
 Yolo County Department of Agriculture

Further Outreach Activities

SCHOOL AND COMMUNITY PRESENTATIONS

In order to keep the public informed, the District offered presentations to school classrooms and local community groups. This program consisted of visual presentations, practical demonstrations and a question-and-answer session. In 2013 a total of **114 presentations** were made to local classrooms and community groups reaching almost 6,000 people. In addition, the District provided informational pamphlets and brochures on topics ranging from mosquitoes, West Nile virus, yellowjackets, wasps, and all of our District programs.

COMMUNITY EVENTS

The District participates in a variety of community events throughout the year. An educational and engaging booth is set up that includes live mosquito and mosquitofish displays, a bug box, a repellent display, free individual repellent packets and a variety of message reinforcement items. Staff is available to answer questions on District activities and to promote our various services. In 2013, we participated in **34 community events** reaching almost 28,000 people.

FIGHT THE BITE CONTEST AND CALENDAR

In an effort to continue educating and informing our community about mosquitoes and West Nile virus, the District hosted a Fight the Bite Calendar Page Contest for Sacramento and Yolo county students in grades K-12. Students were asked to create a calendar page encouraging the audience to practice one or all of the District D's of Mosquito Prevention. Twelve winners were selected from 3352 entries and were announced during Mosquito Awareness Week. Individual winners and their schools received a cash prize and the first place winners in all three categories recorded a public service announcement that aired throughout the summer on Radio Disney. Calendars were produced from the artwork of the twelve winning student entries and a total of 10,000 calendars were distributed at various activities throughout Sacramento and Yolo counties.

MOSQUITO AND WEST NILE VIRUS AWARENESS WEEK

In coordination with mosquito control districts throughout the state, the Sacramento-Yolo Mosquito and Vector Control District hosted several events during Mosquito and West Nile virus Awareness Week April 21-27. This week marked the official launch of the advertising and public education campaign for the season. Various events to disseminate district messages also took place, some of them included repellent distribution at Loaves and Fishes and Fourth n' Hope these are two local agencies that serve homeless residents who are at high risk for mosquito bites and West Nile virus. Winners of the annual Fight the Bite Design a Calendar Page Contest were announced and awarded prizes at their school. Lastly, presentations to various community groups were also made.

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 offered free mosquito repellent wipes for agencies and community organizations to use during outdoor evening activities and events such as National Night Out, summer concerts in the park, outdoor movies and various activities sponsored by parks and recreation and council districts. 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 vector-borne 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 management
- Research and special projects

Surveillance of Mosquitoes

Mosquito surveillance is an essential component of the District's Integrated Pest Management (IPM) program and a considerable amount of effort is devoted to it. The District's surveillance program consists of a systematic approach for locating mosquito breeding sources 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 becomes part of a historical database, which provides information on the dynamics of mosquitoes and mosquito-borne diseases within the District's surveillance area.

In 2013, our District collected 247,765 mosquitoes during 27,400 trap nights 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 uses three types of traps for collection of abundance data — American Light traps, Mosquito Magnet® traps, and Gravid traps. All three trap types are set in representative sites in both counties and are used to gather information on the distribution of all mosquito species and to monitor populations of mosquito species of concern. Data are interpreted in the context of historical records and mosquito abundance is compared to a 5-year average.

The American Light trap collects mosquitoes as well as other insects, which are attracted to the light produced by this trap, regardless of the physiological or behavioral state of the insect. This trap type has been used by the District for many years and it has provided historical data since before the introduction of West Nile virus in our area. The Mosquito Magnet® trap captures host-seeking mosquitoes that are attracted to the carbon dioxide emissions produced from burning liquid propane. The third type, the Gravid female trap, attracts female mosquitoes that are seeking to lay eggs in water rich in organic materials. 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.

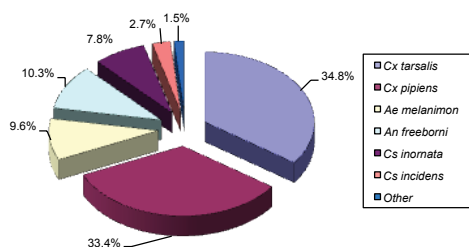




AMERICAN LIGHT TRAPS

In 2013 the District used 26 American Light traps in fixed sites within Sacramento and Yolo Counties for a total of 9,065 trap nights. The total number of mosquitoes collected with those traps was 73,291. Of these, 46,421 (63.4%) were females. The most abundant mosquito species captured by the American Light traps were *Culex tarsalis*, followed by *Culex pipiens*, *Aedes melanion*, *Anopheles freeborni*, *Culiseta inornata*, and *Culiseta incidens*. Other mosquito species were collected in smaller numbers and accounted for less than 1.6% of the total collection.

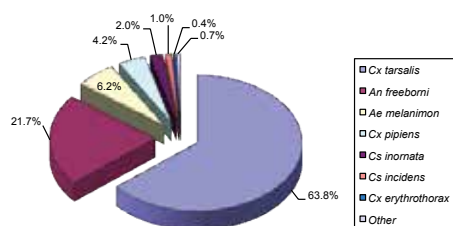
AMERICAN LIGHT TRAP COLLECTION



MAGNET TRAPS®

The District used a total of 26 Mosquito Magnet traps in 2013 in Sacramento and Yolo Counties during 9,162 trap nights. A total of 137,860 mosquitoes were collected by these traps, and most (94.6%) were females. The most abundant species collected were *Cx. tarsalis*, *An. freeborni*, *Ae. melanion*, *Cx. pipiens*, *Cs. inornata*, *Cs. incidens*, and *Cx. erythrothorax*. Other species collected accounted for less than 1% of the total collection.

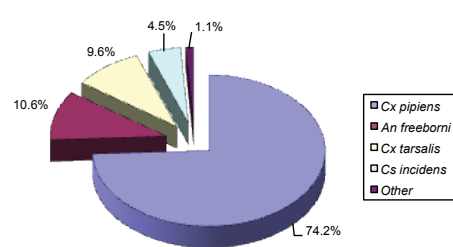
MOSQUITO MAGNET TRAP COLLECTION



GRAVID TRAPS

A total of 26 Gravid traps were used in 2013 in Sacramento and Yolo Counties for adult mosquito abundance tracking during 9,184 trap nights. A total of 36,614 mosquitoes were collected by these traps, and most (84.8%) were females. The most abundant species, as expected, was *Cx. pipiens*, followed by *An. freeborni*, *Cx. tarsalis*, and *Cs. incidens*. Other mosquito species constituted about 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. *Cx. 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. In 2013, abundance for this species followed the same pattern as observed in previous years, with a peak in June and another in mid-August.

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. Following a trend from 2013, this species was the most abundant by far in our traps in 2013. *Cx. tarsalis* numbers were also much higher than 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* sp., *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* and *Cx. apicalis* in our District's area. Abundance numbers for these species followed the pattern observed in the 5-year average.

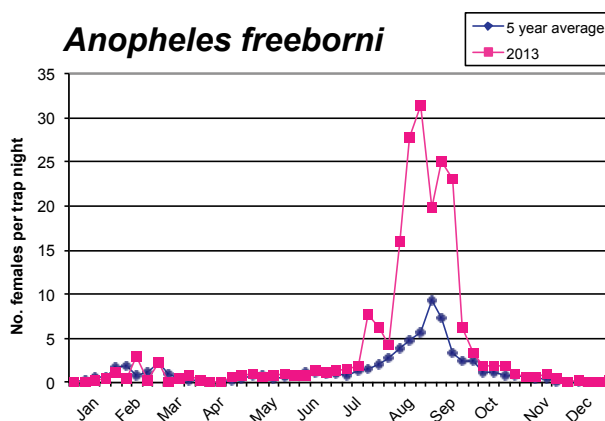
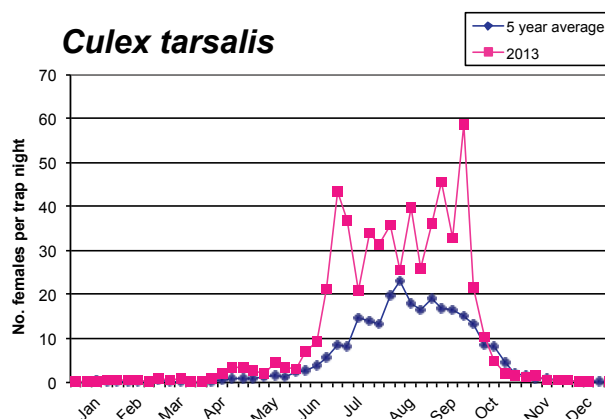
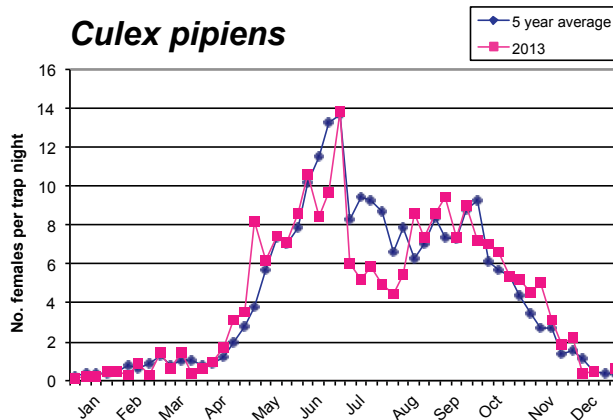
Anopheles freeborni, the western malaria mosquito, is a large mosquito, it is most active at dusk, and will readily enter houses. It can be a significant nuisance during its peak population periods. Females feed on most mammals and are most active in the dusk and early evening hours. This species may 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 2013, *An. freeborni* populations were very abundant and numbers were much higher than the 5 year average for this species. 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. *Ae. 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 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 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* sp. 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 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* sp. 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. *Cs. 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. *Cs. particeps* is also found in our District area, but is not as common in our traps as *Cs. inornata* and *Cs. incidens*.

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.

ABUNDANCE TRENDS OF MOSQUITO VECTORS OF DISEASE IN SACRAMENTO AND YOLO COUNTIES IN 2013





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 remain asymptomatic 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 bitten again 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 many mosquito control districts in their surveillance programs and may serve as an early indicator of local arbovirus activity in an area.

In 2013, the District maintained a total of 50 chickens distributed in 6 flock sites within Sacramento and Yolo Counties. Over 500 blood samples were collected from April 22 through October 25. Samples were tested for the presence of antibodies towards SLE, WEE, and WNV viruses. The first West Nile virus-positive chicken sample was detected on a collection made on July 15, 2013. At the end of the sampling period, antibody conversions had been found in all six flocks with a total of 18 chickens positive for antibodies towards West Nile virus. No seroconversion for other viruses were detected.

2013 SENTINEL CHICKEN TESTS

SACRAMENTO COUNTY				
Flock Location	No. chickens	WEE positive	SLE positive	WNV positive
Tyler Island	8	0	0	3
Natomas	8	0	0	2
Rancho Murieta	8	0	0	1

YOLO COUNTY				
Flock Location	No. chickens	WEE positive	SLE positive	WNV positive
Dunnigan	10	0	0	8
Esparto	8	0	0	1
Knights Landing	8	0	0	3

WILD BIRDS

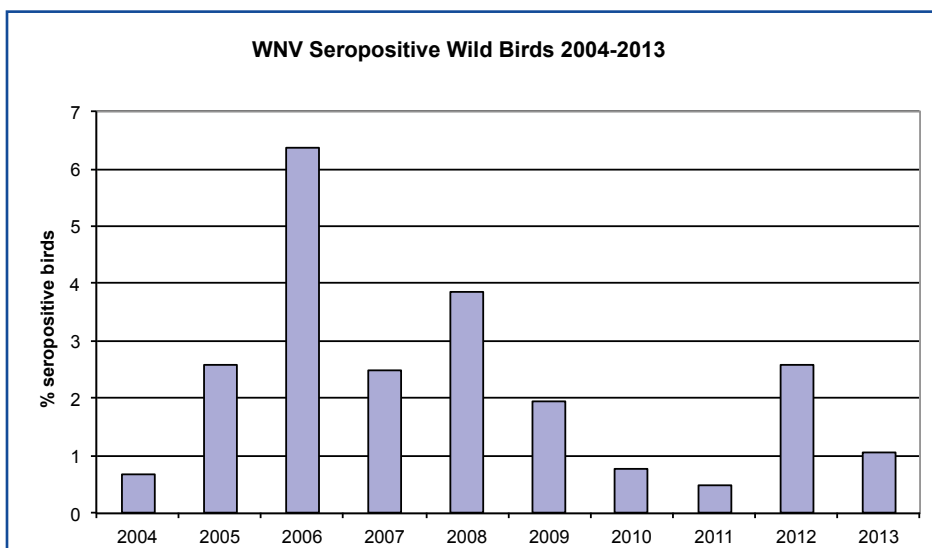
The District's wild bird surveillance program monitors the presence of antibody for encephalitis virus in the avian population in rural and suburban habitats. The purpose of the program is to aid in the identification of local enzootic virus transmission, the determination of avian hosts, their residency, mobility, longevity, and mortality by maintaining records of changes in abundance, age structure, and immunity. Data provided by this program contribute to our understanding of the local infection cycle in birds and mosquitoes, and assist in the assessment of the risk of virus transmission to residents. The program was initiated in the spring of 1996 to monitor the endemic Western Equine Encephalomyelitis (WEE) virus and has since also provided the first evidence of West Nile (WN) virus transmission in Sacramento County and tracked the virus as it rapidly moved into the resident bird population and became established.

In order to capture wild birds, the District uses mist nets with authorization from the U.S. Geological Survey, Bird Banding Laboratory in Laurel, MD, and the California Department of Fish and Wildlife. Each bird captured is aged, sexed, weighed, measured, banded, and a small blood sample (0.1ml/10g wt.) is collected to test for the presence of arbovirus antibody. Birds are released at the location of capture and samples are brought into the District's laboratory, where they are tested by an enzyme-linked immunosorbent assay (ELISA) that identifies antibody to WEE virus, St. Louis Encephalitis virus (SLE), and WN virus.

The use of wild birds as an arbovirus surveillance tool has provided a serological history of WNV in our District. The wild bird surveillance program is maintained through a cooperative agreement and with volunteer personnel support from the US Fish and Wildlife Service on the Stone Lakes National Wildlife Refuge. In 2013, a total of 627 blood samples were tested from 37 bird species. The collected sera were tested and only antibody for WNV was detected in birds sampled in 2013. Overall, WNV antibody was detected in 1% of the samples.

WNV SEROPOSITIVE WILD BIRDS IN 2013

Bird	Positive detections (total sampled)
Green Heron	1 (7)
Snowy Egret	3 (14)
House Finch	2 (56)

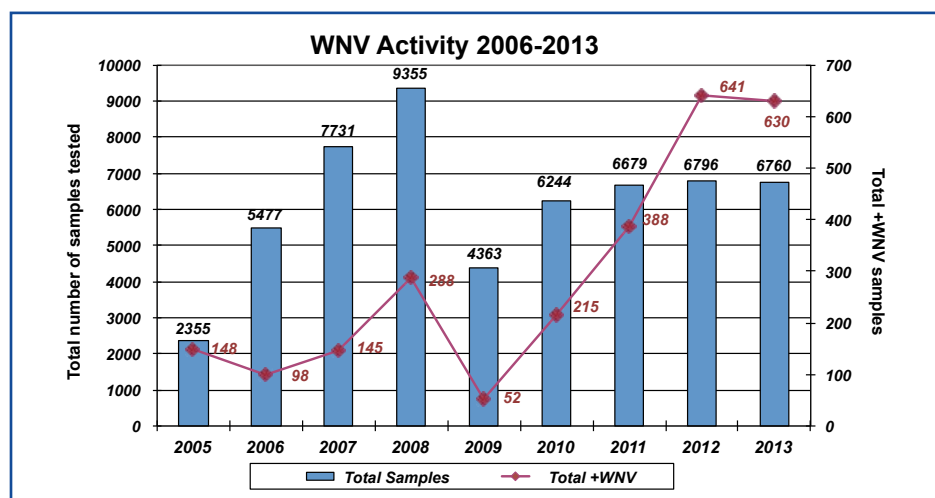




ENCEPHALITIS VIRUS SURVEILLANCE TRAPS

The District uses two types of traps for Encephalitis Virus Surveillance (EVS): CO₂-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 species of concern are then tested for the presence of St. Louis Encephalitis (SLE), Western Equine Encephalomyelitis (WEE), and West Nile (WN) viruses by TaqMan real-time polymerase chain reaction (RT-PCR). The testing is performed by our District's laboratory staff at the Sacramento County Public Health Laboratory in accordance to an interagency partnership established in 2005 to enhance the cooperation and communication on vectorborne diseases and to increase public awareness of potential risk.

Over 232,000 mosquitoes were captured during 4,036 trap nights with the two trap types in 2013. Most of the mosquitoes captured were females (98%) and 92% of them were captured in the CO₂-baited traps. A total of 6,760 mosquito samples (of one to 50 female mosquitoes each) were tested by the District in 2013. The first West Nile virus-positive mosquito was detected on a sample of *Cx. pipiens* collected on June 4, 2013, and the last positive sample was collected on October 22, 2013. A total of 630 mosquito samples tested positive for West Nile virus in 2013 - 384 from Sacramento County and 246 Yolo County. No seroconversion for other viruses were detected.



2007-2013 SUMMARY OF ENCEPHALITIS VIRUS SURVEILLANCE

		2007	2008	2009	2010	2011	2012	2013
Mosquito pools	Total tested	7731	9355	4363	6244	6679	6796	6760
	WNV-positive	145	288	52	215	388	641	630
Chicken samples	Total tested (Total no. chickens)	2713 (90)	2629 (90)	1020 (60)	2909 (91)	2514 (91)	1100 (104)	518 (50)
	Seropositive	23	7	6	11	7	40	18
Wild bird samples	Total tested	1456	1290	1079	1078	711	565	627
	Seropositive	27	41	18	6	6	14	6

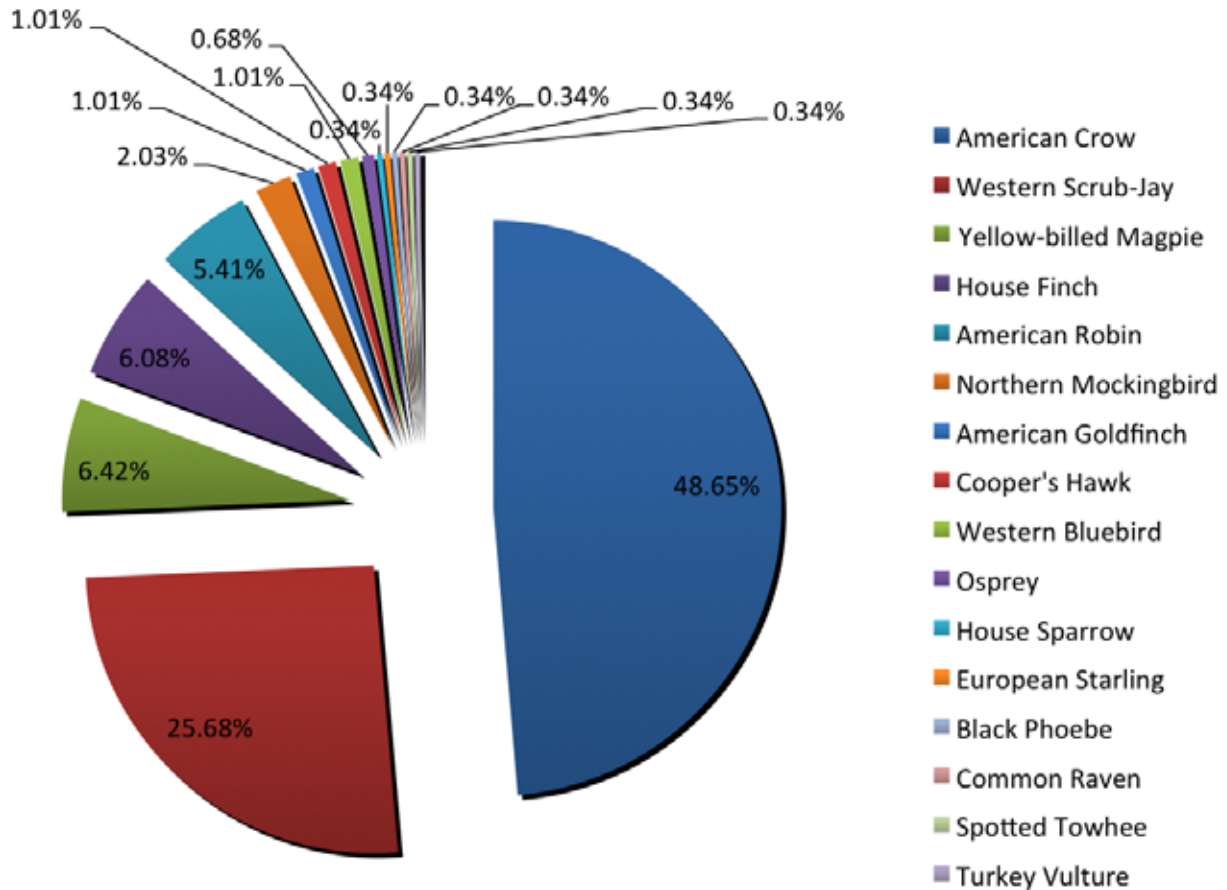
DEAD BIRDS

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 <http://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 St. Louis Encephalitis (SLE), Western Equine Encephalomyelitis (WEE), and West Nile (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 2013, a total of 2,011 dead birds were reported to the WNV hotline (1,538 from Sacramento County and 473 from Yolo County). A total of 607 dead birds were tested for WN, WEE and SLE viruses and 296 were found positive for WNV (191 from Sacramento County and 105 from Yolo County). Most of the positive dead birds were American Crows (48.7%) and Western Scrub Jays (25.7%), followed by Yellow-billed Magpies (6.4%), House Finches (6.1%), and Northern Mockingbirds (5.4%). Other bird species constituted less than 8% of the total WNV-positive birds tested.



2013 WNV-positive Dead Birds



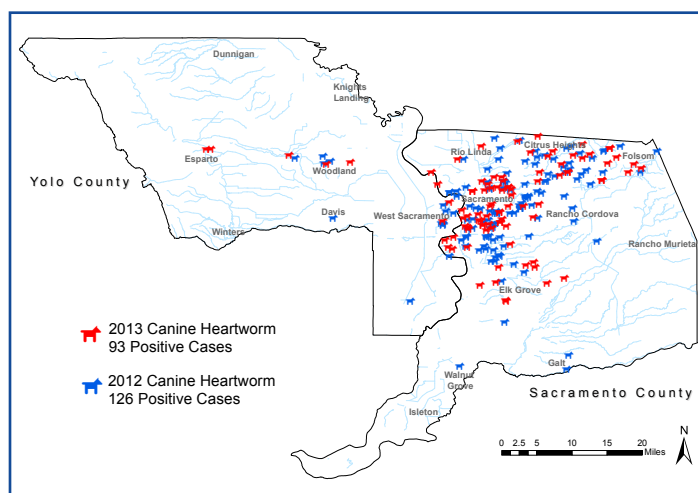
Surveillance for Other Mosquito-Borne Diseases

In addition to encephalitis virus surveillance, the District's laboratory conducts surveillance for other mosquito-borne diseases, such as canine heartworm, malaria, and dengue. Canine heartworm is a filarial nematode (*Dirofilaria immitis*) primarily vectored in this region by *Aedes 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. In addition, the District maintains a Canine Heartworm Surveillance program, which consists of contacting veterinary clinics and hospitals in Sacramento and Yolo Counties and collecting data on heartworm tests performed and number of positive cases detected. Positive cases are then matched with sources of the western treehole mosquito to determine the areas of greatest risk of transmission of canine heartworm. The report generated is also sent to all veterinary clinics to reinforce the vector component of the heartworm transmission cycle and help create awareness about the disease and the District's participation.

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 *Anopheles 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 2013, the District received one reported malaria case, in which the person had traveled outside

of the United States. After the initial discovery of the malaria case and subsequent trapping and testing of any Anopheline mosquitoes captured, there was no evidence of local transmission.

Dengue, another mosquito-borne disease, is caused by a virus and is also transmitted to people by mosquitoes. The mosquito species that transmit Dengue (*Aedes aegypti* and *Aedes albopictus*) are not currently found or established in Sacramento and Yolo Counties. Whenever the District receives a report of a Dengue case, the laboratory initiates trapping for any *Aedes* species around the reported location. Six dengue cases were reported to the District by the Sacramento and Yolo County Health and Human Services Departments in 2013 and all involved travel outside the United States. In addition, the District maintains an Invasive Species Surveillance program, which consists of additional trapping for early detection of any new species introduction in our area, such as the mosquito species mentioned above, which may transmit dengue and other diseases.



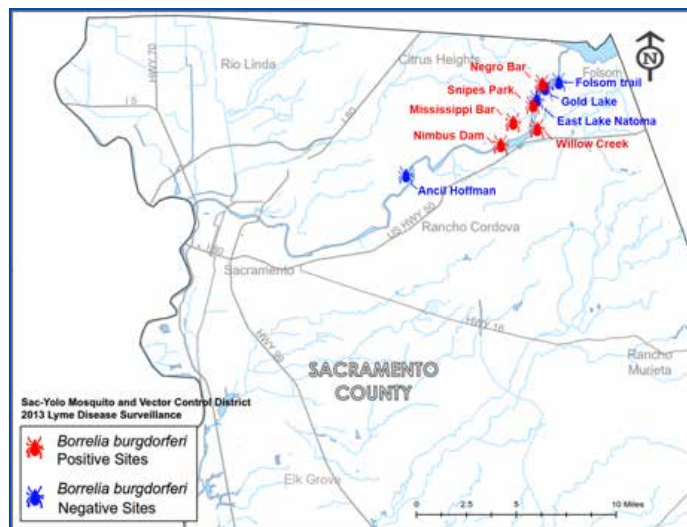
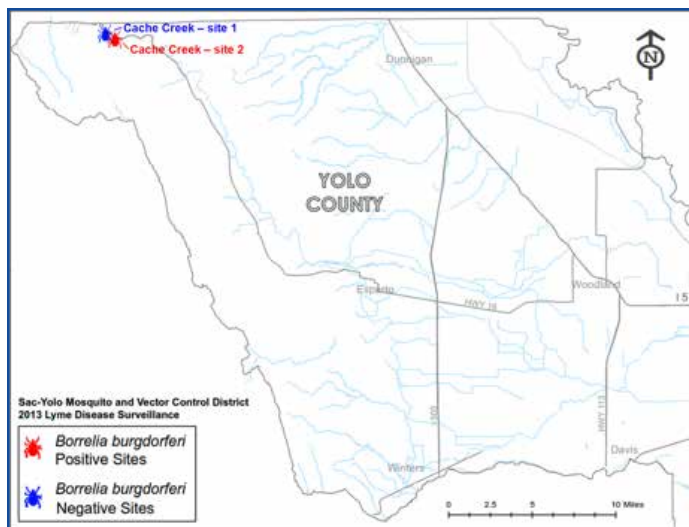
Tick and Lyme Disease Surveillance

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 eleven fixed locations continuously 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 and test them if they are found to be western blacklegged ticks. 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.

2013 LYME DISEASE SURVEILLANCE DATA

YOLO COUNTY	Total Ticks	Pools Tested	Positive Pools	Infection Rate*
Cache Creek – site 1	208	47	0	0
Cache Creek – site 2	316	68	2	6.36
SACRAMENTO COUNTY	Total Ticks	Pools Tested	Positive Pools	Infection Rate*
Ancil Hoffman	3	3	0	0
East Lake Natoma	268	56	0	0
Folsom trail	52	16	0	0
Gold Lake	18	6	0	0
Mississippi Bar	271	60	6	22.98
Negro Bar	226	51	2	8.87
Nimbus Dam	115	25	4	36.81
Snipes Park	301	65	3	10.11
Willow Creek	89	24	2	22.55
TOTALS	1,867	421	19	

*Infection rate MLE = Maximum Likelihood Estimate (in 1,000)



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 three locations in Yolo County and six in Sacramento County.

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 23 locations throughout Sacramento and Yolo Counties.

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 evolving and spreading, 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.

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).

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, spiders, stored product pest beetles, moths, bedbugs, midges and other species of flies.

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 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 the University of California, Montana State University, and from the industry sector, on collaborative research projects involving the ecology of West Nile virus in California, effectiveness of ULV 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 - Sacramento, 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 23 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.

RICE FIELDS STOCKED WITH MOSQUITOFISH

Number of Fields:..... 156
Pounds of Fish*: 2,814.0
Acres Stocked: 8,946.0

WILDLIFE REFUGES AND DUCK CLUBS STOCKED WITH MOSQUITOFISH

Number of Fields:..... 53
Pounds of Fish:..... 586.3
Acres Stocked: 3,018.7

SOURCES STOCKED WITH GUPPIES

Number of Sources: 43
Pounds of Guppies: 2.4
Acres Stocked: 0.2

MOSQUITOFISH SUPPLIED TO TECHNICIANS

Woodland Facility: 153.0 lbs
Elk Grove Facility: 344.8 lbs

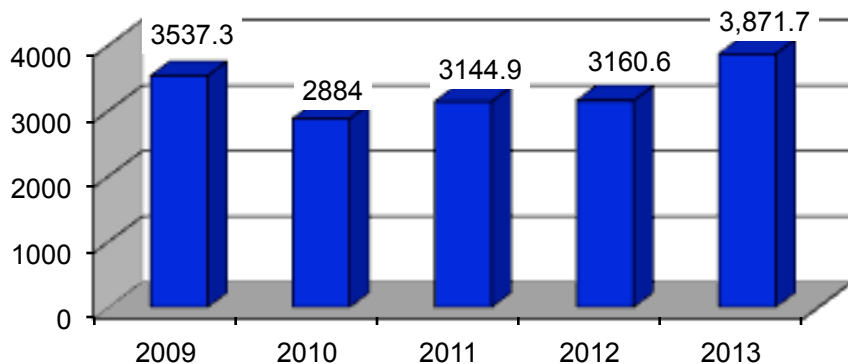
SUMMARY OF ALL MOSQUITOFISH PLANTS IN 2013

Number of Sources: 4,428
Pounds of Fish:..... 3,871.7
Acres Stocked: 14,903.6

* 1 pound of fish equals approximately 450 fish.



**A COMPARISON OF MOSQUITOFISH USED
2009 - 2013**



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.

MOSQUITO REDUCTION BEST MANAGEMENT PRACTICES (BMPS) MANUAL

In 2013, The Ecological Management Department aggressively pursued landowner implementation of 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: <http://www.fightthebite.net/physical-control/>.

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. 2013 saw the continued trend in both large programmatic as well as small local environmental project proposals being received by the Department for review.



ECOLOGICAL MANAGEMENT PROJECTS IN 2013

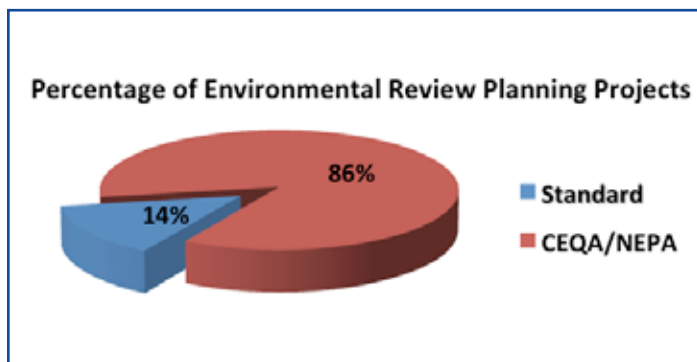
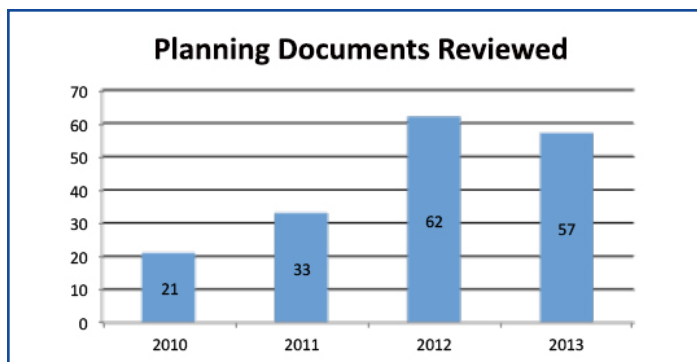
The Ecological Management Department handled eighty one individual work requests in addition to eleven annual mowing projects totaling over thirty eight miles of mowed access roadways. The mowing projects are designed to improve site access for the technicians and in many cases provide the necessary 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 2013, the Ecological Management Department reviewed 57 development projects from cities, counties, federal and state agencies, requesting the District to offer comments relating to mosquito production. Forty nine of the documents reviewed were part of an environmental review process such as the California Environmental Quality Act (CEQA) or National Environmental Protection Act (NEPA) review process. The Department evaluated each plan or project for areas of concerns, and responded to the appropriate agencies with comments where appropriate. Notable projects reviewed included the South Sacramento Habitat Conservation Plan, The Bay Delta Conservation Plan, Yolo Bypass Salmonid Habitat Restoration, Lower-Yolo Tidal Restoration Project, and the Southport Levee Project in addition to six Specific Area Plans. The Planning program allows the Department to identify and request correction of many potential mosquito breeding sites or site access restrictions before they become an issue after project development or implementation.

Department staff attended public forums and stakeholder workshops and workgroups in an effort to promote BMP implementation on projects of all types within the District. In 2013, staff actively participated in the planning process of the Bay Delta Conservation Plan (BDCP) as a member of the Yolo Bypass Fish Enhancement Planning Team.



STORMWATER PROGRAM

The Department's Stormwater Program continued to grow as regulatory controls require stormwater runoff to be treated or contained on site. In addition to new development issues, the Department continued to address numerous drainage blockages, access issues associated with dense riparian or vegetated streambanks, and upland mosquito breeding within drainage corridors.

Department staff responded to multiple West Nile virus hot spots near stormwater conveyance or stream corridors in 2013. Much of the mosquito breeding in creek channels was caused from water backing up behind numerous beaver dams, as well as vegetated and choked channels. 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. The District worked with landowners to remove and monitor 37 dams on a routine basis and when applicable, installed a Clemson Pond Leveler (CPL) pond leveling device that allowed water to flow downstream through the active dam without causing additional mosquito breeding. Staff held multiple site meetings with various city and county agencies responsible for stream channel maintenance in and around areas of high mosquito abundance collections.

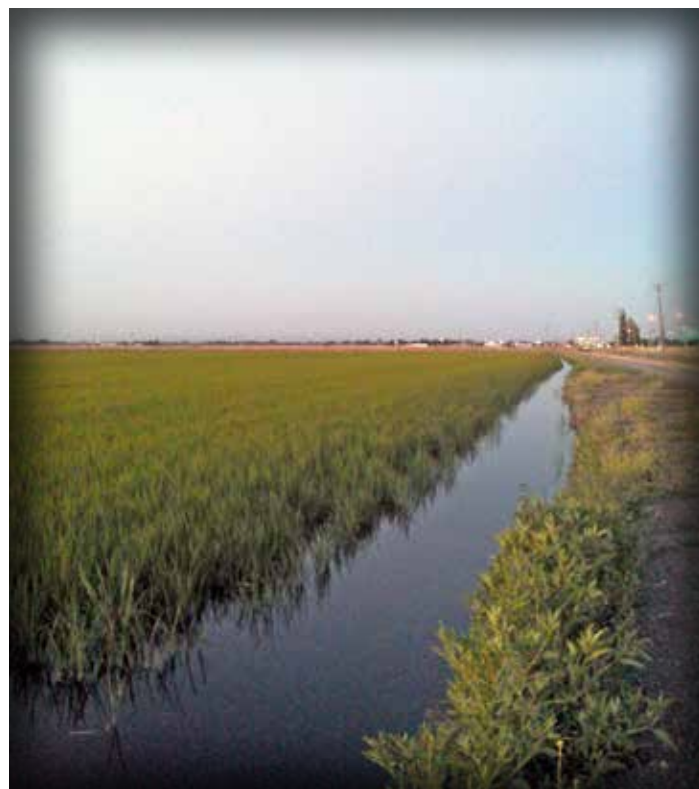
In 2013, the Ecological Management Department encountered significant beaver related activity, particularly within the Natomas East Main Drainage Canal (NEMDC) and Robla Creek in and around Hansen Ranch. Increased water flows coupled with high beaver populations demanded regular inspection, dam removal, and inter-agency collaboration.

Staff continued to work closely with the United States Bureau of Reclamation and California State Parks in managing mosquito breeding habitats within the Delta Meadows and Delta Cross Channel properties near Locke, CA.



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. In addition to implementing BMPs, the Department administered the tiered fall flooding cost share program designed to discourage early flooding prior to October 1st of each year. In 2013, seven wetland properties 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.



AGRICULTURE PROGRAM

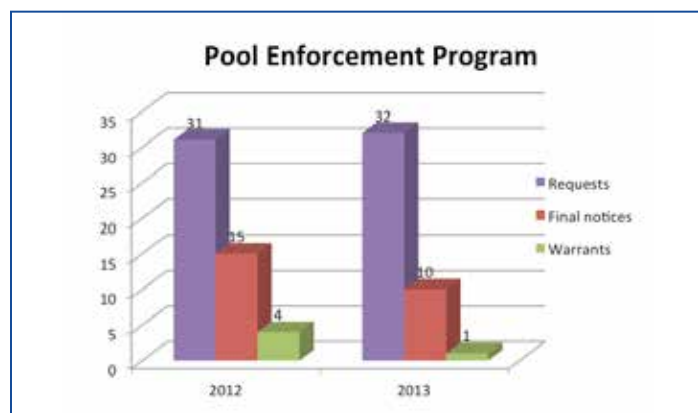
The Department responded to 19 technician requests to reduce standing water or improve access in or around irrigated agricultural lands. Often off site drainage issues are resolved by reducing irrigation runoff, and encouraging sound BMP implementation as outlined in the District's BMP Manual. The department provided spring time mowing of key agricultural sumps and access roads to enhance District technician safety and product efficacy.

URBAN/INDUSTRIAL PROGRAM

Staff inspected all cemeteries within the District on a routine basis. No major violations were noted with minor issues resolved with brief site meetings with cemetery management.

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 31 pool access and enforcement requests from zone supervisors. While most pool entry requests were resolved by contacting the property owners, ten 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. In 2013, one warrant was executed to gain access and treat the backyard swimming pool.



Microbial & Chemical Control

Microbial and chemical control is 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.

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 26 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 conducts year round inspections of various types of immature and adult 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.

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 and paper wasp nests.

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.





MOSQUITO AND VECTOR CONTROL OPERATIONS

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 outlines the District's response 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 Bird and/or Mosquito Pool

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 Chicken/Animal

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 enhanced in 2005 to sample and survey the high number and types of catch basins that produce mosquitoes within Sacramento and Yolo counties. A catch basin is defined as a chamber, well or inlet designed to collect rain water which includes systems to collect debris and sediment and prevent the clogging of sewers. Catch Basin technicians focus their primary efforts on inspecting, monitoring and treating approximately 160,000 catch basins, many of which are found to be problematic in urban and suburban neighborhoods throughout both of our Counties.

In 2013, staff also spent time converting all old paper maps into a digital format. Mapping is a very complex yet very important part of the catch basin program as it helps crews find and identify basins with landmarks for each confirmed basin. The electronic formatting of the catch basin maps decreased the time necessary to make map alterations thus increasing the time available for other treatments and tasks.

The catch basin program staff was also involved in field efficacy testing of District products used to treat the basins. Evaluating the effectiveness of such products ensures that they are used at appropriate levels and intervals. Two bikes continued to be an important part of the program. Under proper conditions, they are more efficient than vehicles and two more bikes will be added next year. Another bonus with using the bikes is the decrease in carbon emissions which helps the environment.

This year, the catch basin program continued collaborations with the City of Sacramento and other cities to enhance and promote a green waste container program which encourages residents to utilize green waste containers for all yard clippings instead of leaving it loose on the street. Grass clippings and other lawn debris can flow into street basins and gutters increasing the production of mosquitoes. Placing all waste into containers helps to limit the growth of mosquito populations and reduces favorable areas where they can develop.



SWIMMING POOL PROGRAM

In 2013, the swimming pool program continued to be a large focus of the District's 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 internet aerial images. This year, the District's request for service program generated 908 pool-related requests. Field technicians performed 6,532 pool inspections and made 1,517 treatments.

The best way to prevent mosquitoes in a pool is to keep it clean or drain it. However if a pool is neglected, District technicians will add mosquitofish to the pool. While it will still be dirty, it will no longer produce mosquitoes or pose a public health threat.



2013 MATERIALS USAGE

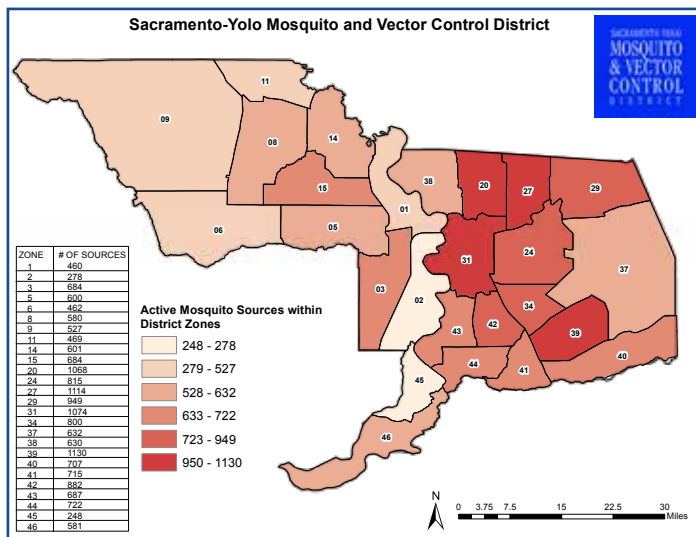
LARVICIDE MATERIALS	ACRES TREATED	AMOUNT OF MATERIAL	NUMBER OF APPLICATIONS
Agnique MMF	45	43 gal	291
Agnique MMFG	8	106 lbs	714
Altosid Briquets	11	60 lbs	2,223
Altosid Liquid & Liquid Concentrate	3,191	32 gal	789
Altosid Pellets	1,339	6,348 lbs	880
Altosid SBG	40	200 lbs	1
Altosid XR Briquets	88	2,995 lbs	4,010
Altosid XR-G	6,453	32,320 lbs	78
Aquabac G	0.13	1 lb	4
Aquabac XT	5	0.7 gal	8
Aquaprene XL Briq	0.07	3 lbs	1
Fourstar SBG	6,786	34,044 lbs	120
MetaLarv S-PT	5	25 lbs	1
Mosq Oil GB/BVA/CoCoBear	74	342 gal	760
Mosquiron	0.03	0.9 lbs	30
Natular 2EC	2,676	31 gal	405
Natular G	221	1,452 lbs	7
Natular G30	1,787	10,380 lbs	1,242
Natular XRT	92	3,155 lbs	5,296
Vectobac 12AS	24,517	2,412 gal	2,655
Vectobac G/GS	63,314	326,137 lbs	1,392
Vectobac WDG	3,489	709 lbs	134
Vectolex CG/FG	454	5,034 lbs	448
VectoMax CG/FG	1,351	7,265 lbs	22,068
VectoMax WSP	29	570 lbs	19,909

ADULTICIDE MATERIALS	ACRES TREATED	AMOUNT OF MATERIAL	NUMBER OF APPLICATIONS
Organophosphate (Naled)	163,455	1,050 gal	32
Pyrethrins	174,847	831 gal	364
Pyrethroids	370,827	1,637 gal	697

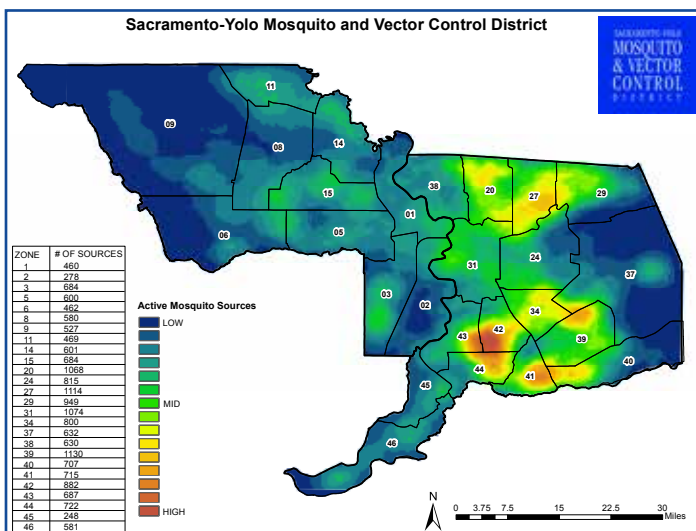
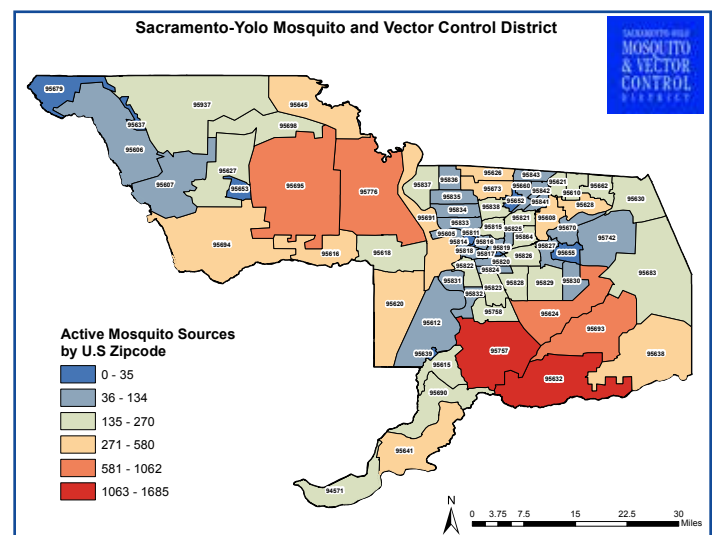
YELLOWJACKET CONTROL MATERIAL	AREA TREATED	AMOUNT OF MATERIAL	NUMBER OF APPLICATIONS
Drione	531 sqft	13 lbs	109
PT 565 Plus XLO	1,468 sqft	0.6 gal	31

Geographical Information Systems & Information Technology

In 2013 the GIS Department recorded 68,673 applications of California Environmental Protection Agency-registered products to 838,674 acres, which included 18,099 known mosquito breeding sources, 112,132 catch basins, 2,955 requests for service from the public, and 46,030 acres of rice. Besides the EPA registered products, mosquito eating fish were used in over 14,000 acres of mosquito breeding habitat. Three hundred, forty swimming pools were added to the database as new mosquito breeding sources, down 34.6% from the previous year.



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. Responding to telephone inquiries, maintaining public records, coordinating policies, and reporting to the Board of Trustees are just a few of the many duties the department performs. 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 95 vehicles, 2 forklifts, 2 Argo all terrain vehicles, 10 quad-runners, 4 John Deere Gator utility vehicles, 10 utility trailers, 2 low-bed trailers, 2 wheel tractors, 2 back hoe tractors, 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, hedge-trimmers, 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, 2013

	<u>Governmental Activities</u>
ASSETS	
Cash and investments	\$ 9,661,725
Cash with fiscal agent	548,170
Accounts receivable	345,858
Interest receivable	4,048
Inventory	577,725
Net pension asset	1,264,362
Net OPEB asset	17,186
Capital assets, net of accumulated depreciation	4,035,422
Total Assets	<u>16,454,496</u>
LIABILITIES	
Accounts payable and other accrued liabilities	\$ 449,186
Compensated absences	335,693
Total Liabilities	<u>\$ 784,879</u>
NET POSITION	
Invested in capital assets	\$ 4,035,422
Unrestricted	11,634,195
Total Net Position	<u>\$ 15,669,617</u>
Total Liabilities and Net Position	<u>\$ 16,454,496</u>

Sacramento–Yolo Mosquito & Vector Control District
Statement of Revenues, Expenditures and Changes in Fund Balance
FOR THE YEAR ENDED JUNE 30, 2013

	BUDGET		ACTUAL	VARIANCE FAVORABLE (UNFAVORABLE)	
REVENUE					
Total Revenue	\$	9,938,927	\$	10,306,097	\$ 367,170
EXPENDITURES					
Aircraft services	\$	495,000	\$	553,298	\$ (58,298)
Auditing/fiscal		12,500		11,500	1,000
Capital outlay				96,450	(96,450)
Communications		87,500		65,231	22,296
Control operations		15,975		15,407	568
District office expenses		15,000		10,793	4,207
Ecological management		30,000		4,410	25,590
Fisheries		17,855		17,320	535
Gas and petroleum		170,000		183,270	(13,270)
Geographic information systems		16,250		1,948	14,302
Information technology		23,800		7,981	15,819
Insecticides		500,000		768,908	(268,908)
Insect growth regulator		550,000		510,684	39,316
Laboratory services		144,238		116,051	28,187
Liability insurance		146,000		139,159	6,841
Materials and supplies		10,000		7,238	2,762
Member/training		60,300		110,565	(50,265)
Microbial		900,000		1,360,494	(460,494)
Professional services		98,500		76,838	21,662
Public information		360,000		317,665	42,335
Research		75,000		50,000	25,000
Rents and leases		4,000		5,613	(1,613)
Safety program		5,000		2,528	2,472
Salaries and benefits		6,786,653		6,209,223	577,430
Structure and grounds		44,500		47,444	(2,944)
Utilities		80,000		85,672	(5,672)
Vehicle parts and labor		147,000		96,473	50,527
Total Expenditures	\$	10,795,071	\$	10,872,163	\$ (77,092)
Excess (deficiency) of revenue over expenditures	\$	(856,144)	\$	(566,066)	\$ 290,078
Fund Balance – July 1, 2012			\$	11,254,406	
Fund Balance – June 30, 2013			\$	10,688,340	

SACRAMENTO-YOLO
**MOSQUITO
& VECTOR
CONTROL**
DISTRICT

FIGHT THE
BITE

Sacramento County	Yolo County
8631 Bond Road	1234 Fortna Avenue
Elk Grove, CA 95624	Woodland, CA 95776
Phone: 1-800-429-1022	Phone: 1-800-429-1022
Fax: 916-685-5464	Fax: 530-668-3403
Web site: www.FIGHTtheBITE.net	Web site: www.FIGHTtheBITE.net
Hours: 7:00 am to 3:30 pm	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.