

*Providing 71 Years
of Service to
San Joaquin County*

◆ 2016

**San Joaquin County
Mosquito & Vector Control District**

**Annual
Report**

Annual Report



**In Memoriam of Trustee Chester C. Miller
October 5, 1936 to February 3, 2016
Representing the City of Tracy
from 1987 to 2015**

Trustee Chester C. Miller served the residents of San Joaquin County Mosquito and Vector Control District for 28 years from 1987 to 2015. Chet was born and raised in Colusa, California on a family farm. He received his Bachelor of Science degree in General Agriculture from California State University, Chico in 1962. Chet worked in the agricultural chemical industry for thirty-seven years performing sales / sales management for three companies. He retired in 1994. He was married to his wife Donna for 52 years; has two children and enjoyed spending time with his grandchildren. He was a member of Tracy Kiwanis, Elks and SIRs. In addition, Chet enjoyed golf, reading, and traveling the USA and abroad.

Mr. Miller joined San Joaquin County Mosquito and Vector Control District as a Trustee in December of 1987. He served as Board President in 1994-1995 and again in 2002-2003. He was President of the MVCAC Trustee Corporate Board in 1996. Chet served as the regional trustee representative for the Northern San Joaquin Valley region of MVCAC. During an interview Chet stated "I found my role to be looking after the public's safety while keeping costs down and using pesticides responsibly." Chet's dedication to the District and its mission was greatly appreciated.

The District's Board of Trustees meets on the third Tuesday
of each month at 1:00 p.m. at the District's office:
7759 S. Airport Way Stockton, CA 95206
(209)982-4675 or 1-800-300-4675, district@sjmosquito.

Forward

On behalf of the Board of Trustees and staff of the San Joaquin County Mosquito and Vector Control District, I am pleased to submit the 2016 Operational and Fiscal Year Report. This report includes information on District administration and operations during the past year.

Financially, the District experienced a 4% increase in revenues from that of 2015, primarily due to an increase in property values, increases in commercial real estate development, and declining real estate foreclosures in the County. Since the mid- nineties, local property taxes earmarked for the District continue to be diverted to the State of California's Educational Revenue Augmentation Fund (ERAF). These revenue diversions have prompted the District to continue implementing the Mosquito, Vector, and Disease Control assessment approved by County landowners in 2005. This nominal charge generates a revenue stream that helps address vector-borne disease surveillance and operational control measures, community education and outreach activities, and as last year other related vector control operations to address the arrival of invasive species.

Operationally, field and laboratory staffing levels were maintained to meet the challenges of West Nile virus (WNV). 2016 WNV activity increased from 2015 when compared to collected mosquitoes infected with the virus. Although less mosquitoes were collected, the infection rate of the mosquitoes tested in 2016 were the second highest since 2008. In addition, there was an increase in infection levels of recovered dead birds from that of 2015. Surprisingly, there were eight horse cases as compared to only 1 horse case in 2015. This can be attributed to the lack of, or incomplete, immunization of these horses. Although statewide there was a decline of human cases, the number of confirmed human cases for San Joaquin County increased to 12, as compared to 3 cases in 2015. Simply stated, the District's emphasis on detecting virus in local mosquito populations is crucial for effective control to prevent the further spread of mosquito-borne diseases.

As in the past, the District requires landowners and water managers to prevent the development of mosquitoes on their property. This is important, since the District has realized a decline in effectiveness of certain mosquito control products on specific geographic mosquito populations. In addition, the District is still faced with current State and Federal regulations that limit how mosquito control can be implemented in and over aquatic sites.

Surveillance and control measures were implemented using the District's integrated pest management (IPM) plan and the California Mosquito-Borne Disease Surveillance and Response Plan. These plans are used to detect and respond to West Nile virus activity. In 2016, the District's surveillance program included specific trapping devices used to collect new invasive mosquito species such as *Aedes aegypti* (the Yellow Fever mosquito) and *Aedes albopictus* (the Asian Tiger mosquito). The District continues to refine diagnostic work in the laboratory, and consistently tests the effectiveness of mosquito control products. Public education is invaluable to ensuring landowners and water managers operate their property in a manner that does not create a public nuisance. In addition, we must annually examine our revenue sources and budget expenditures to remain as fiscally sound as possible.

Mosquito and vector control is an important service of public health protection. The District remains vigilant in the effort to consistently prevent the spread of West Nile virus in our County. In addition, we must stay the course in preparing for the arrival of invasive mosquito species capable of spreading mosquito-borne viruses that potentially could threaten our community. Organized mosquito control activities are an essential service the residents of San Joaquin County have come to expect. States and local governments are challenged to develop and maintain essential mosquito and vector control programs, such as during tight budgetary times and when faced with State and Federal regulations that could impact control efforts. To this extent, the Board of Trustees and staff should be commended for their continued dedication and tireless work in providing a quality mosquito and vector control program for the residents and visitors of San Joaquin County.

Respectfully submitted,

Eddie Lucchesi

Eddie Lucchesi, Manager

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Main Office

Mission Statement

Adopted by the Board of Trustees
On May 21, 1996

San Joaquin County Mosquito and Vector Control District provides comprehensive vector surveillance and control services to enhance the public health and quality of life for the residents and visitors of San Joaquin County. As a locally controlled independent agency, we seek to fulfill our mission through the following commitments:

- ü To utilize the most advanced administrative and operational technology available;
- ü To provide stewardship for public funds by stressing efficiency in our operations;
- ü To encourage citizen participation in achieving our mission;
- ü To educate the public regarding the health implications of disease transmitting pests;
- ü To provide services consistent with an awareness and concern for environmental protection;
- ü And lastly, to provide and maintain a safe and effective public health pest management program.

San Joaquin County Mosquito and Vector Control District is an independent special district. The District's operations are funded by San Joaquin County property taxes, a special tax, and a benefit assessment. The District is governed by an eleven member Board of Trustees, seven representing each incorporated city and four representing the county at large. The Board employs a manager who oversees program functions, hires and supervises staff. The staff consists of full and part-time employees to facilitate the daily district operations.

District History

In 1932, San Joaquin County health officials enlisted the aid of Civilian Conservation Corps to remove brush along streams to reduce mosquito producing stagnant water. In 1942, local citizens organized a petition signed by 3,800 residents to form a district. The Board of Supervisors formed the Northern San Joaquin County Mosquito Abatement District on January 22, 1945. A second district, the San Joaquin Mosquito Abatement District, was formed in 1955, for the remaining portion of the County. Due to the growing concern of encephalitis in the County, demands for mosquito control continued to increase. In 1980, by mutual consent of their governing bodies, the two independent districts combined to form San Joaquin County Mosquito Abatement District. The District expanded its mission to include another vector, ticks in 1992 & 1993. To reflect the newly adopted tasks, the District changed its name to San Joaquin County Mosquito & Vector Control District. To date, the District proves service to all of the residents and visitors of San Joaquin County covering 1,420 square miles.

(excerpt from original document)

Dated: January 22, 1945

BOARD OF SUPERVISORS OF THE COUNTY OF
SAN JOAQUIN -- STATE OF CALIFORNIA

By: (W.R. Ruggles) Chairman

Attest: R. E. Graham, County Clerk

By: (J. R. Plummer) Deputy Clerk

Said motion was seconded by Supervisor Stuckenbruck and duly carried

NORTHERN SAN JOAQUIN COUNTY MOSQUITO ABATEMENT DISTRICT, RESOLUTION FIXING
BOUNDARIES

Supervisor Rimington moved that the following Resolution be passed and adopted, towit:

BEFORE THE BOARD OF SUPERVISORS OF THE COUNTY OF SAN JOAQUIN, STATE OF CALIFORNIA

RESOLUTION AND ORDER FOR THE INFORMATION OF THE
NORTHERN SAN JOAQUIN COUNTY MOSQUITO ABATEMENT DISTRICT

---oOo---

This matter came on regularly for hearing before this Board on January 15, 1945, at the hour of 11:00 A.m., in the offices of the Board in Room 3 of the County Courthouse in the City of Stockton, County of San Joaquin, State of California, being the regular meeting place of said Board, and as authorized by Section 2216 of the Health and Safety Code, said hearing was adjourned to January 22, 1945 at the hour of 10:00 A.M., at the same place, and from the proceedings and evidence the Board finds:

That due and legal petitions are on file in the Office of this Board, which comply with the provisions of Chapter 5, Division 3 of the Health and Safety Code and from testimony and evidence introduced, it appears to this Board that the public necessity and welfare requires the formation of a mosquito abatement district; and this Board does declare and order that the territory within the boundaries hereinafter described and which are hereby fixed and determined, be organized as a mosquito abatement district to be known as the NORTHERN SAN JOAQUIN COUNTY MOSQUITO ABATEMENT DISTRICT.

This Board further finds and declares that certain objections and protests to the formation of said District and to the inclusion of certain territory therein were filed, and the same were duly and legally heard and considered and are hereby denied.

This Board further finds and declares that the territory hereinafter described includes the city of Lodi in said county, and there is on file in the office of this Board the duly authenticated Resolution of the said City for its inclusion in the District.

“Vector” Defined

According to the California State Health and Safety Code, Section 2002(K): “Vector” means any animal capable of producing discomfort or injury, including, but not limited to arthropods (mosquitoes, flies, fleas, lice, ticks, mites, etc.), small mammals (rabbits, rodents, etc.) and other vertebrates, but not including domestic animals.

Vectors can transmit infectious organisms that cause human and animal diseases. These diseases can be serious and sometimes fatal. Arthropods, particularly haematophagous insects, are the major group of vectors transmitting diseases (vector-pathogen) including encephalitis (mosquito-virus), malaria (mosquito-protozoan), typhus (flea/lice-bacterium), plague (flea-bacterium), dog heartworm (mosquito-roundworm), and Lyme disease (tick-bacterium). Encephalitis-causing viruses transmitted by arthropods are called arboviruses (Arthropod-borne viruses). The California Arbovirus Surveillance Program emphasizes forecasting and monitoring activity of St. Louis encephalitis (SLE), western equine encephalomyelitis (WEE), and West Nile virus (WNV). These viruses are maintained in the wild bird-mosquito cycles, and therefore are not dependent upon infections of humans or domestic animals for their persistence. Infections of humans and domestic animals by these viruses are transmitted by bites of infected mosquitoes that have fed on infected wild birds. WNV is currently of most concern in San Joaquin County. It was first detected in San Joaquin County in 2004 and reached epidemic risk levels in 2005 - 2008 and 2012 - 2016.

There are 17 mosquito species found in San Joaquin County. Three of them are of major public health concern; *Culex tarsalis*, is the principal vector of WEE, SLE and WNV, *Culex pipiens*, is the vector of WNV, and SLE, and *Anopheles freeborni*, the vector of malaria.

Mosquitoes of San Joaquin County

- | | |
|--|---|
| 1. <u><i>Culex tarsalis</i></u>
Western Encephalitis mosquito | 12. <u><i>Aedes washinoi</i></u>
No common name |
| 2. <u><i>Culex pipiens</i></u>
Northern House mosquito | 13. <u><i>Aedes vexans</i></u>
Inland flood water mosquito |
| 3. <u><i>Culex stigmatosoma</i></u>
Banded foul water mosquito | 14. <u><i>Culiseta incidens</i></u>
Cool-weather mosquito |
| 4. <u><i>Culex erythrothorax</i></u>
Tule mosquito | 15. <u><i>Culiseta inornata</i></u>
Large winter mosquito |
| 5. <u><i>Anopheles freeborni</i></u>
Western malaria mosquito | 16. <u><i>Culiseta particeps</i></u>
No common name |
| 6. <u><i>Anopheles franciscanus</i></u>
No common name | 17. <u><i>Orthopodomyia signifera</i></u>
No common name |
| 7. <u><i>Anopheles punctipennis</i></u>
Woodland malaria mosquito | |
| 8. <u><i>Aedes nigromaculis</i></u>
Irrigated pasture mosquito | |
| 9. <u><i>Aedes melanimon</i></u>
No common name | |
| 10. <u><i>Aedes dorsalis</i></u>
No common name | |
| 11. <u><i>Aedes sierrensis</i></u>
Western treehole mosquito | |



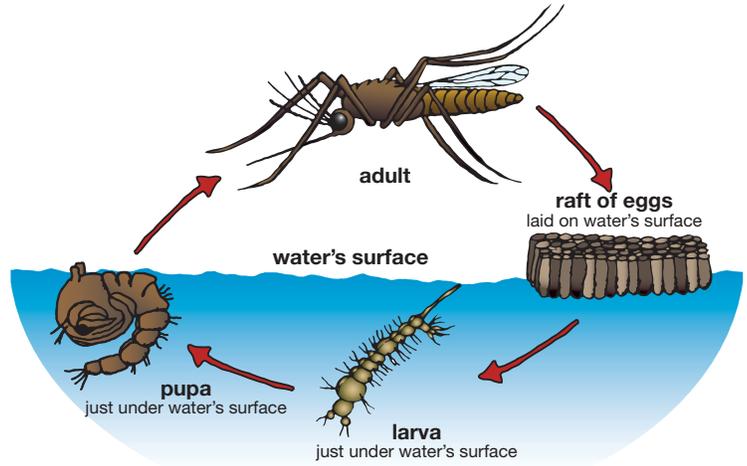
Anopheles
Malaria Mosquito

“INVASIVE AEDES” MOSQUITOES - The Facts:

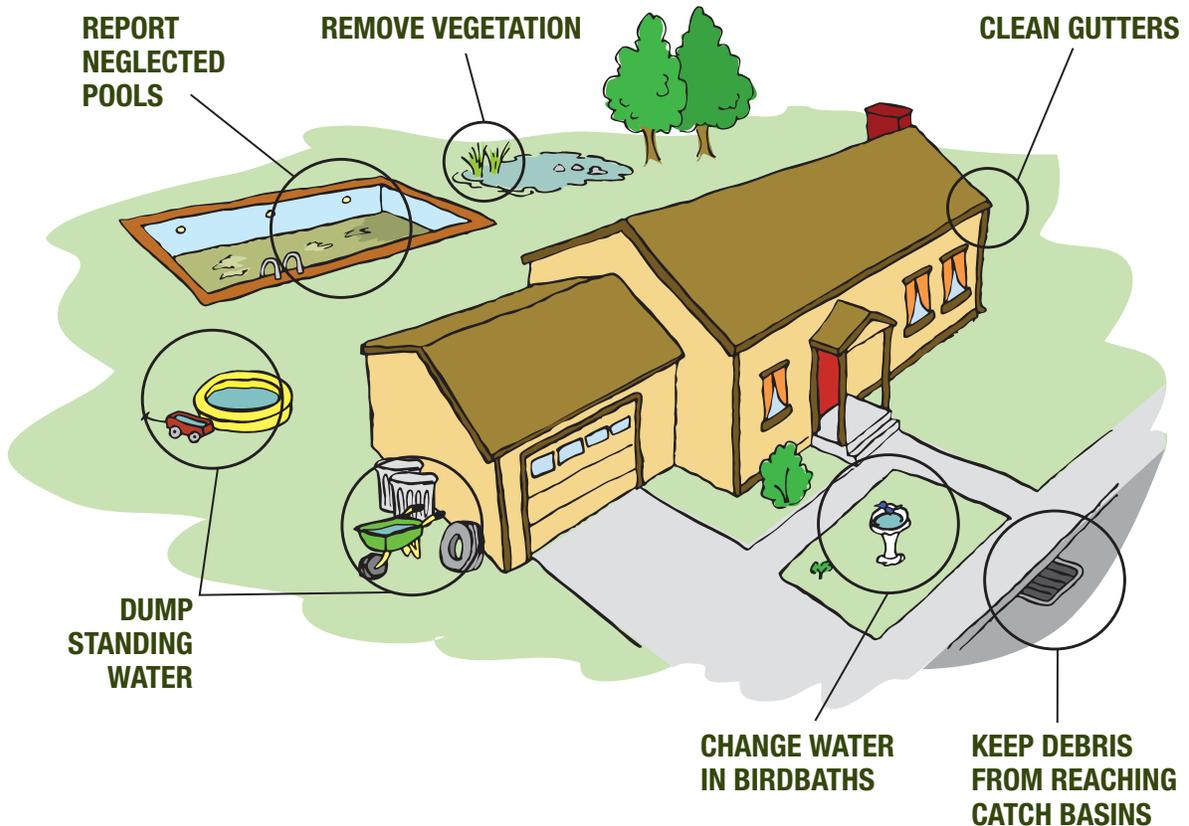
- **Invasive Aedes** refers to two mosquito species, *Aedes aegypti* and *Aedes albopictus*. These two species are found in many countries throughout the world.
- **The District** is currently providing surveillance to detect these invasive mosquitoes. They were not detected here in 2016.
- **Invasive Aedes** have the capability to carry Zika, dengue, yellow fever, and chikungunya.
- **Call the District** if you notice daytime biting mosquitoes.

Mosquito Development

Mosquitoes complete a full metamorphosis: egg, larva, pupa, and adult. Critical to the mosquito's life cycle is water. Egg rafts are laid on still or standing water. Each raft contains 100 - 300 eggs. The eggs hatch to larvae. The larvae grow through 4 instars, shedding their outer skin as they grow to the next stage. Once the larvae reach the 4th stage (or instar), they then transform to pupae. The pupal stage is the equivalent of the cocoon, where the adult insect body develops. Once development is complete, the pupae hatch off the water as adult mosquitoes. The adult female then needs to take a "blood meal" to provide necessary nutrients to her eggs. In warmer weather, mosquitoes complete a full metamorphosis, on average, in seven to ten days. Mosquito development around residential properties is the primary source for urban mosquitoes.



Find & Eliminate Mosquito Development Sources!

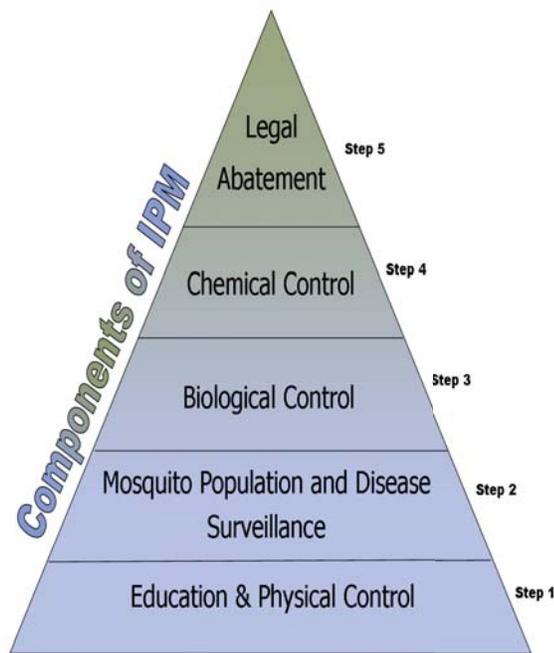


Integrated Pest Management

District operations are based on a concept that utilizes several different approaches to vector control. The concept is referred to as Integrated Pest Management (IPM). The District’s definition of IPM is “a sustainable approach, or plan, to managing public health pests and vectors, by combining, biological, chemical, legal, natural and physical control tactics in a way that minimizes economic, health and environmental risks.” IPM can also be considered as a systematic approach to public health pest management, which combines a variety of surveillance and control practices. With regards to implementing a plan to control vectors, IPM can be defined as socially acceptable, environmentally responsible and economically practical protection of the public’s health and well being. In the spirit of IPM, Integrated Mosquito Management (IMM), is a process that is directly related to the specific control of mosquitoes.

Since the need for mosquito control was recognized in the early twentieth century, increased knowledge of mosquito biology has driven the formulation of a variety of methodologies designed to successfully reduce both mosquito nuisance levels and mosquito-borne disease transmission. As the technologies and knowledge base from which these methodologies were derived have matured, they have been increasingly seen as mostly complimentary or synergistic in nature, providing optimal control as part of an overall strategy. IMM has been developed to encourage a balanced usage of cultural and insecticidal methodologies and habitat manipulations in order to minimize adverse environmental impacts. IMM is knowledge-based and surveillance-driven, and when properly practiced is specifically designed to accomplish the following:

1. Protect human, animal and environmental health.
2. Promote a rational use of pesticides.
3. Reduce environmental contamination to soil, ground water, surface water, pollinators, wild-life and endangered species.
4. Utilize natural biological controls to conserve and augment other control methods.
5. Use target specific pesticides to the extent possible.
6. Emphasize the proper timing of applications.
7. Minimize pesticide resistance problems.



Mosquito Population Surveillance

The District collects mosquitoes in various types of mechanical traps to target specific mosquito species that are vectors of encephalitis viruses. The trap types are referred to as Encephalitis Virus Surveillance (EVS) traps and gravid traps, which are used extensively throughout the District covering different types of mosquito breeding sources. Upon placement, the traps run for 24 hours prior to collection. Contents of the traps are analyzed each week. Each trap's contents indicate the population in a specific area along with information about the mosquito species distribution. The data is submitted to the California Vector Borne Disease Surveillance Gateway for compilation with other vector control agency data. In 2016, we collected the second highest number of mosquito vector populations since 2008 with significantly higher mosquito numbers in the periods of April - June.

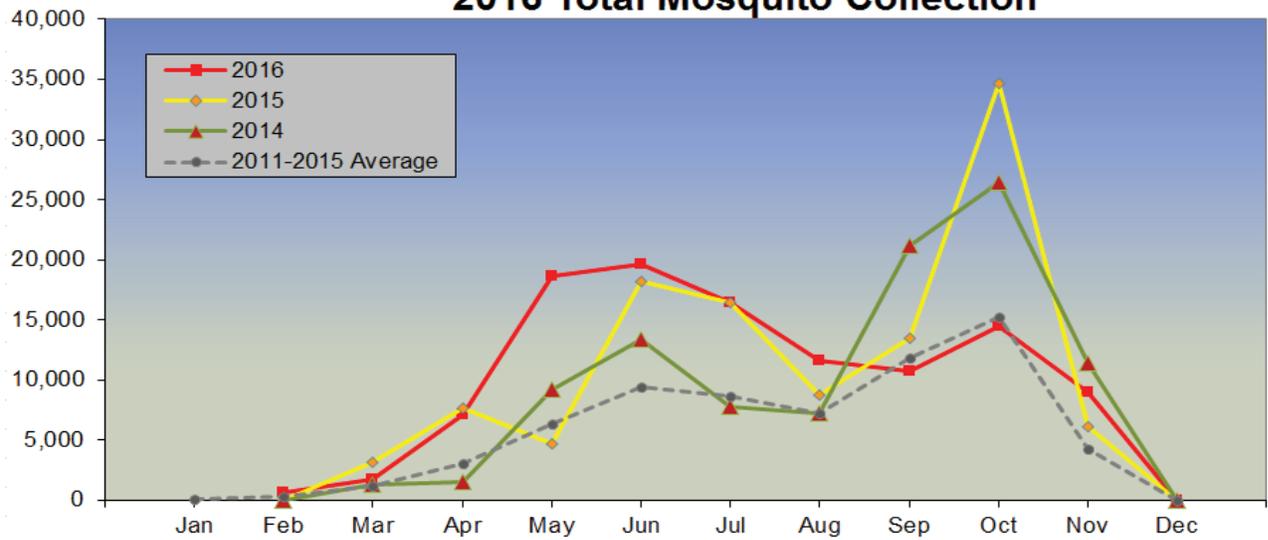


Encephalitis Virus Surveillance (EVS) Trap



Gravid Trap

2016 Total Mosquito Collection



Invasive Aedes mosquito surveillance

The District also conducts surveillance activity on invasive *Aedes aegypti* and *Aedes albopictus* mosquito species, which can vector dengue, chikungunya, yellow fever and Zika virus. The District deploys mosquito oviposition traps, called Ovitrap, in approximately 20 locations that include nurseries, the Stockton Port, freight carriers, RV Parks, marinas, tire dealers/recyclers, cemeteries and public parks. These two mosquito species have been discovered in San Mateo County, Madera County, Fresno County, Kern County and Southern California, but have not been found in our area.



Ovitrap



BG Sentinel Trap

Mosquito-Borne Disease Surveillance

In combination with mosquito population surveillance, early detection of mosquito-borne diseases is critical to developing a proactive and effective control and prevention response. The District uses several surveillance methods to test for the presence of encephalitis viruses and other pathogens. These methods include testing wild birds (including dead birds) and groups of mosquitoes for the presence of pathogens within their bodies using quantitative RT-qPCR. For many years, dead birds and mosquitoes have been the earliest indicators of WNV activity in San Joaquin County.

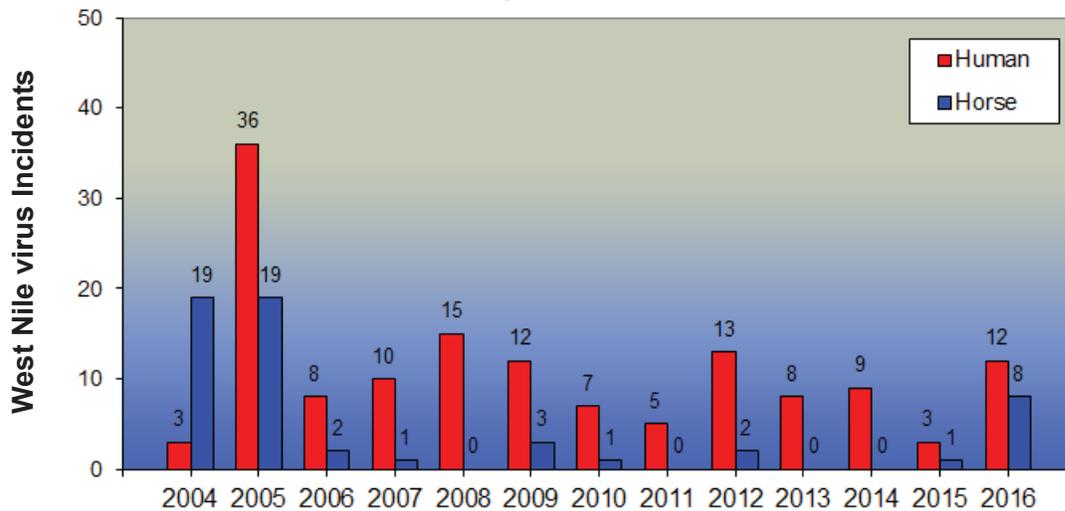
In San Joaquin County, West Nile virus was first detected in 2004 with 3 human cases, followed by intensive amplification and transmission resulting in 36 human cases and 19 horse cases in 2005. WNV activity subsequently went through a pattern of 2-3 years of average or below average activity followed by 1-2 years of moderately high activity. This pattern generally agrees with what has been observed nationally, although regional variations exist and outbreaks occurred intermittently in the nation.

The 2016 year is considered a high WNV activity year in the pattern cycle. The mosquito vector populations were slightly lower than in 2015, but still reached the second highest since 2008. In addition, this year the WNV minimum infection rate in mosquitoes reached a historical high. Collectively, this year's risk assessment showed that WNV transmission in San Joaquin County reached and stayed at epidemic planning levels during most of the summer period. Consequently, there were 12 human cases with 2 fatalities and 8 equine cases reported in our county. The equine case number is the highest since 2006.



Mosquito Trap Collection

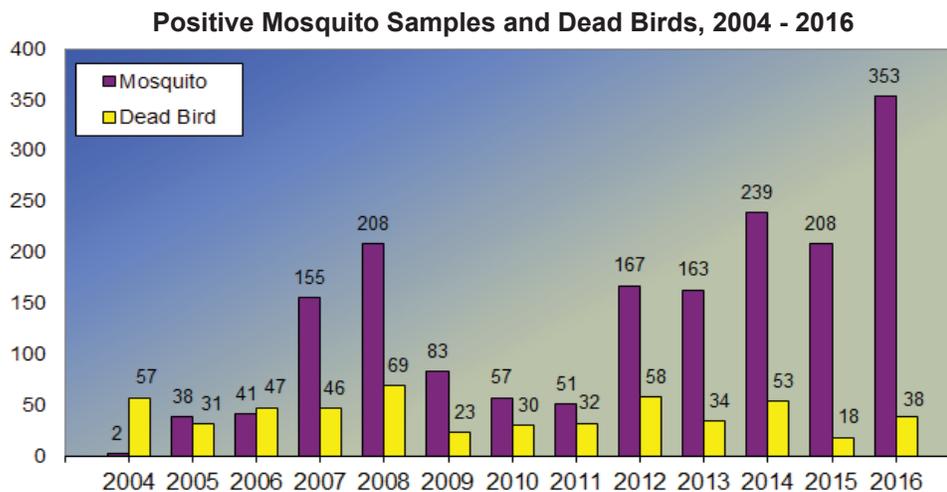
Human and Equine Cases, 2004 - 2016



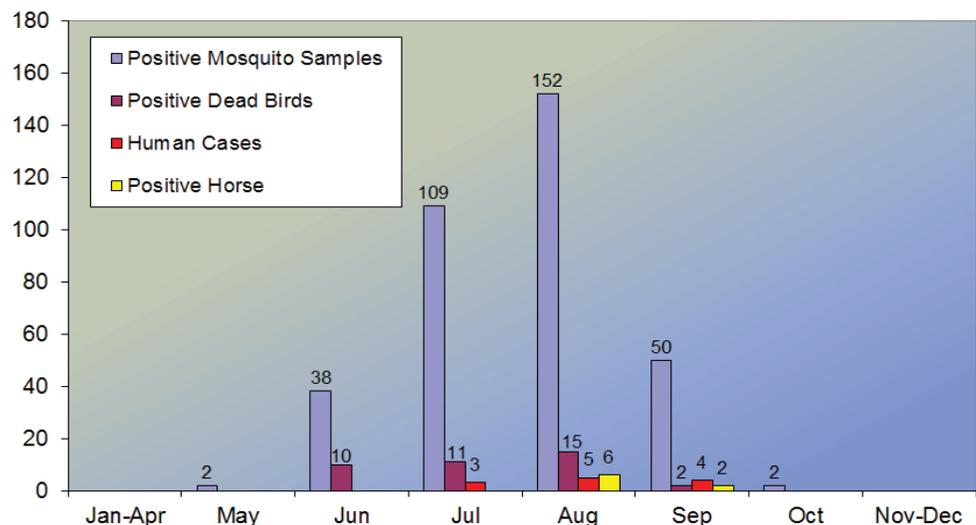
Mosquito-Borne Disease Surveillance

From 2004 to 2016, a total of 23,216 mosquito pools of nine mosquito species were tested by VecTest™, RAMP® and/or RT-qPCR. There were 1,775 positive mosquito pools (7.65%) that were of species *Cx. tarsalis* (849), *Cx. pipiens* (903), *Cx. erythrothorax* (19) and *Ae. vexans* (4). In 2016, there were 2,794 mosquito samples tested for diseases, resulting in 353 collections being positive for WNV. In contrast to 2015, 208 out of 3,170 mosquito samples tested positive for WNV.

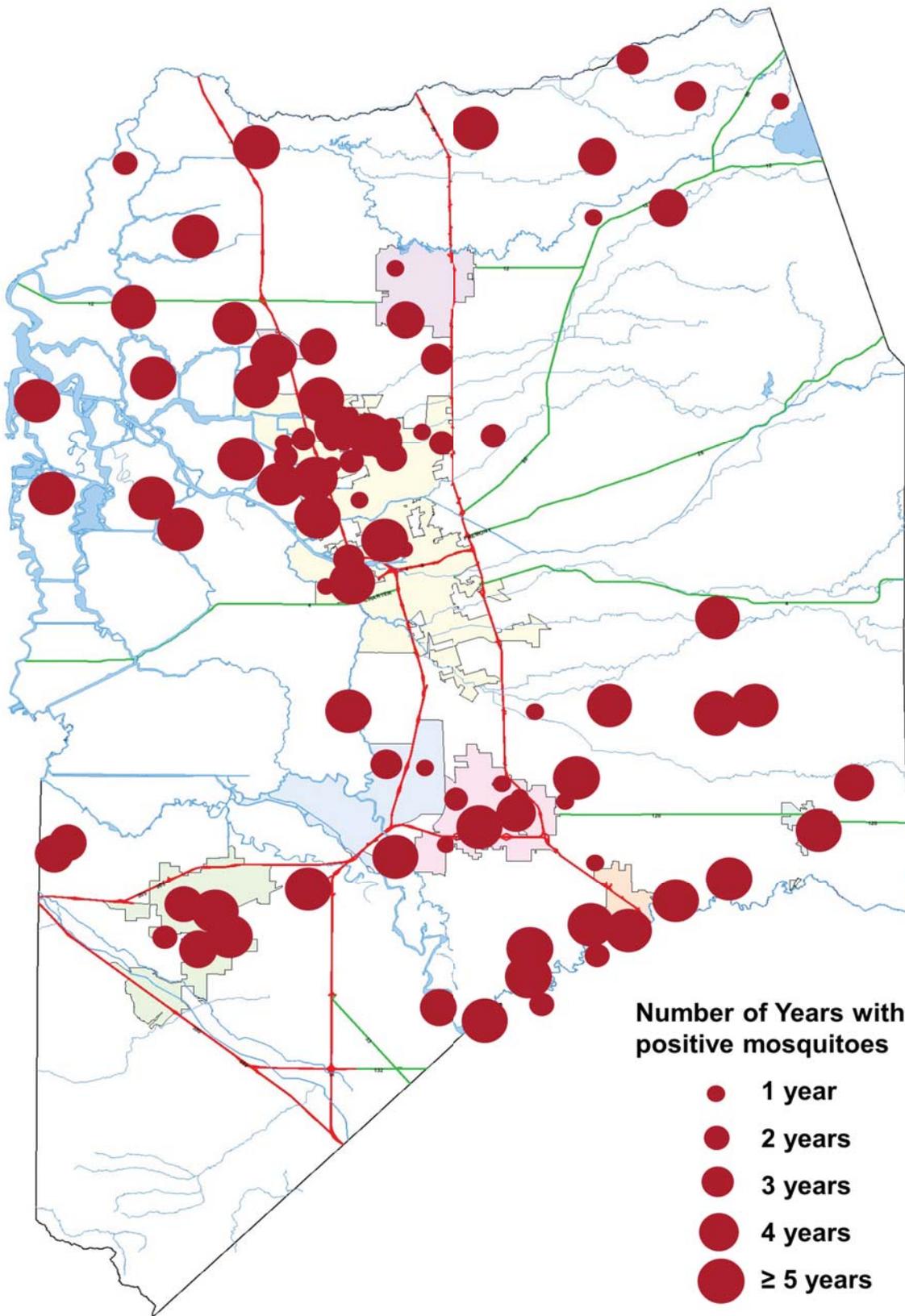
The District received dead bird reports from residents through the statewide WNV hotline (1-877-968-2473). The reports are used by the California Department of Public Health to create statewide risk maps. These maps assist the District in targeting areas for additional mosquito control efforts. From 2004 to 2016, the District received 13,534 dead bird reports and tested 1,821 birds, resulting in 536 positive birds. About 80% of the positive birds are corvids (crows, ravens, jays, magpies) and the rest are mostly passerine birds (sparrows, finches, robins). In 2016, the District received 317 dead bird reports. The District tested 70 of them and 38 tested positive for WNV infections.



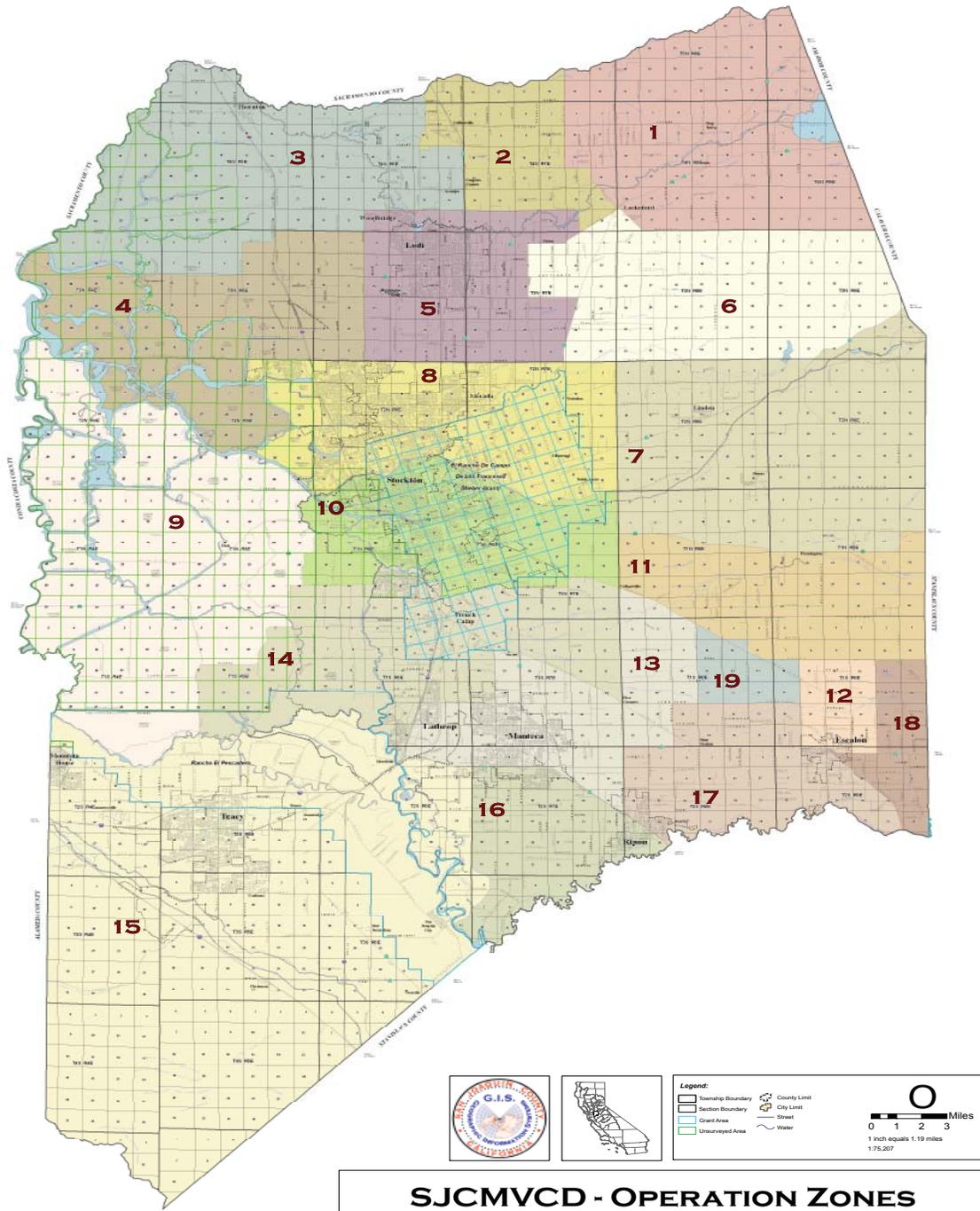
WNV Activity In San Joaquin County, 2016



Geographic Distribution of WNV Activity in Mosquitoes San Joaquin County 2004 - 2016



Operational Zone Map



The District is divided into 19 operational zones, each staffed with a state certified mosquito control technician. Zones are grouped into one of three regions under the direction of a regional supervisor. There are a total of 115 mosquito source types categorized by agricultural, natural, residential, and industrial/commercial sources. Examples include: field crops, animal waste ponds, irrigation ditches, natural drains, treeholes, containers, septic tanks, ornamental ponds, roadside ditches, railroad borrow pits, tires, storm water retention ponds, and catch basins.

Public Outreach

The District's public outreach aims to inform and educate the public of all mosquito related issues pertinent to San Joaquin County. These issues range from mosquito development and control methods, to the risk of mosquito-borne diseases and invasive mosquito species. To communicate timely and accurate information, we utilize news releases, spray alerts, website posting, paid newspaper ads, radio and magazine ads, as well as school presentations and informational booths to accomplish that goal.

The following are the most notable outreach activities that the District performed during 2016:

- Large scale radio campaigns aim to increase awareness of mosquito development, mosquito-borne disease and invasive species. The District contracted with local radio stations to run ads on KAT 103.3, KHOP 95.1, and KHHK 104.1. Partnering with Merced and Turlock Mosquito Abatement Districts, 444 live read traffic spots and 30 second commercial spots ran from 4/18/16 to 9/11/16. Hispanic radio ran 60 second spots from 4/18/16 to 9/18/17 with a total of 300 radio spots. The District also ran 132 radio spots on a local station KJOY 99.3 during the same time period.

- Special projects completed: 1) We partnered with SJC Office of Education Migrant Farm Worker Program to distribute 500 educational packets to farm labor camps; 2) 41,000 English & Spanish bookmarks were distributed to Stockton Unified School District's Health Education program; 3) We partnered with SJC Solid Waste Department to deliver tire recycling coupons to property owners with old tires; 4) The Public Relations Department of SJC Office of Education assisted the District in the distribution of 10,000 "Be A Mosquito Detective" third grade flyers to thirteen school districts in San Joaquin County; 5) Distributed flyers to horse owners regarding WNV and mosquito prevention; 6) 2015 Annual Report distributed to 154 e-mail recipients.

- The District website is posted with all news releases and adult mosquito spraying news alerts. As a result, we interviewed twenty-one times with radio, newspaper and television. We received several front page newspaper articles, as well as, radio, and television coverage. The Record printed nearly every spray operation in their newspaper. The District contracts with GovDelivery as an electronic communication platform designed to bring website users to the District's website, www.sjmosquito.org. GovDelivery gives total control to the end users who can sign up for several types of information as a opt in / opt out service. During the year, seven news releases and 52 spray alerts were sent. The website had 64,975 total visitors for the entire year, which averages 5,414 visitors per month, up 1,242 visitors from 2016.



- Third grade students participating in three Ag Venture programs: 77 presentations with 1,616 students in attendance

- Fifth and sixth grade elementary students: 35 presentations with 49.5 classes in attendance totaling 1,659 students

- Other presentations provided by request included the following: San Joaquin Master Gardeners, San Joaquin Agricultural Drought Task Force, Thornton Municipal Advisory Council, San Joaquin Public Information Officers group, J.R. Simplot Company and Lodi Lake Docents

- 126 contacts were made during the District's eighth annual mosquitofish giveaway held throughout San Joaquin County

- Educational Booths and Events: Earth Day, Senior Awareness Day at Micke Grove Park, and three community science nights at local schools, and a health fair at Westwood School in Stockton

- The SJC Office of Emergency Services (OES) helped the District to distribute mosquito prevention tips through social media during West Nile Virus & Mosquito and Vector Control Awareness Week. OES was instrumental in having a Proclamation for such week declared by the San Joaquin County Board of Supervisors.

San Joaquin County Mosquito & Vector Control District Public Outreach

REPORT DAYTIME BITING MOSQUITOES

Report daytime biting mosquitoes or significant mosquito problems to
(209) 982-4675 or 1-800-300-4675

Please go to sjmosquito.org for more information





HELP!

Protection Through Prevention



Protection Through Prevention

Report Daytime Biting Mosquitoes!

Why? Two invasive mosquito species found in several areas of California are capable of transmitting diseases like dengue and Zika virus to humans. Once established, they are very difficult to eradicate. Early detection is key to their control.

Report daytime biting mosquitoes to San Joaquin County Mosquito and Vector Control District

**209.982-4675,
1-800-300-4675
or online at sjmosquito.org**



91000107 4/27/401

Newspaper and digital newspaper advertisements ran 17 times in the Record on Sundays and Wednesdays during the summer months.



Need Mosquito-Fish?



Fish Giveaway

JUNE 27 - JULY 1

throughout San Joaquin County
info. at sjmosquito.org

Digital Billboard advertisement on Hwy 99 and Arch/Airport Way, Stockton



BE A MOSQUITO DETECTIVE
HELP PREVENT MOSQUITOES AND THEIR DISEASES!



HERE ARE SOME THINGS YOU NEED TO KNOW TO BE A GREAT MOSQUITO DETECTIVE

There are many types of mosquitoes. All mosquitoes start as eggs laid in water by a female mosquito. Larvae hatch from the eggs and eat small debris in the water. They grow and become pupae, similar to a cocoon, where their bodies develop into adults. Eventually, they hatch off the water as adult mosquitoes. These series of changes are called metamorphosis.

When the female mosquito bites, she uses the blood as food for her eggs. Each time she bites she lays more eggs. Because of multiple bites, she can carry disease to people and animals like birds and horses. (Standard 3-LS1-1)

Each type of mosquito inherits traits from its parents. Some traits include what animals they prefer to bite. Another trait is their choice of the kind of water where they lay eggs. Some mosquitoes like dirty water and others like clean water. Some like water held in trees and others like salty water in marshes by the ocean.

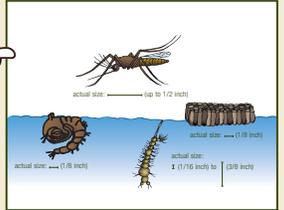
Over many years each type of mosquito adapted to the environment that was available to them. The most important types are mosquitoes around your home because the diseases mosquitoes can carry may hurt people. (Standards 3-LS3-1, 3-LS3-2)

NOW THAT YOU KNOW THE BASICS OF MOSQUITOES, DRAW ARROWS AND LABEL THE LIFECYCLE STAGES IN PROPER ORDER

Remember, the stages are:
1) adult mosquito, 2) egg raft
3) larva, 4) pupa, then back to an adult mosquito.

Next to the mosquito, write "bites to get blood for laying eggs".

Then write "dump water" between every lifecycle stage to stop mosquito development.



actual size: (up to 1/2 inch)
actual size: (1/16 inch)
actual size: (1/16 inch to 1/8 inch)
actual size: (1/16 inch to 1/8 inch)

CONGRATULATIONS, YOU ARE NOW A "MOSQUITO DETECTIVE!"
TURN THIS PAPER OVER AND START YOUR DETECTIVE WORK.

"Be A Mosquito Detective" third grade flyers were sent to thirteen school districts in San Joaquin County.



SAN JOAQUIN COUNTY MOSQUITO & VECTOR CONTROL DISTRICT

Protection Through Prevention



YOU CAN HELP PREVENT INVASIVE MOSQUITOES!

Some new species of mosquitoes may be coming our way. They are potential carriers of mosquito diseases like dengue and Zika. **We need your help.** These mosquitoes prefer residential areas and bite during the day.

REPORT DAYTIME BITING MOSQUITOES TO
San Joaquin County Mosquito & Vector Control District
Contact the District at **209.982.4675 or 800.300.4675**
or at our website www.sjmosquito.org

NOTE: These mosquitoes develop in flower pots and containers around homes. They prefer to be around people.

San Joaquin Magazine "at home" section ad ran with an accompanying article

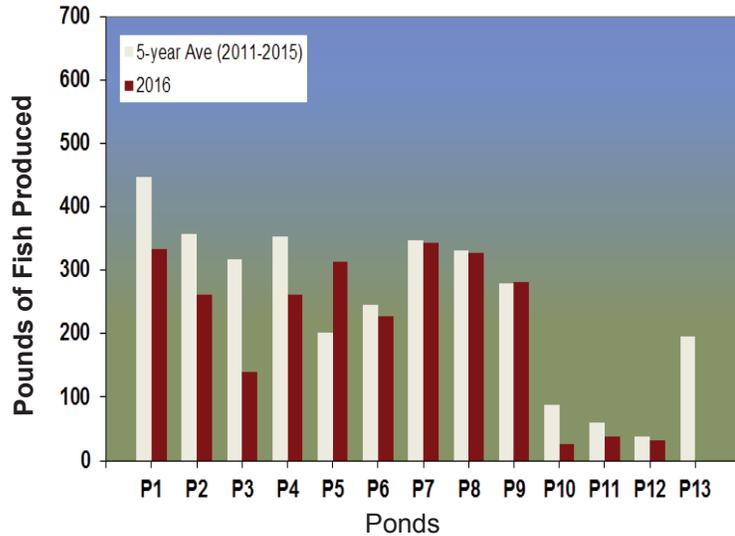
Biological Control

Biological mosquito control is one of the mainstays in protecting the public from mosquitoes and the transmission of mosquito-borne diseases. Biological mosquito control agents include a wide variety of pathogens, parasites and predators. The primary biological control agent used by the District is *Gambusia affinis*, the mosquitofish.

Mosquitofish are small live-bearing minnows closely related to the common guppy. These fish are a voracious consumer of mosquito larvae and pupae and can survive in varying water temperatures. Because mosquitofish are surface feeders, they are extremely efficient mosquito predators. A single mosquitofish has been said to consume upwards of 80-100 mosquito larvae per day. They are capable of quickly populating a source if conditions are favorable. The fish are placed in a variety of permanent and semi-permanent fresh water habitats such as neglected swimming pools, water troughs, rice fields, and wetlands.

The District's White Slough Fish Rearing Facility is located at the City of Lodi's White Slough Water Pollution Control Facility. The facility consists of thirteen rearing ponds and four above ground tanks. The ponds are capable of rearing 3,500 - 4,000 pounds of fish per year.

Mosquitofish Production



Transferring mosquitofish from ponds to holding tanks

Mosquitofish Planting Sites / Pounds Planted

	Fish Origination Site	Island & Duck Club Flooding	Wildlife & Ecological Reserves	Sewers, Retention & Private Ponds	Rice Fields	Service Requests: Fish Ponds, Swim Pools, Water troughs	Miscellaneous
2016	White Slough	733.7 lbs.	549 lbs.	65.2 lbs.	579.3 lbs.	443.9 lbs.	133.9 lbs.
	Wild Fish	0 lbs.	0 lbs.	0 lbs.	0 lbs.	195.77 lbs.	0 lbs.
5 Yr. Avg. 2011-2015	White Slough	1397.4 lbs.	342.9 lbs.	69.6 lbs.	538.2 lbs.	611.9 lbs.	189.4 lbs.
	Wild Fish	20.8 lbs.	1.8 lbs.	13.0 lbs.	0 lbs.	37.1 lbs.	2.8 lbs.

Physical Control

The term physical control refers to making an environmental or physical change to a mosquito-breeding source by physical or mechanical means. Physical control is also known as “source reduction”. Ultimately, physically changing the mosquito-breeding source can make the site less suitable for mosquito production.

Landowners and land managers have a responsibility to minimize mosquito production on their lands and play a key role in reducing mosquito populations throughout the District. The implementation of mosquito prevention Best Management Practices (BMPs) can reduce or eliminate the ability of aquatic sites to produce mosquitoes. BMPs are defined as actions landowners can take to reduce or eliminate mosquito production from water sources on their property in an environmentally and fiscally responsible manner, and to reduce the potential for transmission of disease from mosquitoes to humans.

In 2012, the California Department of Public Health and the Mosquito and Vector Control Association of California updated a manual of BMPs titled “BEST MANAGEMENT PRACTICES FOR MOSQUITO CONTROL IN CALIFORNIA” (<http://www.westnile.ca.gov/resources.php>), which has been adopted by the District and is used as the standard set of recommendations for property owners to reduce or eliminate mosquito breeding sources on their property.

Each mosquito breeding source and property is unique, and the BMPs listed in this manual will apply to some properties, but not others. After evaluating their property, the District works with the landowner to implement applicable BMPs to reduce or prevent future mosquito breeding as well as to manage existing mosquitoes at that site.

Mosquito Control Best Management Practices At-A-Glance:

- Eliminate artificial mosquito sources.
- Ensure man-made temporary sources of surface water drain within four days (96 hours) to prevent development of adult mosquitoes.
- Control plant growth in ponds, ditches, and shallow wetlands.
- Design facilities and water conveyance and/or holding structures to minimize the potential for producing mosquitoes.



This garden bucket of water provides a source for mosquito development that can infest an entire city block.

Chemical Control

Chemical control of mosquitoes is the application of natural or man-made compounds (insecticides) to reduce mosquito populations to tolerable levels. Chemical control methods are applied to obtain immediate control when physical and biological control methods fail to maintain mosquito numbers below a tolerable level or during an epidemic of mosquito-borne disease when immediate control measures are needed.

The District follows accepted principles of proper pesticide usage which includes: 1) Using pesticides as a last resort to complement biological, physical or natural controls; 2) Applying pesticides in a manner that minimizes harm to non-target organisms; 3) Using pesticides to treat specific sites where mosquitoes (which are causing annoyance or creating a public health problem) are breeding; 4) Applying pesticides selectively to the proper life stage of the mosquito; 5) Applying pesticides in a manner that will minimize personal hazard to the applicator and other persons in the vicinity; 6) Applying pesticides in accordance with federal and state laws and regulations.

The District is signatory to a National Pollution Discharge Elimination System (NPDES) permit for applications of larvicides to surface waters. The permit is granted by the State Water Resources Control Board, which reviews the District’s mosquito control activities in local waterways.

Chemical Control

Larvicides may be applied to water in which larvae or pupae are developing. Pastures, septic tanks, irrigation ditches, animal waste ponds, creeks, sloughs, catch basins, treeholes, and roadside ditches are examples of areas the District's technicians regularly inspect and treat to reduce mosquito populations.

Adulticides may be applied as space sprays, mists, or fogs to kill adult mosquitoes and as a residual insecticide on surfaces likely to be contacted by adult mosquitoes.

Herbicides are used to reduce mosquito habitat and provide better access for larvicide treatment, and biological control.



Treating catch basins in a residential area to prevent mosquito development



Treating treeholes at Oak Grove park in Stockton to prevent the Treehole mosquito, carrier of canine heartworm



Preparing herbicide equipment to spray vegetation that harbors mosquito development.

Larvicide, Adulticide and Herbicide

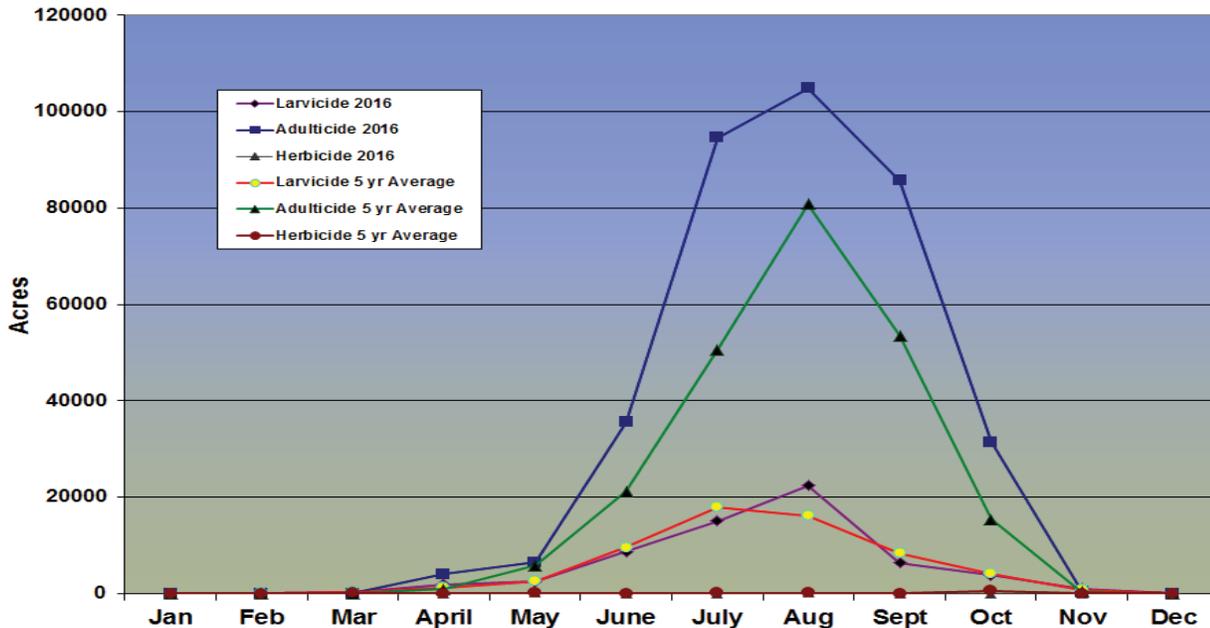


Table is in acres treated	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Larvicide 2016	12	206	742	942	1637	11914	14882	12607	3996	5537	169	0
Larvicide 5 yr. avg.	44	96	272	1263	2439	8340	18454	17754	13184	4048	866	10
Adulticide 2016	0	0	17	87	77	23811	56885	80139	65729	39713	0	0
Adulticide 5 yr. avg.	14	277	4	1353	7636	17697	46666	76895	54954	9855	331	1
Herbicide 2016	50	132	117	48	128	80	217	127	35	49	10	34
Herbicide 5 yr. avg.	16	37	127	88	118	52	139	110	47	560	42	29

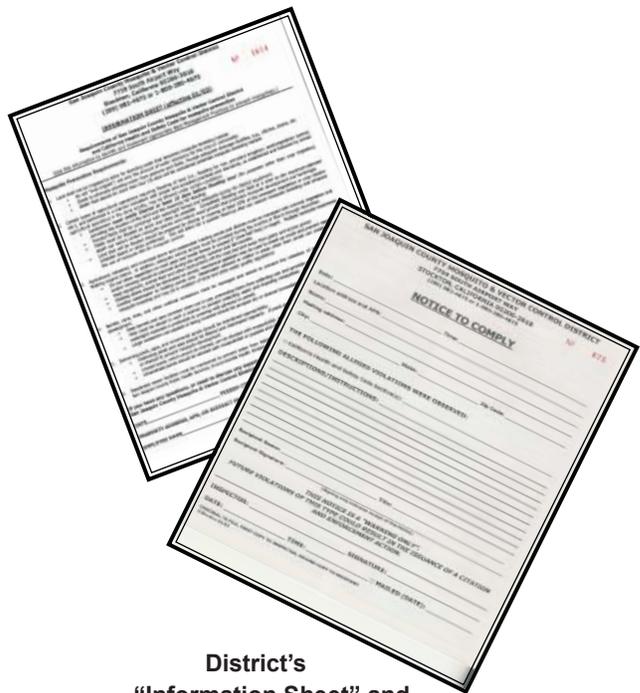
Legal Abatement

The District incorporates local, state and federal statutes to regulate excessive mosquito breeding on private and public lands. Using provisions of the California Health and Safety Code, the District can legally require property owners to reduce or eliminate mosquito breeding when it becomes a public nuisance.

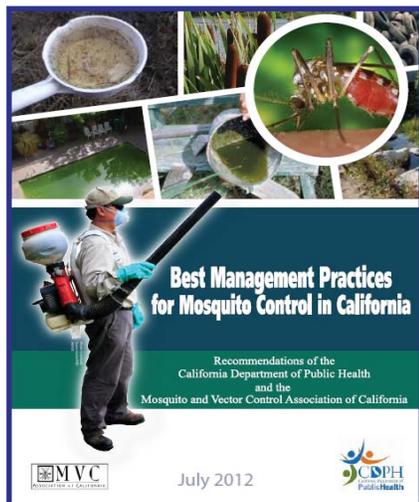
Abatement of mosquitoes generally follows a three step process; whereby, the owner of mosquito-producing land is: 1) contacted and requested to take steps to prevent the occurrence of mosquito development and provided an “Information Sheet”; 2) if corrections do not take place, a “Notice to Comply” is issued; 3) if the condition persists, and the problem is not corrected, the District can initiate legal abatement proceedings per §2060 of the California Health and Safety Code. Fines of \$1,000 per day can be levied for non-compliance once a legal abatement hearing has taken place and the property owner refuses to comply.

During the year, two inspection warrants were obtained due to property owners refusal to allow access for mosquito inspections. Only one warrant was necessary to execute.

	Information Sheet	Notice to Comply	Citation
2016	46	1	0
2015	89	1	0



District's
“Information Sheet” and
“Notice to Comply”



The District provided mosquito prevention Best Management Practices (BMPs) handouts for the reduction of mosquitoes to residential, agricultural, commercial, and industrial property owners. The above handout is available from the District: Best Management Practices for Mosquito Control in California - 2012. The BMPs are often handed out upon request, during routine inspections, presentations, and public events.

Ticks & Tick Borne Disease

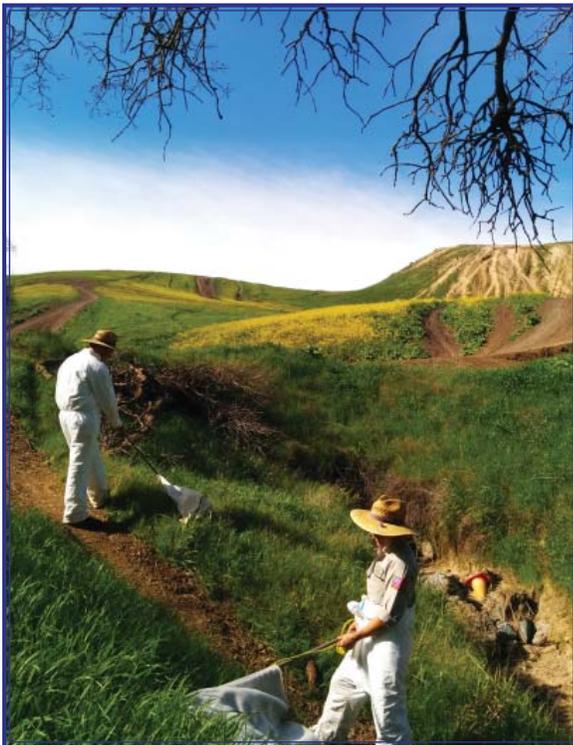
The most common ticks found in San Joaquin County (SJC) are: the American dog tick, *Demacentor variabilis*; the Pacific Coast tick, *Demacentor occidentalis*; and the Brown dog tick, *Rhipicephalus sanguineus*. The Pacific Coast tick is one of the most widely distributed ticks in California. Occasionally, the Western black legged tick, *Ixodes pacificus* is also found in SJC.

The District conducts surveillance for ticks in parks and river areas of SJC that are known habitat. Surveillance for adult ticks is typically performed during the months of November through April when ticks are most abundant. *Ixodes pacificus* is the primary species targeted during surveillance due to its ability to carry Lyme disease. During the year, surveillance was conducted along waterways, riparian areas, and foothill areas used by the public for recreational activities. Ticks may be submitted by local veterinary hospitals and the general public for identification.



Ixodes pacificus
Western Black-legged Tick

In 2016, tick surveillance was performed at Camanche Reservoir and Carnegie Park. For Camanche, one male American dog tick and one female Pacific Coast tick were found. No ticks were found at Carnegie Park.



Tick surveillance at Carnegie park located near the western boarder of San Joaquin County. Felt flags are swept over the edge of trails where animals travel. These trails are one of the best places to find ticks.



Ticks adhere to the felt flag. A historical record of the location, date, and species are recorded. If the tick is a Western black-legged tick, it will be tested for Lyme.

Lyme disease is a serious illness that if left untreated, can have severe long term health complications. Initial symptoms of Lyme disease may include a spreading rash which may be accompanied by fever, aches and fatigue. Possible future complications of the heart and/or nervous system may occur, as well as severe arthritis.



Lyme disease rash called erythema migrans or bull's-eye rash on arm.

Annual Report

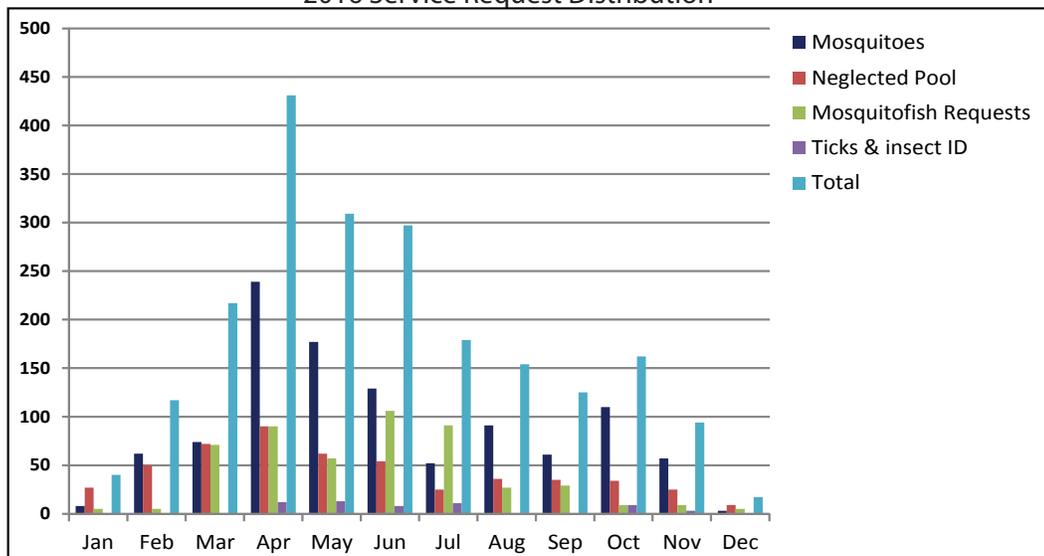
Appendix

Request for Service

The general public is encouraged to contact the District to request service. These requests generally are either to report a mosquito-related problem, request mosquitofish, inquire about information on ticks, insect/vector identification, or to request a property inspection. There is no charge for these services. San Joaquin County residents can call the District at (209) 982-4675 or 1-800-300-4675 or request service at the District's website www.sjmosquito.org. The District usually is able to respond within 24 to 48 hours. During the year the District responded to 2,142 service request calls.

	Mosquitoes		Ticks / Other		Fish		Property Inspection (Pools)	
	2015	2016	2015	2016	2015	2016	2015	2016
January	13	8	0	0	9	5	19	27
February	55	62	0	0	26	5	32	50
March	98	74	0	0	38	71	70	72
April	127	239	0	12	72	90	74	90
May	51	177	0	13	34	57	36	62
June	100	129	0	8	35	106	31	54
July	54	52	9	11	17	91	27	25
August	71	91	0	0	6	27	36	36
September	83	61	13	0	11	29	18	35
October	53	110	0	9	6	9	16	34
November	11	57	0	3	7	9	38	25
December	11	3	6	0	0	5	24	9
Total	727	1063	28	56	261	504	421	519

2016 Service Request Distribution



Financial

SAN JOAQUIN COUNTY MOSQUITO AND VECTOR CONTROL DISTRICT

**Statement of Revenues, Expenditures and Changes
in Fund Balance - Governmental Funds**

For the year ended June 30, 2016

	<u>General fund</u>
Revenues	
Property taxes	\$ 4,440,266
Property assessments	2,991,070
Property tax relief	88,211
Investment income	78,574
Reimbursements and rebates	52,548
Other revenues	<u>2,835</u>
Total revenues	<u>7,653,504</u>
Expenditures	
Operating	
Salaries and benefits	4,491,957
Services and supplies	2,585,893
Debt service	
Principal	2,936
Interest	164
Capital outlay	<u>288,446</u>
Total expenditures	<u>7,369,396</u>
Excess of revenues over expenditures	<u>284,108</u>
Other financing sources (uses)	
Proceeds from sale of capitol assets	<u>687,948</u>
Total financing sources (uses)	<u>687,948</u>
Net Change in fund balances	972,056
Fund balance, beginning of year	<u>11,707,247</u>
Fund balance, end of year	<u>\$12,679,303</u>

District Staff



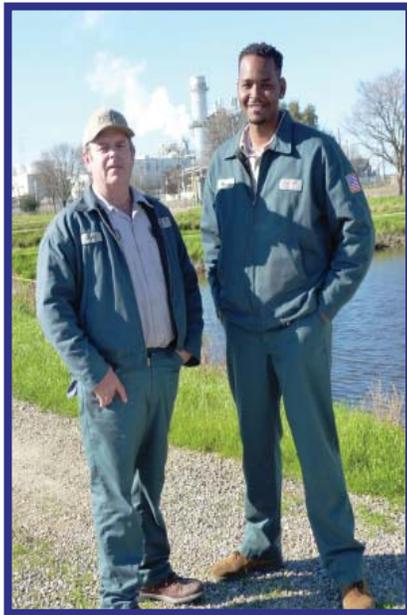
Management & Administrative Staff (left to right)

John Fritz - Assistant Manager, **Ed Lucchesi** - Manager,
Emily Nicholas - Bookkeeper / Administrative Assistant,
Aaron Devencenzi - Public Information Officer,
Jamie Tuggle - Secretary



Laboratory Staff (left to right)

Mary Iverson - Lab Technician I,
Sumiko De La Vega - Microbiologist Lab Technician II
David Smith - Assistant Entomologist,
Dr. Shaoming Huang - Entomologist,



Fishery Staff (left to right)

John Vignolo - Fish Hatchery Manager,
Harold Carpenter - Fish Hatchery Technician I



Mechanic Staff (left to right)

John Moniz - Mechanic I,
David Vana - Mechanic II

San Joaquin County Mosquito & Vector Control District



Northern Region (left to right)

Janine Durham- Mosquito Control Technician I (MCTI),
Keith Nienhuis- Mosquito Control Supervisor, **Sterling Thomas**- MCTI, **Adam Coles**- MCTI,
Deanna Hopkins- MCTII, **Greg Edwards**- MCTI, **Julian Ramos**- MCTI, **Chris Heirs**- MCTI,

Southern Region (left to right)

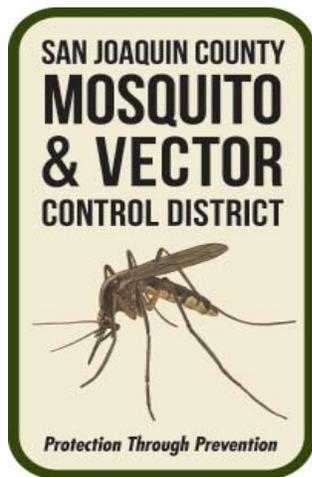
Michael Corrales Jr.- MCTI,
Brian Heine - Mosquito Control Supervisor, **Martin Jucutan** - MCTI, **Richard Domench** - MCTI,
Morgan Bennett- MCTII, **Michael Miller**- MCTI, **Roy Pfeifer**- MCTI



Central Region (left to right)

Dennis Keith- MCTI, **Joseph Sarale** - MCTI, **Norm Hopkins**- MCTI, **Bob Durham**- Mosquito Control Supervisor,
Emily Pope- MCTI, **Larry Nolin**- MCTII, **Steve Duke**- MCTI





7759 S. Airport Way
Stockton, CA 95206

209.982.4675 or
1.800.300.4675

www.sjmosquito.org