2012 ANNUAL REPORT









SACRAMENTO-YOLO MOSQUITO & VECTOR CONTROL DISTRICT





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Dear Residents, Colleagues & Friends

It is with great pleasure that we present to you the 2012 Annual Report for the Sacramento-Yolo Mosquito and Vector Control District! Once again, we were successful in using elements of our Integrated Pest Management Plan to protect residents of Sacramento and Yolo counties against mosquitoes, West Nile virus and other diseases of public health concern. This report outlines the work performed.

The 2012 mosquito and West Nile virus season was a long and intense one not only for our District, but also throughout the state. Nationwide, we experienced one of the worst epidemics since the disease was first introduced in 1999 with Texas being at the epicenter of the outbreak. In total, there were 5674 confirmed human cases across the United States and 286 deaths.

For our District, the season began six weeks earlier than normal with many mosquito pools and birds testing positive as early as May. Such early evidence of West Nile virus activity in the area led to aggressive surveillance on behalf of our laboratory and surveillance program who worked diligently to collect and process mosquito samples and test dead birds in coordination with the California Department of Public Health. Field technicians performed surveillance on known and suspected mosquito development sources and responded quickly to reduce the amount of infected adult mosquitoes. Their expertise guided our control efforts and allowed us to address areas of high risk. At the same time, our Public Information and Education department continued promoting mosquito prevention messages through an extensive advertising and outreach campaign aimed at obtaining public cooperation in draining water around the home, the use of repellent as personal protection, reporting neglected pools and dead birds. The Districts Fisheries department continued breeding and caring for mosquitofish utilized by technicians in known mosquito sources such as rice fields, wildlife refuges and duck clubs. Mosquitofish were also placed in neglected swimming pools and delivered to residents who requested them. The District's catch basin program focused on inspecting, monitoring and treating the thousands of basins found throughout both of our counties and continued to work closely with cities to reduce the amount of green waste on the streets than can become a prime mosquito habitat. Lastly, the Ecological Management department worked successfully with local public and private conservancies and waterfowl hunted properties to implement effective water management practices that reduce the amount of pesticides used to control mosquitoes.

We are committed to providing safe, effective and economical mosquito control for the residents of Sacramento and Yolo counties. We are here to serve you!

If you have any questions about this report please visit our website at www.FIGHTtheBITE.net. You may also call us at 1-800-429-1022.

Sincerely,

Sincerely,

Brown Fudul & Torthal

David Brown, **District Manager**

Frederick S. Goethel, City of Galt 2012 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 10:00am on the third Tuesday of each month in Elk Grove.

2012 Board of Trustees Officers

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

Sacramento County 8631 Bond Road Elk Grove, CA 95624 Phone: 1-800-429-1022 Fax: 916-685-5464

Control Operations Yolo County

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

Personnel

Manager: David A. Brown Assistant Manager: Gary Goodman Administrative Manager: Janna McLeod Program Coordinator: John Fritz Senior Administrative Assistant: Raj Badhan Secretaries: Kellee Brinkman

Laboratory

Laboratory Director: Paula Macedo Environmental Biologist: Stan A. Wright Vector Ecologist: Marcia Reed Microbiologist: Kara Kelley Laboratory Technicians: Dave Butler, Rachel Chisholm, Paula Matney, Stanley Roberts, Marilou Thomas, Derek Reis, Marti Towery 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 ダ Information Technology

Mapping/Systems Coordinator: Rhonda Laffey 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: Danny Bickel, Will Hayes, Pete Marker, Frank Mendez, Soda Sanouvong, Jake Vigna

Mosquito Control Operations Catch Basin Crew

Supervisor: Randy Burkhalter **Field Technicians:** Eric Guimont, David Smith, Ryan Stromberg, 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 WNV 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 a pathogen, parasite or arbovirus. 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 and are designed to minimize non-target effects. Larvicides target mosquito larvae and pupae; 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 (WNV), 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**.



Community Events Attended in 2012

Bloodsource Blood Drive California State Lottery Health and Safety Fair **Citrus Heights Sunday Funday** City of Sacramento Earth Day **City of Sacramento Neighborhood Apartment** Manager's Forum Costco Health & Safety Fairs (2) **Courtland Pear Fair** Davis Picnic Day 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 Hmong Sea Games** Kids Day at the Mexican Consulate in Sacramento Independence Day Celebration at the State Capitol International Kids day Mexican Consulate Health Fair Pacific Rim Street Festival Rancho Cordova Kids day **Rivercats Fight the Bite Night** Sacramento County Fair Tesco Controls Health and Wellness Fair Univision Dia de Donar Sangre Winters Youth Day Yolo County Fair Yolo County Farm Day Yolo County Agricultural Dept. Training

Additional Community Event Involvement and Partnerships

AMCA Education Day Adelante Media **Broderick Christian Center** 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 KBTV** Elk Grove Community Garden Elk Grove Western Festival Entercom Radio **Entravision Communications** Family Radio Folsom Parks and Recreation Galt 4th of July Festival Homeless Connect KCRA 3 Loaves and Fishes My Sisters House Mercy Housing National Night Out Natomas Golf Tournament 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 Salem Communications SOAR Senior Health Fair SMIID Stonelakes Annual Health and Safety Fair Tahoe Park Health Fair Telemundo 33 Twin Rivers Unified School District Univision 19 Villa San Juan Night Out Wilton Fire Protection District Witter Ranch Community Alliance YMCA Yolo Basin Foundation Duck Days Yolo County Association of Realtors Yolo County Board of Supervisors Yolo County Public Health Week

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 2012 a total of **131 presentations** were made to local classrooms and community groups reaching more than 6500 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 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 engaging message reinforcement items. Staff is available to answer questions on District activities and to promote our various services. In 2012 we participated in **30 community events** reaching more than 25,000 people.

FIGHT THE BITE CONTEST AND CALENDAR

In an effort to continue educating and informing our community about mosquitoes and WNV, 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 3309 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 22-28. 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 Christian Broderick Center, 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 offers 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

K-8 LESSON PLANS

The District's lesson plans address topics of mosquito biology, the medical significance of wasps, honeybees, ticks, and vector control. Students are engaged and inspired to learn more about mosquitoes and other vectors as well as additional services the District provides.

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. All the data are part of a historical database, which provides information on the dynamics of mosquitoes and mosquito-borne disease within the District's surveillance area.

In 2012 our District collected over 156,000 mosquitoes during over 27,000 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 of different habitats in both counties. These traps 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 is the most widely used by mosquito control Districts in California. It 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 that are 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 and 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 2012 the District used 26 American Light traps in fixed sites within Sacramento and Yolo Counties for a total of 9,275 trap nights. The total number of mosquitoes collected with those traps was 51,715. Of these, 32,921 (63.7%) were females. The most abundant mosquito species captured by the American Light traps were Culex tarsalis, followed by Culex pipiens, Culiseta inornata, Aedes melanimon, Anopheles freeborni, Culiseta incidens, and Culex erythrothorax. Other mosquito species were collected in smaller numbers and accounted for less than 1.5% of the total collection.

AMERICAN LIGHT TRAP COLLECTION

3.7%

12.1%



MAGNET TRAPS®

The District used a total of 26 Mosquito Magnet traps in 2012 in Sacramento and Yolo Counties during 9,072 trap nights. A total of 72,829 mosquitoes were collected by these traps, and most (93.7%) were females. The most abundant species collected were *Cx. tarsalis, An. freeborni, Ae. melanimon, Cx. pipiens, Cx. erythrothorax, Cs. inornata, Aedes* vexans and *Cs. incidens.* Other species collected accounted for less than 1% of the total collection.



Surveillance

GRAVID TRAPS

A total of 26 Gravid traps were used in 2012 in Sacramento and Yolo Counties for adult mosquito abundance tracking during 9,279 trap nights. A total of 31,826 mosquitoes were collected by these traps, and most (87.8%) were females. The most abundant species, as expected, was *Cx. pipiens*, followed by *Cs. incidens*, *Cx. tarsalis*, and *An. freeborni*. Other mosquito species constituted less than 1% of the total collection.



MOSQUITO MAGNET TRAP 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 as part of 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 readily bite mammals, including humans. In 2012, abundance for this species followed the same pattern as observed in previous years, with a peak in the end of May and early June and another in the end of July. Both peaks were earlier than usually observed for that species in this area. Cx. pipiens numbers are also usually higher at the first peak than at the second, but in 2012 both peaks were about the same.

Cx tarsalis

Cx pipiens Cs inornata

Ae melanimor

An freeborni

■ Cs incidens ■ Cx erythrothorax

Other

Cx. tarsalis, the western encephalitis mosquito, is also a medium-sized and brownish mosquito, with a median white band on the proboscis and white bands on the legs. This species can colonize a wide variety of aquatic sources, such as wetlands, duck clubs, rice fields, and irrigated crops, but in recent years it has been commonly found in significant numbers also in suburban and urban environments, breeding in abandoned or not maintained swimming pools. It is also a bird feeding mosquito that may feed readily on humans, and it is most active in the dusk and early hours of the evening. In 2012, this species was the most abundant by far in our traps and the numbers were also much higher than the 5-year average.

Cx. 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.

An. freeborni, the western malaria mosquito, is a large mosquito and 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 February and a second, greater peak in August and September, when it can be considered a major pest due to the biting activity. In 2012 An. freeborni populations were a little higher early in the season than in previous years. Later in the year, numbers followed the same trend as previous years, with a peak in August, although this second peak was 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 flooding or by agricultural practices. When the fields with eggs on them are flooded, the larvae emerge from the eggs and develop to the adult stage. When this occurs the resulting biting activity for humans and other mammals in the area is significant. For this reason, these mosquitoes are not primarily of disease transmission concern but of nuisance concern. These mosquitoes 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. This mosquito 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 wooded area and the treeholes can be at varying heights, and thus difficult to treat with mosquito control products, even though the mosquito species itself has a limited flight range. This is a small black and white mosquito and it is active during the day as well as at dusk. All of these Aedes mosquitoes are primarily mammal biting mosquitoes. 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. Another mosquito species that can be found in treeholes and sometimes artificial wooden containers in our District's area is Orthopodomyia signifera, 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 feed usually 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 as well. 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*.

ABUNDANCE TRENDS OF MOSQUITO VECTORS OF DISEASE IN SACRAMENTO AND YOLO COUNTIES IN 2012





In addition to adult mosquito surveillance, the District conducts an intensive immature mosquito surveillance program. Aquatic sites are routinely inspected by field technicians, who are trained to identify the collected larvae in the field and also bring them to the District's laboratory for further 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 don't get sick when infected with West Nile virus and are dead-end hosts for it, meaning they do not build 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 2012, the District maintained a total of 104 chickens distributed in 13 flock sites within Sacramento and Yolo Counties. Approximately 1,100 blood samples were collected from April 19 through October 31. 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 2, 2012. At the end of the sampling period, antibody conversions had been found in 9 of the 13 chicken flocks with a total of 40 chickens positive for antibodies towards West Nile virus.

SACRAMENTO COUNTY					
Flock Location	No. chickens	WEE positive	SLE positive	WNV positive	
Elk Grove	10	0	0	8	
Galt	9	0	0	3	
Hood	7	0	0	4	
Natomas	7	0	0	7	
Wilton	11	0	0	10	
Sacramento	8	0	0	3	
Folsom	8	0	0	0	
Rancho Murieta	8	0	0	1	
Pocket	7	0	0	0	

2012 SENTINEL CHICKEN TESTS

YOLO COUNTY					
Flock Location	No. chickens	WEE positive	SLE positive	WNV positive	
Winters	7	0	0	0	
Davis	7	0	0	0	
Esparto	8	0	0	1	
Woodland	7	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 virus and has since also provided the first evidence of West Nile 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 and seed-baited traps with authorization from the U.S. Geological Survey, Bird Banding Laboratory in Laurel MD, and the California Department of Fish and Game. Each captured bird 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 the different viruses.

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 2012, a total of 565 blood samples were tested from 47 bird species. The collected sera were tested for antibody to Western Encephalomyelitis Virus (WEEV), St. Louis Encephalitis Virus (SLEV), and West Nile Virus (WNV). Only antibody for WNV was detected in birds sampled in 2012. Overall, WNV antibody was detected in 2.6% of the samples.

WNV SEROPOSITIVE WILD BIRDS IN 2012

Bird	Positive detections (total sampled)
Green heron	3 (3)
Snowy egret	6 (12)
Great egret	2 (2)
House finch	1 (26)
Red-shouldered hawk	2 (3)



WNV Seropositive Wild Birds 2004-2012









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 site and collected the following morning. Samples are then brought to the District's laboratory for processing and the collected female mosquitoes are pooled by species in pools of one to 50 mosquitoes. Pools 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 163,000 mosquitoes were captured during 4,875 trap nights with the two trap types. Most of the mosquitoes captured were females (96%) and 87% of them were captured in the CO_2 -baited traps. A total of 6,796 mosquito samples (of one to 50 female mosquitoes each) were tested by the District in 2012. The first West Nile virus-positive mosquito was detected on a sample of *Cx. tarsalis* collected on May 22, 2012, and the last positive sample was collected on October 4, 2012. A total of 641 mosquito samples tested positive for West Nile virus in 2012 - 487 from Sacramento County and 154 Yolo County.



2006-2012 SUMMARY OF ENCEPHALITIS VIRUS SURVEILLANCE

		2006	2007	2008	2009	2010	2011	2012
to pools	Total tested	5477	7731	9355	4363	6244	6679	6796
Mosqui	WNV-positive	98	145	288	52	215	388	641
samples	Total tested (Total no. chickens)	1686 (100)	2713 (90)	2629 (90)	1020 (60)	2909 (91)	2514 (91)	1100 (104)
Chicken	Seropositive	39	23	7	6	11	7	40
l samples	Total tested	1933	1456	1290	1079	1078	638	565
Wild bird	Seropositive	180	27	41	18	6	6	14

Surveillance 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). In addition, carcasses that test negative are submitted to CAHFSL (California Animal Health and Safety Laboratory) at the University of California, Davis campus, where necropsies are performed and additional tissue samples are then tested again for the presence of West Nile virus at the Center for Vectorborne Diseases (CVEC) laboratory. 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 2012, a total of 4,240 dead birds were reported to the WNV hotline (3,637 from Sacramento County and 603 from Yolo County). Our laboratory stopped collecting and testing dead birds in August. A total of 1,443 dead bird reports were submitted to the District before we interrupted testing. Technicians attempted to pick up and evaluate all of them for testing, which resulted in 1,217 dead birds tested and 523 found positive for WNV (416 from Sacramento County and 107 from Yolo County). Most of the positive dead birds were American Crows and Western Scrub Jays, followed by Yellow-billed Magpies and House Finches.







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 greater 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 routinely 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 2012, the District received

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 program was 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. The laboratory identifies and counts these traps and keep historical data on all sites. In addition to queen traps, worker traps are set throughout the year. These are baited with heptyl butyrate, an attractant. These traps are set in locations throughout 23 sites in Sacramento and Yolo Counties. reports of four malaria cases between January and December. In all cases 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 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. One dengue case was reported to the District by the Sacramento County Health and Human Services Department in 2012 and it 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 introduced in our area.



Identification of Arthropods of Public Health Significance

Mosquitoes are vectors of various diseases, including West Nile virus, Western Equine Encephalomyelitis virus, St. Louis Encephalitis virus, canine heartworm, dengue, and malaria, 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, midges and a variety of flies. Surveillance

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 ten 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.

YOLO COUNTY	Total Ticks	Pools Tested	Positive Pools	Infection Rate*
Cache Creek – site 1	63	14	0	0
Cache Creek – site 2	277	60	0	0
SACRAMENTO COUNTY	Total Ticks	Pools Tested	Positive Pools	Infection Rate*
Ancil Hoffman	22	7	0	0
East Lake Natoma	87	20	0	0
Gold Lake	9	6	0	0
Mississippi Bar	251	55	5	20.47
Negro Bar	291	63	1	3.44
Nimbus Dam	87	20	5	63.43
Snipes Park	227	48	0	0
Willow Creek	125	30	4	33.30
TOTALS	1,439	323	15	

2012 LYME DISEASE SURVEILLANCE DATA

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

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 would 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 are susceptible reference colonies used as comparison when testing mosquitoes collected from the field, following resistance testing protocols from the Centers for Disease Control and Prevention (CDC). If the testing results of field populations indicate possible resistance issues, the samples are submitted to the University of California or the Centers for Disease Control and Prevention for further molecular and biochemical testing.





Research and Special Projects

The laboratory is responsible for performing analyses of the effectiveness of Ultra Low Volume (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 the 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. 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, 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. Mosquitoeating 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 $2\frac{1}{2}$ inches in total length, while males are typically under $1\frac{1}{2}$ 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.

The District has had good success in controlling mosquitoes in these types of sources. The District has also stocked large landscape lakes with these fish for the control of midges.





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:
Pounds of Fish*:
Acres Stocked:

WILDLIFE REFUGES AND DUCK CLUBS STOCKED WITH MOSQUITOFISH

Number of Fields:	51
Pounds of Fish:	
Acres Stocked:	5,028.0

SOURCES STOCKED WITH GUPPIES

Number of Sources:	72
Pounds of Guppies:	70.7
Acres Stocked:	

MOSQUITOFISH SUPPLIED TO TECHNICIANS

Woodland Facility:	180.0	lbs
Elk Grove Facility:	460.1	lbs

SUMMARY OF ALL MOSQUITOFISH PLANTS IN 2012

Number of Sources:	5,335
Pounds of Fish:	3,160.6
Acres Stocked:	11,354.5
* 1 pound of fish equals approximately 450 fish.	



A COMPARISON OF MOSQUITOFISH USED 2008 - 2012











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 2012, The Ecological Management Department aggressively pursued landowner implementation of the Best Management Policies (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 BMP, and in some cases assisted with physical improvements. The BMP manual is available for download at: http://www.fighthebite.net/physical-control/.

The 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. 2012 continued the upward trend in environmental policy proposals and development plans received by the Department.

ECOLOGICAL MANAGEMENT PROJECTS IN 2012

The Ecological Management Department handled sixty one individual work requests in addition to ten annual mowing projects in conjunction with local landowners. The mowing projects are designed to improve site access for the technician and in many cases provides 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 ensure 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 2012, the Ecological Management Department reviewed sixty-two development projects from cities, counties, federal and state agencies, requesting the District to offer comments relating to mosquito production. Twenty-eight of the documents reviewed were part of a California Environmental Quality Act (CEQA) review process. The Department evaluated each plan or project for areas of concerns, and sent detailed comments back to the appropriate agencies for review. This program allows the Department to identify and request correction of many potential mosquito development or habitat sites or site access restrictions before they become an issue.

Staff also collaborated and assisted the Mosquito and Vector Control Association of California (MVCAC) and the California Department of Public Health (CDPH) with commenting on a variety of major policies and permits within California. Documents of importance included the Central Valley Flood Protection Plan, as well as the California State Water Resources Control Board's Draft Phase II Small MS4 Stormwater General Permit.

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 2012 staff actively participated in the planning process of the Bay Delta Conservation Plan (BDCP) and is a member of the Yolo Bypass Fish Enhancement Planning Team.





STORMWATER PROGRAM

The Department's Stormwater Program continues to grow and evolve as regulatory and local planning 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 aquatic sites within drainage corridors.

Department staff responded to multiple West Nile virus hot spots near stormwater conveyance or stream corridors in 2012. 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 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 removal of beaver dams by hand or with equipment is typically the first approach. The District worked with landowners to remove dams on a routine basis and when applicable, installed a Clemson Pond Leveler (CPL) device that allowed water to flow downstream through the active dam without causing additional mosquito habitat. 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 2012, The Ecological Management Department encountered significant beaver related project activity, particularly within the Laguna Creek corridor within the City of Elk Grove City limits. Increased water flows coupled with high beaver populations demanded regular inspections and dam removal.

Staff continued to work closely with the United States Bureau of Reclamation in developing a comprehensive mosquito control plan to reduce mosquito populations on Reclamation owned properties within the California Delta, within the District's boundaries.

In addition Staff reviewed numerous Low Impact Development(LID) and other Hydromodification control systems within new developments. Staff worked with County and City stormwater officials to mitigate the affects these systems may have on District control operations and to reduce or eliminate potential mosquito breeding.

2012 Annual Report

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-born 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 mosquitofish. 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 habitat 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 2012 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 fourteen 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 enforcement program involves the Department making numerous attempts to contact property owners to gain access for the purpose of treating mosquito habitats with long term control options. 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 thirty one access and enforcement requests from field technician supervisors. Fifteen Final Notices were 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 2012, four warrants were executed to gain access and treat mosquito larval habitat.





Sacramento-Yolo Mosquito & Vector Control District

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 mosquito larvae and pupae. 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 in order to quickly reduce adult mosquito populations.

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

A 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)] or when the California Department of Public Health (CDPH) notifies the District of a mosquito-borne virus from a dead bird(s) or mosquito pool(s) within the District's boundaries.

Level III - Positive Sentinel Chicken/Animal

A response is initiated when the District's Laboratory detects a sero conversion to a mosquito-borne virus (i.e., WNV, WEE or SLE) in a sentinel chicken(s) or when CDPH notifies the District of a mosquito-borne virus 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, or 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).



Sacramento-Yolo Mosquito & Vector Control District

CATCH BASIN PROGRAM

The Catch Basin Program was enhanced in 2005 to combat 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.

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. In 2012 two bikes and an electric scooter continued to be an important part of the program. Under the proper conditions, they were found to be more efficient than vehicles. Another bonus with using the bikes and scooter is the decrease in carbon emissions which helps the environment.

Lastly, 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. As of July 2013 all residential yard waste customers will be required to use containers for weekly yard waste collection and "loose in the street pick up" will no longer be offered.



CATCH BASIN TREATMENTS 2005-2012











SWIMMING POOL PROGRAM

In 2012, 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 internet aerial images. This year, the District's request for service program generated 2,097 pool-related requests. Field technicians performed 8,989 pool inspections and made 4,223 treatments.





Sacramento-Yolo Mosquito & Vector Control District

2012 MATERIALS USAGE

LARVICIDE MATERIALS	ACRES TREATED	AMOUNT OF MATERIAL	NUMBER OF APPLICATIONS
Vectobac 12AS	17,432	2,309 gal	2,254
Vectobac G	77,855	390,714 lb s	1,138
Vectobac WDG	2,872	609 lbs	102
Vectolex CG	249	2,416 lbs	265
Vectolex WDG	29	28 lb s	13
VectoMax WSP	29	563 lbs	16,626
VectoMax CG	3,215	18,065 lbs	14,276
Aquabac 200 G	7	74 lbs	19
Aquabac XT	4,196	524 gal	295
Natular 2EC	646	8 gal	99
Natular G30	2,480	13,308 lbs	993
Natular XRT	129	5,182 lbs	13,472
Altosid Pellets	1,062	4,715 lbs	1,032
Altosid Liquid & Liquid Concentrate	7,802	57 gals	770
Altosid Briquets	14	73 lbs	6,064
Altosid XR Briquets	132	4517 lbs	1,098
Altosid XR-G	6,169	31,030 lbs	252
Altoside SBG	801	4,005 lbs	6
Mosquito Oil GB/BVA	84	315 gal	695
Agnique MMF	78	66 gal	294
Agnique MMFG	93	1,007 lbs	881
Fourstar SBG	4,023	20,100 lbs	48
Spheratax SPH WSP	0.04	.87 lbs	38
Summit Briquets	0.21	2.69 lbs	90
ADULTICIDE MATERIALS	ACRES TREATED	AMOUNT OF MATERIAL	NUMBER OF APPLICATIONS
Pyrethrins	61,992	314 gal	321
Pyrethroids	441,331	1958 gal	671
Trumpet EC	262,069	1718 gal	37
YELLOWJACKET CONTROL MATERIAL			
	AREA TREATED	AMOUNT OF MATERIAL	NUMBER OF APPLICATIONS
Drione	AREA TREATED 389 sq ft	AMOUNT OF MATERIAL 12 lbs	NUMBER OF APPLICATIONS

2012 Annual Report

Geographical Information Systems & Information Technology

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, web-based database programming, software and peripherals, and 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.

In 2012, a custom database solution was created for tracking and reporting visual observations of field conditions in accordance with the National Pollutant Discharge Elimination System. This database was deployed within existing custom GIS software in field technician vehicles.

In 2012 the GIS Department recorded 62,617 applications of California Environmental Protection Agency-registered products to 897,965 acres, which included over 18,000 known mosquito breeding sources, 150,000 catch basins, 3,739 requests for service from the public, and 48,175 acres of rice. Besides the EPA registered products, mosquito eating fish were used in over 11,000 acres of mosquito breeding habitat. Five hundred, twenty swimming pools were added to the database as new mosquito breeding sources, down 33% from the previous year. The District has a database of just over 6,200 pools that are either current mosquito producers, historic producers, or are re-occurring mosquito larva habitats.

The District uses GIS to track the locations of the adult mosquito surveillance sites, dead birds from the CDPH West Nile virus dead bird program, sentinel chicken flocks, and positive canine heartworm locations.







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 District's program coordinator 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 quadrunners, 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 Assets

JUNE 30, 2012

	Gover	mmental Activities
ASSETS		
Cash and investments		\$ 9,592,376
Cash with fiscal agent		711,762
Accounts receivable		318,067
Interest receivable		5,902
Inventory		940,522
Net pension asset		1,580,452
Net OPEB asset		17,272
Capital assets, net of accumulated depreciation		4,145,060
Total Assets		17,311,413
LIABILITIES		
Accounts payable and other accrued liabilities	\$	314,223
Compensated absences		354,434
Total Liabilities	\$	668,657
NET ASSETS		
Invested in capital assets	\$	4,145,060
Unrestricted		12,497,696
Total Net Assets	\$	16,642,756
Total Liabilities and Net Assets	\$	17,311,413

Sacramento–Yolo Mosquito & Vector Control District Statement of Revenues, Expenditures and Changes in Fund Balance FOR THE YEAR ENDED JUNE 30, 2012

	BUDGET		ACTUAL	VARIANCE FAVORABLE (UNFAVORABLE)	
REVENUE					
Total Revenue	\$	10,368,737	\$ 10,403,497	\$	(34,760)
EXPENDITURES					
Aircraft services	\$	520,000	\$ 381,679	\$	138,321
Auditing/fiscal		12,500	11,500		1,000
Depreciation expense		203,000	83,958		119,042
Communications		95,000	74,004		20,996
Control operations		22,950	18,195		4,755
District office expenses		15,000	14,091		909
Ecological management		33,600	5,473		28,127
Fisheries		17,570	16,732		838
Gas and petroleum		196,000	175,267		20,733
Geographic information systems		16,225	3,784		12,441
Information technology		19,600	19,466		134
Insecticides		500,000	589,370		(89,370)
Insect growth regulator		600,000	523,51 <i>7</i>		76,483
Laboratory services		144,730	113,153		31,577
Liability insurance		155,977	151,772		4,205
Materials and supplies		10,000	6,004		3,996
Member/training		85,500	66,866		18,634
Microbial		925,00	926,340		(1,340)
Professional services		125,000	107,468		17,532
Public information		350,000	334,142		15,858
Research		75,000	50,000		25,000
Rents and leases		4,000	5,135		(1,135)
Safety program		5,000	1,824		3,176
Salaries and benefits		6,508,552	6,291,683		216,869
Structure and grounds		56,000	42,995		13,005
Utilities		85,000	80,128		4,872
Vehicle parts and labor		176,000	128,445		47,555
Total Expenditures	\$	10,957,204	\$ 10,222,991	\$	734,213
Change in Fund Balance	\$	(588,467)	\$ 180,506	\$	768,973
Fund Balance – July 1, 2011			\$ 11,073,900		
Fund Balance – June 30, 2012			\$ 11,254,406		





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.

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