

*Providing 72 Years
of Service to
San Joaquin County*

◆ 2017

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

**Annual
Report**

Annual Report



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.org

San Joaquin County Mosquito & Vector Control District

Forward

On behalf of the Board of Trustees and staff of the San Joaquin County Mosquito and Vector Control District (District), I am pleased to submit the 2017 Operational and Fiscal Year Report. This report includes information on District administration and operations during the past year.

Financially, the District experienced a 3% increase in revenues from that of 2016, primarily due to an increase in property values and increases in commercial and residential real estate development. 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 mosquito species.

Operationally, staffing levels were maintained to meet the challenges of West Nile virus (WNV). For 2017 WNV activity was similar to that of 2016 regarding collected mosquitoes infected with the virus. Although higher mosquito vector populations were collected, the infection rate of those mosquitoes tested in 2017 was 5% less than that of 2016. In addition, there was a decrease in infection levels of recovered dead birds from that of 2016 and a decrease in horse cases from eight in 2016 down to two in 2017. Although statewide there was a decline of human cases, the number of confirmed human cases for San Joaquin County increased to 14, as compared to 12 cases in 2016. The District emphasizes virus detection in local mosquito populations in the efforts to prevent the further spread of mosquito-borne diseases. These efforts were extremely important during this past year.

In the early spring of 2017, the District was faced with the challenge of responding to mosquito breeding in the areas affected by the aftermath of the January and February storms. The affected areas were expansive, and required numerous aerial larvicide applications to control mosquito larvae found in these areas. The District's work was increasingly important, due to the fact that these locations were hot spots for WNV activity during the three previous years. We were faced with unforeseen challenges related to the damages from these storm events, and the necessity to educate our public regarding the mosquito control efforts along designated areas most affected by these storms and related flooding was crucial. The District's comprehensive approach to ensure the prevention of mosquito-borne virus located in or near the affected flood-lands proved to be successful when comparing the high mosquito vector populations to the percentage of WNV infection.

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 2017, the District continued the use of 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. We remain vigilant in the effort to consistently prevent the spread of WNV and annually evaluate our response strategies in preparation for the arrival of invasive mosquito species capable of spreading mosquito-borne diseases. 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 provides 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, to-wit:

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. This virus was first detected in San Joaquin County in 2004 and reached epidemic risk levels in 2005 - 2008 and 2012 - 2017.

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 | |



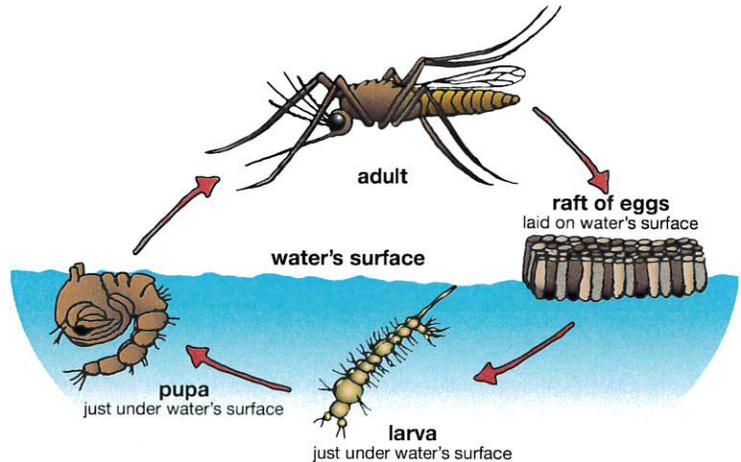
Aedes aegypti

“INVASIVE AEDES” MOSQUITOES - The Facts:

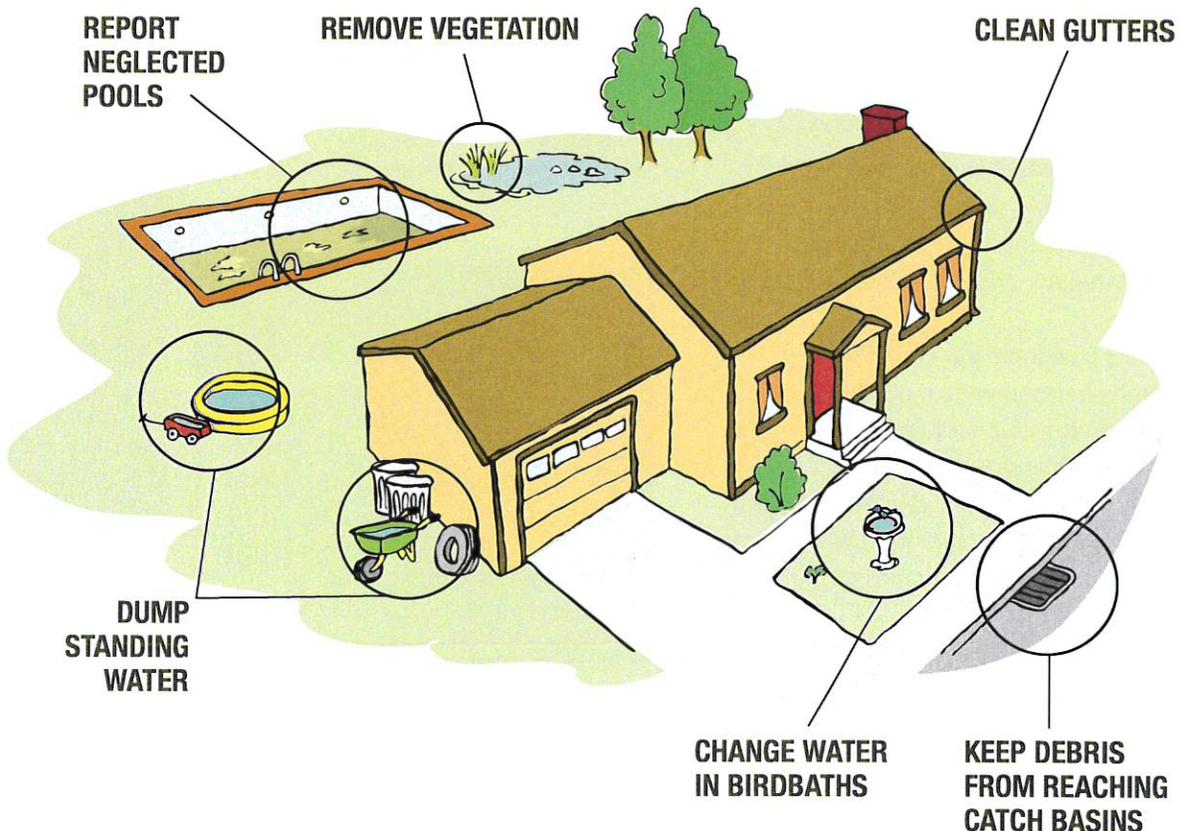
- **Invasive Aedes** refers to two mosquito species, *Aedes aegypti* and *Aedes albopictus*. These two species are found in many countries throughout the world.
- **The District** is currently providing surveillance to detect these invasive mosquitoes. No invasive mosquitoes were detected here in 2017.
- **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 knowledge base from which these methodologies were derived have matured, the technologies are 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, wildlife 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.



Chemical control includes treating cemetery urns to prevent mosquito development



Mosquitofish are the primary biological control used by the District



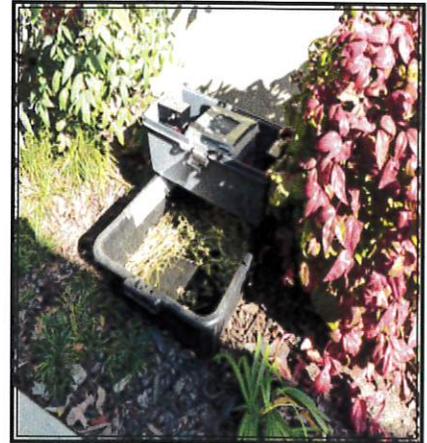
Education includes promoting physical control



Surveillance trap for mosquito population & disease surveillance

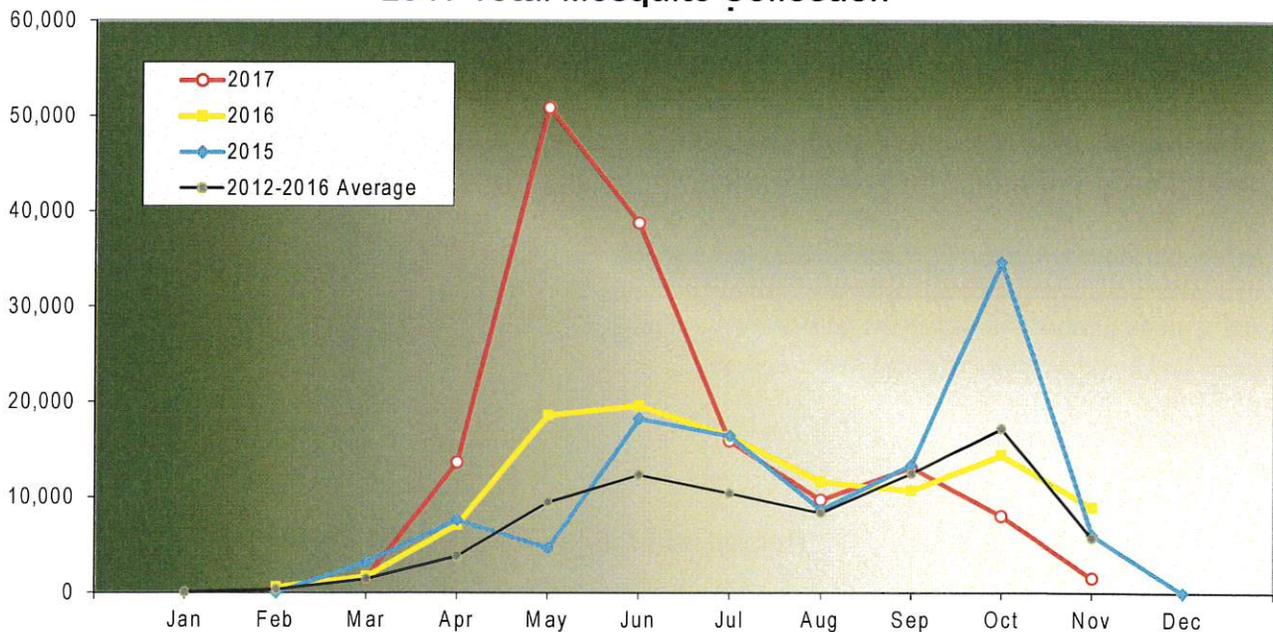
Mosquito Population Surveillance

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 system for compilation with other vector control agency data. In 2017, we collected record high numbers of mosquito vector populations since the arrival of WNV in 2004, with substantially higher mosquito numbers in the periods of April-June.



Gravid Trap

2017 Total Mosquito Collection



In 2017, The District expanded surveillance activity for invasive *Aedes aegypti* and *Aedes albopictus* mosquito species, which are vectors of Dengue, Chikungunya, Yellow Fever and Zika virus. The District deployed mosquito oviposition traps (Ovitrap and GAT traps) in approximately 138 locations in six cities that include residential neighborhoods, nurseries, the Port of Stockton, freight carriers, RV Parks, marinas, tire dealers/recyclers, cemeteries and public parks. These two mosquito species have been discovered in San Mateo County, Merced County, Fresno County, Tulare County, Madera County and Southern California, but have not been found in San Joaquin County.



Ovitrap

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 dead birds and groups of mosquitoes for the presence of pathogens within their bodies using quantitative RT-PCR. For many years, dead birds and mosquitoes have been the earliest indicators of WNV activity in San Joaquin County.

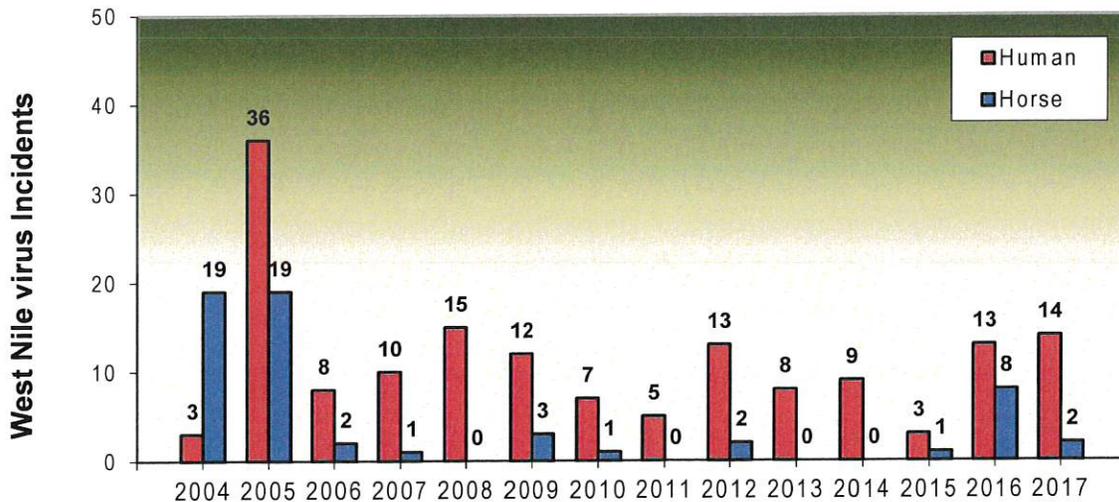
In San Joaquin County, WNV was first detected in 2004 with three human cases, followed by intensive amplification and transmission resulting in 36 human cases and 19 horse cases in 2005. WNV activity subsequently went through a pattern of 2-3 years of average or below average activity followed by 1-2 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 2017 year is considered a high WNV activity year in the pattern cycle. The mosquito vector populations reached a historical high and the number of mosquito samples positive for WNV was the second highest since 2004. Although the WNV minimum infection rate in mosquitoes was at an average level, the overall WNV transmission in San Joaquin County still reached and stayed at epidemic planning levels during most of the summer period. Consequently, there were 14 human cases and 2 equine cases reported in our county.



Mosquito Trap Collection

Human and Equine Cases, 2004 - 2017

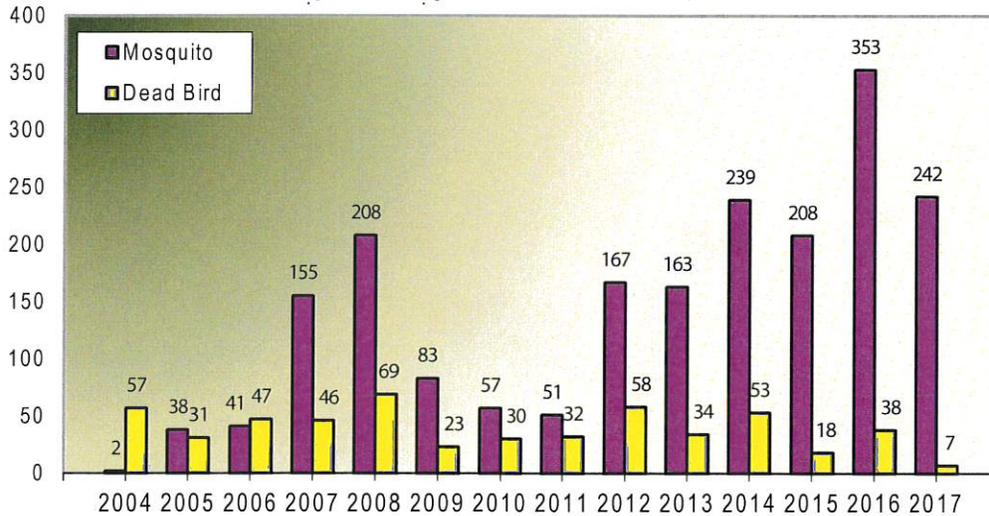


Mosquito-Borne Disease Surveillance

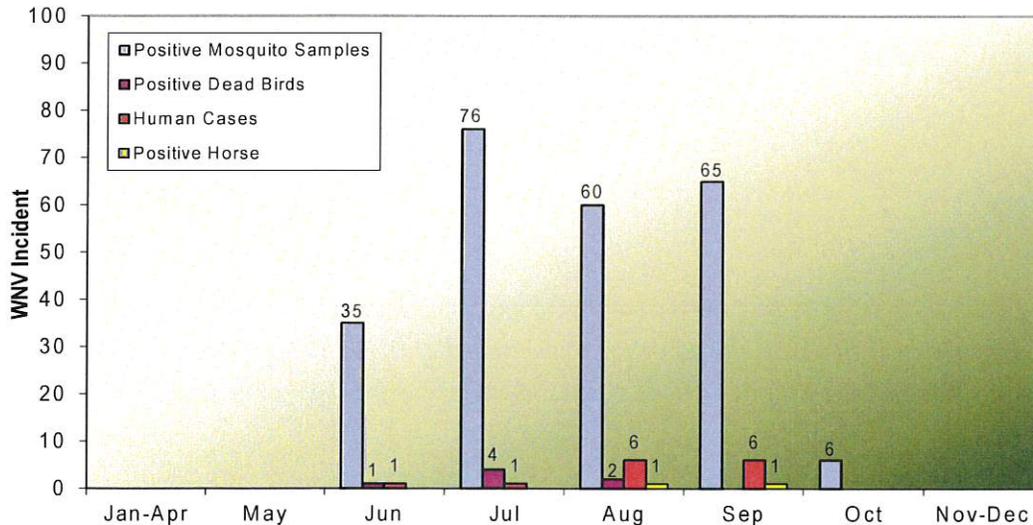
From 2004 to 2017, a total of 26,191 mosquito samples (pools) from nine different mosquito species were tested by VecTest™, RAMP® and/or RT-qPCR; of which there were 2,017 positive mosquito samples (7.70%) that were of species *Cx. tarsalis* (1,011), *Cx. pipiens* (983), *Cx. erythrothorax* (19) and *Ae. vexans* (4). In 2017, there were 2,975 mosquito samples tested for diseases, resulting in 242 collections being positive for WNV. In comparison, there were 353 out of 2,794 mosquito samples tested positive for WNV in 2016.

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 2017, the District received 13,767 dead bird reports and tested 1,861 birds, resulting in 543 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 2017, the District received 233 dead bird reports of which 40 able to be tested with 7 being WNV positive.

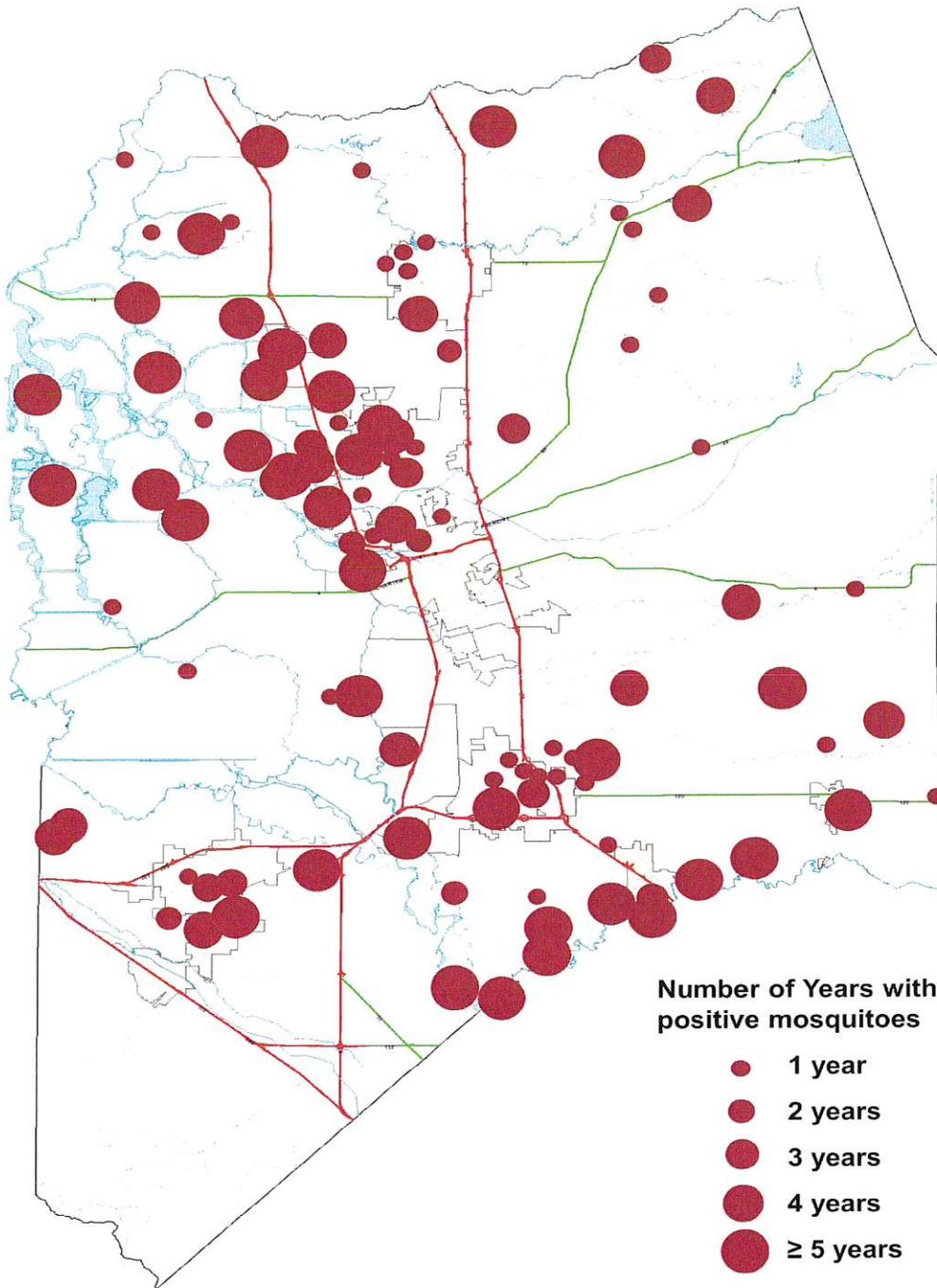
Positive Mosquito Samples and Dead Birds, 2004 - 2017



WNV Activity In San Joaquin County, 2017

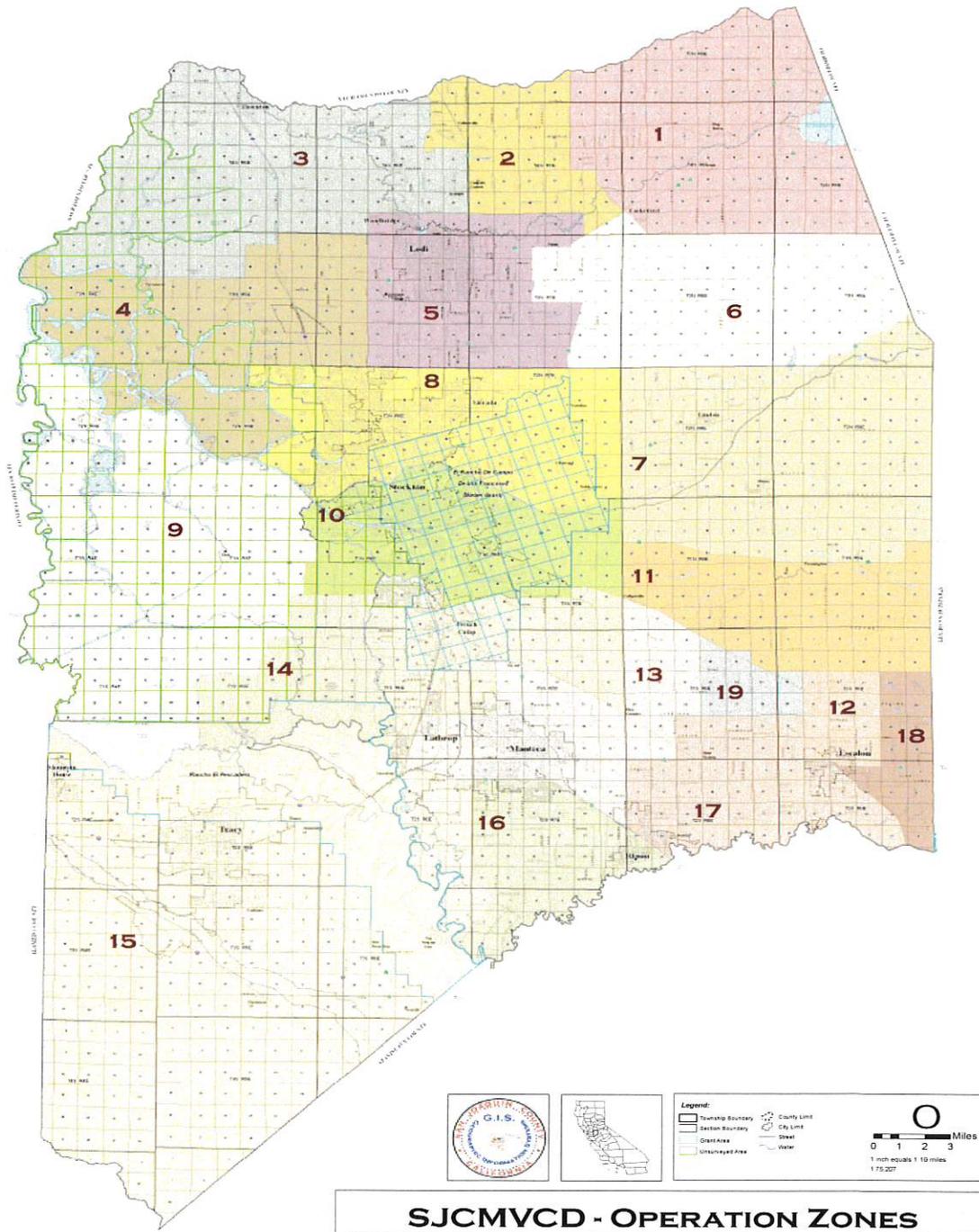


Geographic Distribution of WNV Activity in Mosquitoes San Joaquin County 2004 - 2017 (10 years)



Geographic mapping indicated that hot zones of WNV activity in mosquitoes are located in the Delta area, north portion of City of Stockton, City of Manteca, and along the southern border of San Joaquin County. The District will continue to employ robust and sensitive methods to monitor WNV activity in dead birds and mosquitoes.

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.

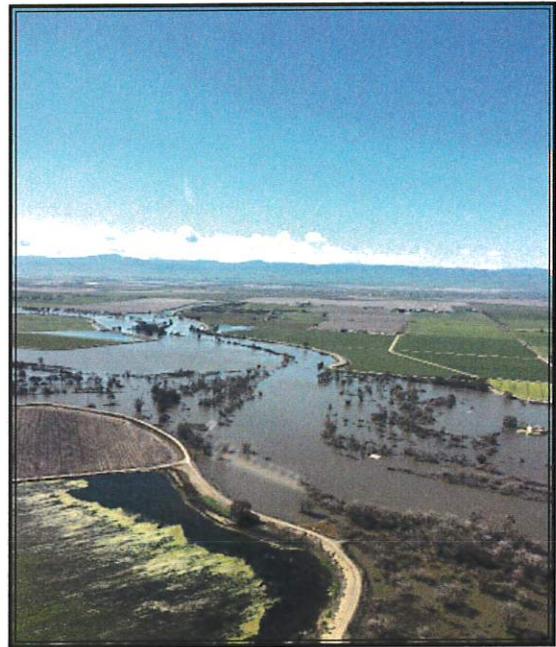
Flooding of 2017 - Special Report

Early in 2017, California began to see relief from one of the longest drought periods in recent history. For a local comparison, in 2016 from January through May, San Joaquin County received 6.4 - 15.8 inches of rain fall (average of low to high collection sites) compared to 10.6 - 28.1 inches received during the same time period in 2017. The result: rivers in SJC were at, or over, maximum water capacity which resulted in small levee breaks, seepage, and flooded low lands. Sierra reservoirs went from drought historic lows to full capacity. Water was released daily in preparation for additional storms.

Homes, resort areas, homeless camps, industrial and agricultural properties all flooded. The results were early high mosquito counts, consisting mainly of *Cx. tarsalis* and the potential for a high level of disease transmission.

A review of the District's surveillance records by California Department of Public Health showed "mosquito abundance in some of these areas was more than 2000-3000% higher than (the District's) five year averages of these locations. In particular, some of these areas were along the San Joaquin, Stanislaus, and Mokelumne Rivers and in the San Joaquin Delta." With the significance of this event, quick action was necessary.

Early on, aggressive control actions began to take place. Technicians were documenting and reporting vast flooded areas. In response, additional EVS surveillance traps were placed in areas of greatest concern. Mosquito control efforts regarding specific treatment areas were communicated to the public. A news release



South San Joaquin County river flooding.

titled "Mosquitoes-Storms-Flooding", and a flyer discussing mosquito prevention after the rain storms, were sent via social media. The released information was well covered by local media.

In addition, Q&A talking points were developed for District employees to use when encountering the public. The San Joaquin County Office of Emergency Services (SJCOES) offered the District assistance with on-going communication on emergency conditions. As weather warmed, Sierra snow melt filled the reservoirs and water was released to already full rivers and tributaries. As a result, *Cx. tarsalis* numbers began to spike, prompting ground and aerial control applications.

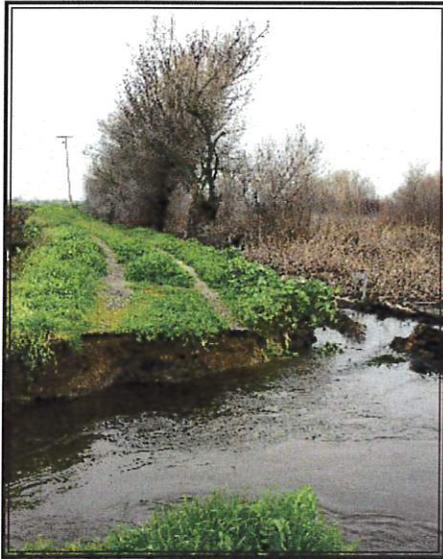
Aerial larviciding and adulticiding occurred along the Mokelumne, San Joaquin and Stanislaus Rivers, as well as Delta island flood-lands. The District spent a total of \$321,493 to treat 42,571 acres, as compared to the last three year average costs (January 1 - June 30 of 2014 - 2016) of \$9,866 to treat 40.3 acres.



Portion of Thornton underwater.

Flooding of 2017 - Special Report

In early March, Governor Brown declared a State of Emergency in San Joaquin County in response to the February storms. Working with CalOES, a “Project” application was completed. After President Trump approved a Major Disaster Declaration, a subsequent request for public assistance was developed. FEMA began working with the District in developing a “scope of work” that required numerous supportive documentation. While working with FEMA, it became apparent that FEMA often handles “single event disaster”, but the winter storms continued to have affects through June due to the amount of snow melt released from the reservoirs which continued to sustain high water levels in the rivers.



River levee break in north San Joaquin County

In summary, *Cx. tarsalis* populations surged early in the year due to fresh water sources as a result of increased rainfall throughout SJC. It appears that the high *Cx. tarsalis* counts may have contributed to an earlier than normal WNV positive human case. The District’s comprehensive efforts resulted in a reduction of the overall *Cx. tarsalis* population. By week 24, June 11, 2017, the *Cx. tarsalis* population was back within the normal range for these affected areas.

Ultimately our goal of protecting human health from mosquito-borne disease was accomplished when compared to past yearly comparisons. During the drought year of 2016, 13 WNV positive human cases were reported in SJC. In 2017, 14 human cases were reported in SJC. The District discovered new potential mosquito breeding sites to monitor during future flood events. District staff is now more experienced in handling such situations. Ultimately, we were able to minimize the early *Cx. tarsalis* populations and protect human health during the 2017 flood event.

On April 17, 2017 a second news release was sent out titled “Wet Weather Is Resulting In Many Mosquitoes and Other Bugs”. The news release was well received, being reported on television, newspapers and public radio. An ad was placed in the San Joaquin Farm Bureau newspaper, as well as Her Life magazine. Contracted radio and electronic billboards began to run “Dump and Drain” ads targeted at homeowners to help keep mosquito numbers down.

In every disaster event, there are unforeseen situations that need to be addressed. As flood waters continued to spread to low land areas, new mosquito development areas emerged. This created a challenge in accessing, documenting and subsequently treating these new locations. Drastic fluctuations in river flows created additional problems regarding treatment. Applying chemicals with varied residual activity became a guessing game. Receding flood areas were treated with residual mosquito control products, only to be prematurely washed away when water was released from reservoirs preparing for additional storms.

MOSQUITO PREVENTION AFTER RAIN STORMS AND FLOODING

HEAVY RAIN STORMS AND POTENTIAL FLOODING CAN LEAD TO INCREASED MOSQUITO DEVELOPMENT

With more rain, comes more mosquitos and a higher risk for mosquito-borne disease. Early prevention will reduce mosquitoes as the weather gets warmer. To reduce the ideal environments for mosquitoes to develop, we recommend the following mosquito control tips after storms and floods.

DRAIN WATER FROM YOUR PROPERTY

- Clear debris from drain ditches to allow water flow
- Cut small ditches to drain water off your property
- Remove rainwater from empty swim pools.

REMOVE DEBRIS FROM YOUR PROPERTY

- Mosquitoes can develop in less than a tablespoon of water.
- Remove tarps, tires, plastic containers, tin cans, jars, buckets, etc.
- Remove any standing water under your home and in your basement.

CHECK FOR OTHER MOSQUITO DEVELOPMENT SITES

- Repair broken pipes and sprinklers
- Clean rain gutters.
- Dump water from items stored outside including kiddie pools, wheelbarrows, bird baths and plant saucers.
- Rain barrels need to be properly screened or capped and leak free

AVOID MOSQUITO BITES

- Apply a repellent that contains DEET, Picaridin, IR3535®, or Oil of Lemon Eucalyptus. **Make sure to follow label instructions!**
- Wear protective clothing, such as long sleeved shirts and pants.
- Check and repair all screens and doors to keep mosquitoes out of your house.
- Minimize outdoor activities at dusk and dawn when mosquitoes are most active.

For additional help, contact the District at:
209.982.4675 or 1.800.300.4675 or visit our website www.sjmosquito.org

The final FEMA project worksheet, with supporting documentation was submitted to Washington D.C. for funding in September, 2017.

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, annual reports, website posting, paid newspaper ads, radio and magazine ads, as well as school presentations and informational booths to accomplish that goal.

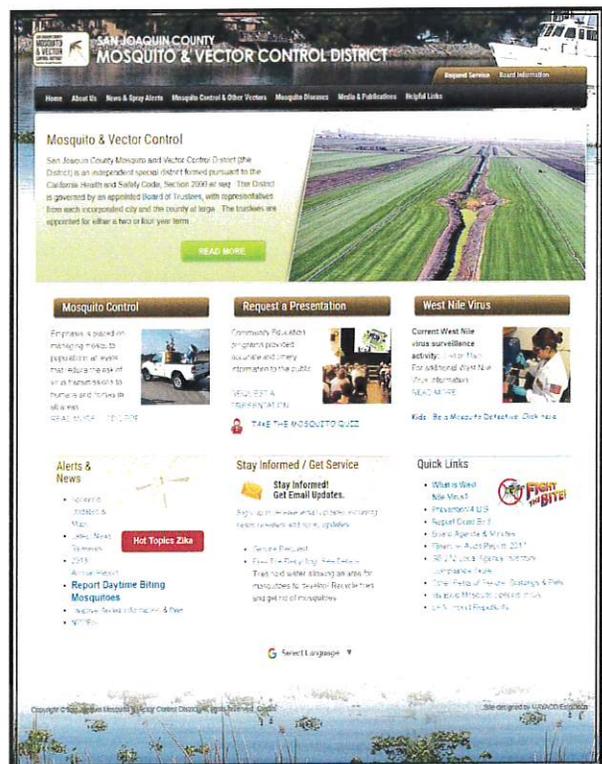
The following are the most notable outreach activities the District performed during 2017:

Large scale radio campaigns aim to increase awareness of mosquito development, mosquito-borne disease and invasive mosquito species. The District contracted with local radio stations to run 30 second ads on KATM 103.3, KWIN 97.7, KWNN 98.3 and KQOD 100.1. Also included in the purchase were two Hispanic stations KMIX 100.9, and KTSE 97.1. Partnering with Merced and Turlock Mosquito Abatement Districts, 645 commercials and 90 traffic spots were contracted to run from April through mid-September. The District also contracted to run 398 commercials on a local station KJOY 99.3 and KSTN 105.9 during the same time period. Live interviews were provided on KJOY, KATM, KSTE, KMIX, KTSE.

Special project: Because of the rapid movement of invasive mosquitoes in California, a public education campaign started mid-summer through October. Early detection of *Aedes aegypti* and *Aedes albopictus* may help to prevent these mosquitoes from becoming established in San Joaquin County. Radio ads, digital billboards, newspaper ads and magazine publications included the message, "Report Daytime Biting Mosquitoes".

The District website is posted with all news releases and news alerts for adult mosquito spraying. As a result, we interviewed eight times with radio, newspaper and television. We received several front page newspaper articles, as well as, radio, and television coverage. Frequently, local papers print many of our spray notifications. 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 47 spray alerts were sent. The website had 108,138 total visitors for the entire year, which averages 9,011 visitors per month. This is an increase of 43,163 visitors from 2016.

- Third grade students participating in three Ag Venture programs: 58 presentations with 1,486 students in attendance
- Fifth and sixth grade elementary students: 36 presentations with 61 classes in attendance totaling 1,829 students
- Presentations were provided to the Central Valley Association of Realtors, and the Stockton Rotary at the Stockton Country Club.
- 115 contacts were made during the District's ninth annual mosquitofish giveaway held throughout San Joaquin County
- Educational Booths and Events: Earth Day, Senior Awareness Day at San Joaquin Fair Grounds, Ag Fest and San Joaquin County Fair, Costco Safety Day, 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 the 2017 floods, as well as the District's mosquitofish giveaway.



San Joaquin County Mosquito & Vector Control District

Public Outreach

AFTER ALL THE RAIN, IT'S TIME TO PREVENT MOSQUITOES!

SAN JOAQUIN COUNTY MOSQUITO & VECTOR CONTROL DISTRICT

DUMP AND/OR DRAIN WATER AROUND YOUR PROPERTY.

Look for anything that can hold water for more than a few days. Buckets, dirty, neglected swimming pools, tires, trash cans, and rain gutters are some examples of areas where water stands and mosquitoes develop.

Call the District for free mosquitofish in abandoned pools and ponds.

For help or questions call San Joaquin County Mosquito & Vector Control District at: 209.982.4675, 800.300.4675 or visit our website: www.sjmosquito.org

Magazine Ad

News Release

For Immediate Release
June 9, 2017
9417-03

Aaron Deversenzi
Public Information Officer
Office: (209) 982-4675

LOCAL AREA MOSQUITOES TEST WEST NILE VIRUS POSITIVE
First find of West Nile Virus activity in San Joaquin County for 2017

(STOCKTON, CA) – San Joaquin County Mosquito and Vector Control District's (District) mosquito-borne disease surveillance program confirmed West Nile virus (WNV) positive mosquito samples found in trap codes 95366 and 95337. This is the first find of WNV in San Joaquin County for 2017. "This first serve as a reminder that mosquitoes carry disease that can harm humans. The District does its part in controlling mosquitoes, however mosquito control is everyone's responsibility," said Ed Lucchesi, Manager of the District. "Adult mosquito control activities will increase in accordance with our surveillance results," said Lucchesi.

With the past winter flooding followed by intermittent warm weather and sporadic rains, it is important that people protect themselves from mosquito bites. Residents and visitors of San Joaquin County can reduce their risk of WNV infection and other mosquito-transmitted diseases by taking these precautions:

- Eliminate all sources of standing water on your property that can support mosquito breeding.
- Apply insect repellent containing the active ingredients DEET or Picaridin when outdoors, according to label instructions.
- Avoid spending time outside when mosquitoes are most active, at dawn and dusk, and especially for the first two hours after sunset.
- When outdoors, wear long pants, long-sleeved shirts and other protective clothing.
- Exclude mosquitoes from your home with tight fitting screens on doors and windows.
- Contact your veterinarian for information on vaccinating equine against WNV.
- Report significant mosquito infestations to San Joaquin County Mosquito & Vector Control District at www.sjmosquito.org (209) 982-4675, 1-800-300-4675.
- Report dead birds and tree squirrels to 1-877-WNV-BIRD (1-877-968-3473) or www.wnvmc.ca.gov.

For additional information, request service and/or to sign up for the District's spray notification system, go to www.sjmosquito.org

7755 S. AIRPORT WAY STOCKTON, CALIFORNIA 95206 2018
(209) 982-4675 FAX (209) 932-9125 www.sjmosquito.org

News Release

REPORT DAYTIME BITING MOSQUITOES! **EXPAND**

SAN JOAQUIN COUNTY MOSQUITO & VECTOR CONTROL DISTRICT

REPORT DAYTIME BITING MOSQUITOES!

San Joaquin County Mosquito & Vector Control District is asking your help to prevent invasive mosquitoes!

Invasive mosquito species are not native to the area and their introduction is likely to cause harm to human health.

Facts:

- Aedes aegypti and Aedes albopictus are aggressive daytime biters.
- These urban dwelling mosquitoes prefer to bite humans both indoors and outdoors.
- Once established, these mosquitoes are difficult to control.
- They are potential carriers of diseases like Zika, dengue and chikungunya.

Click here for more information and to report mosquitoes

Online Newspaper Banner and Drop-down Ad

SAN JOAQUIN COUNTY MOSQUITO & VECTOR CONTROL DISTRICT

MOSQUITOES - STORMS - FLOODING
Time to Remove Standing Water!

Early prevention will help reduce mosquitoes and mosquito-borne diseases as the weather becomes warmer. We need your help and cooperation.

Clear debris from drain ditches to allow water to drain. Drain water off of flooded land. Remove water from tires, buckets, jars, cans, farm containers and equipment.

Call the District if there are problem areas where water can't be removed.

Contact: San Joaquin County Mosquito and Vector Control District for additional information:
209.982.4675 • 800.300.4675
or visit our website www.sjmosquito.org

San Joaquin Farm Bureau Newspaper

INVASIVE MOSQUITO SPECIES?

Invasive mosquito species are not native to the area and their introduction is likely to cause harm to human health.

FACTS:

- Aedes aegypti and Aedes albopictus are aggressive daytime biters.
- These urban dwelling mosquitoes prefer to bite humans both indoors & outdoors.
- These mosquitoes like to feed on ankles, wrists and elbows.
- They lay eggs in small amounts of water. The eggs can survive for a long time on the surface of containers.
- Once established, these mosquitoes are difficult to control.
- They are potential carriers of diseases including Zika, dengue and chikungunya.

The District is actively trapping for these invasive Aedes mosquito. Public call-ins are very important! Report mosquitoes biting during the day and other mosquito problems to San Joaquin County Mosquito & Vector Control District.

FOR MORE INFORMATION, TO REPORT MOSQUITOES, OR TO REQUEST SERVICE:
www.sjmosquito.org | 209.982.4675 or 800.300.4675

Magazine Ad

San Joaquin County Mosquito & Vector Control District

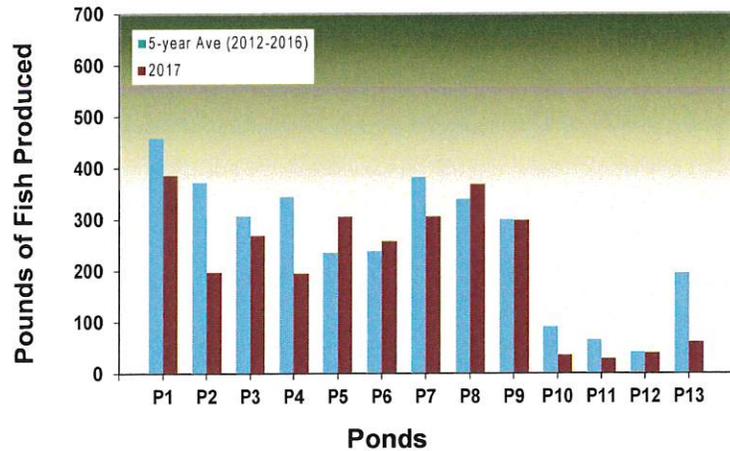
Biological Control

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 distribution 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
2017	White Slough	763.1 lbs.	524.7 lbs.	37.2 lbs.	690.4 lbs.	100.61 lbs.	48 lbs.
	Wild Fish	0 lbs.	0 lbs.	5 lbs.	0 lbs.	18.5 lbs.	15.4 lbs.
5 Yr. Avg. 2012-2016	White Slough	1429.6 lbs.	397.9 lbs.	80.3 lbs.	558.6 lbs.	614.48 lbs.	176.2 lbs.
	Wild Fish	20.8 lbs.	1.8 lbs.	13.0 lbs.	0 lbs.	58.0 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” 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.



Discarded tires collect rain water resulting in prime mosquito development sources.

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.

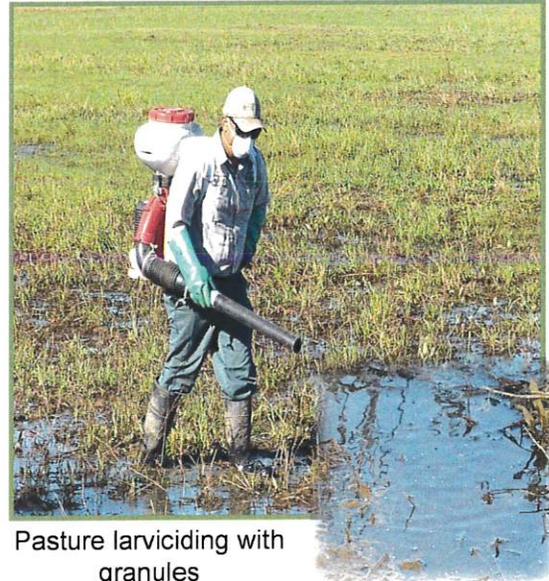
Chemical Control

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.

The chart below shows larviciding and adulticiding for 2017 with a comparison to a five year average. For acres treated with herbicide, see the table below the graph.



Larvicide & Adulticide Applications In Acres Treated

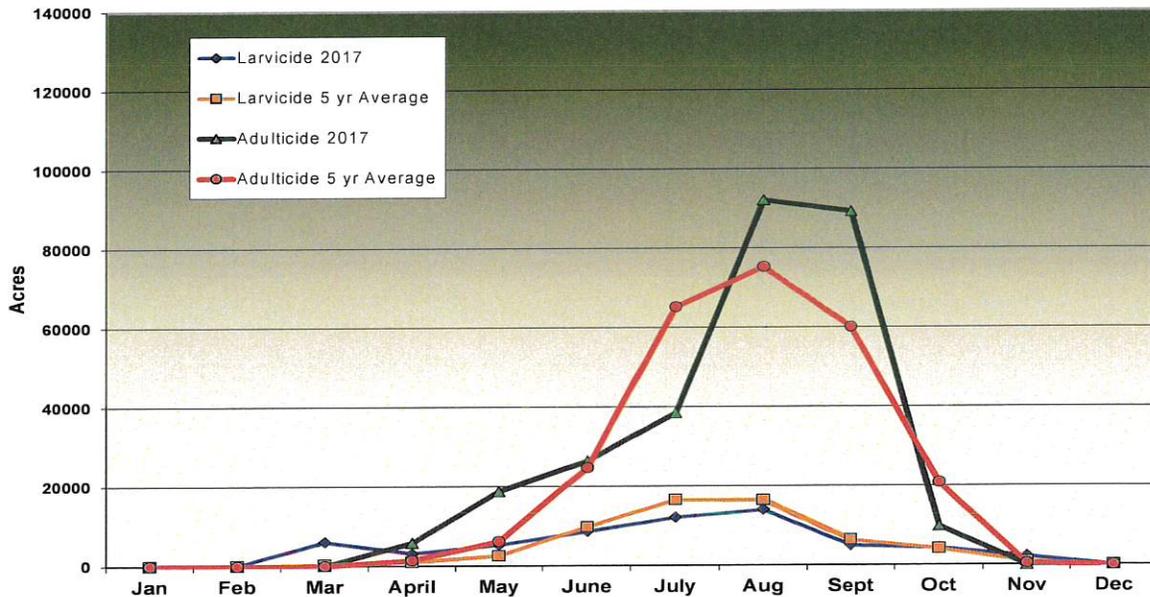


Table is in acres treated	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Larvicide 2017	10	142	6082	3140	5331	8636	12147	14038	5007	4400	2237	11
Larvicide 5 yr. avg.	25	133	434	1054	2603	9800	16600	16476	6439	4168	915	16
Adulticide 2017	0	1	25	5825	18775	26397	38447	92089	89236	9822	1	1
Adulticide 5 yr. avg.	0	3	8	1455	6181	24690	65232	75313	60077	20869	414	1
Herbicide 2017	72	21	54	46	161	56	93	93	6	7	47	98
Herbicide 5 yr. avg.	26	67	107	76	109	62	132	129	31	36	15	36

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 San Joaquin county.

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.

In 2017, tick surveillance was performed at Camanche Reservoir and Carnegie Park. This year 10 male and 12 female *Dermacentor occidentalis* (Pacific Coast tick) ticks were collected. The District received a public specimen submission of Lyme disease tick *Ixodes pacificus* (the Western black-legged tick), which tested negative for Lyme disease.



Ixodes pacificus
Western Black-legged Tick



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.



Example of a Lyme disease rash called erythema migrans or bull's-eye rash on arm

Annual Report

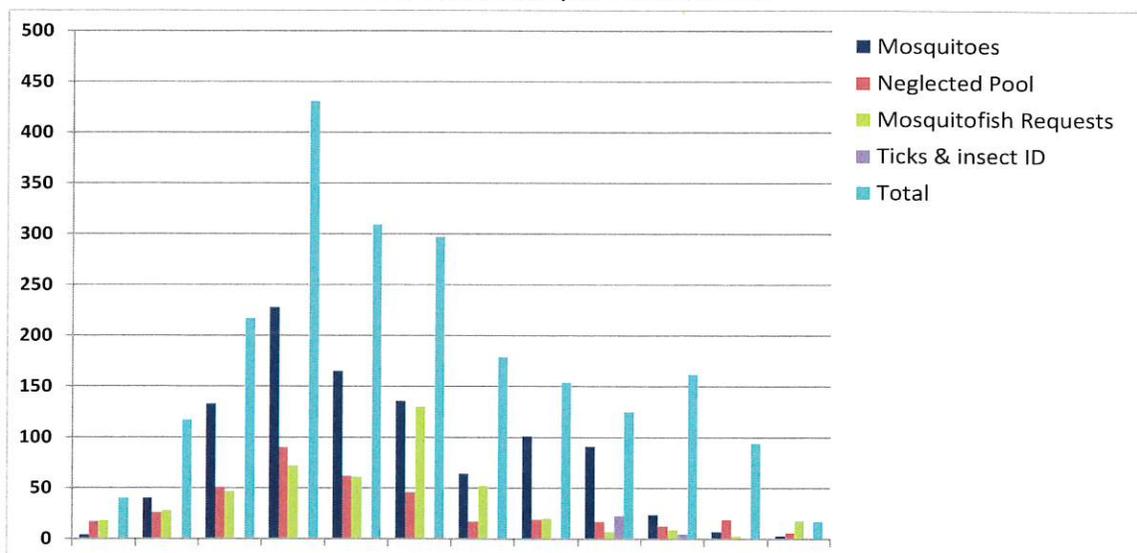
Appendix

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 1,872 service request calls.

	Mosquitoes		Ticks / Other		Fish		Property Inspection (Pools)	
	2017	2016	2017	2016	2017	2016	2017	2016
January	4	8	0	0	18	5	17	27
February	40	62	0	0	28	5	26	50
March	133	74	0	0	47	71	51	72
April	228	239	0	12	72	90	90	90
May	165	177	0	13	61	57	62	62
June	136	129	0	8	130	106	46	54
July	64	52	0	11	52	91	17	25
August	101	91	0	0	20	27	19	36
September	91	61	23	0	7	29	17	35
October	24	110	5	9	9	9	13	34
November	7	57	0	3	3	9	19	25
December	3	3	0	0	18	5	6	9
Total	996	1063	28	56	465	504	383	519

2017 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, 2017

	<u>General fund</u>
Revenues	
Property taxes	\$ 4,773,561
Property assessments	3,011,111
Grant revenue	109,904
Investment income	95,990
Property tax relief	94,289
Reimbursements and rebates	56,232
Other revenues	<u>2,289</u>
Total revenues	<u>8,143,376</u>
Expenditures	
Operating	
Salaries and benefits	4,159,642
Services and supplies	2,992,211
Debt service	
Principal	3,004
Interest	96
Capital outlay	<u>262,393</u>
Total expenditures	<u>7,417,346</u>
Excess of revenues over expenditures	<u>726,030</u>
Other financing sources (uses)	
Proceeds from sale of capitol assets	<u>11,900</u>
Total financing sources (uses)	<u>11,900</u>
Net Change in fund balances	737,930
Fund balances, beginning of year	<u>12,679,303</u>
Fund balance, end of year	<u>\$13,417,233</u>

Excerpt from page 15 of the Financial Statements And Independent Auditor's Report 2017

Annual Report

District Staff - Years of Service as of December 31, 2017

Fishery Staff

John Vignolo - Fish Hatchery Manager, 27 yrs.
Harold Carpenter - Fish Hatchery Technician I, 1 yr.

Field Staff -Northern Region

Keith Nienhuis - Mosquito Control Supervisor, 29 yrs.
Chris Heirs - Mosquito Control Technician II (MCT II) 10 yrs.
Janine Durham - MCT I, 12 yrs.
Sterling Thomas - MCT I, 3 yrs.
Adam Coles - MCT I, 2 yrs.
Greg Edwards - MCT I, 10 yrs.
Juilan Ramos - MCT I, 3 yrs.
Norm Hopkins - MCT I, 13 yrs.

Field Staff - Central Region

Deanna Hopkins- Mosquito Control Supervisor, 17 yrs.
Bob Durham - Mosquito Control Supervisor, (Retired 30 yrs.)
Larry Nolin - MCT II, 33 yrs.
Dennis Keith - MCT I, 32 yrs.
Joseph Sarale - MCT I, 10 yrs
Emily Pope - MCT I, 8 yrs
Steve Duke - MCT I, 11 yrs
Josh Diaz - MCT I, 1 yr

Field Staff - Southern Region

Morgan Bennett - Mosquito Control Supervisor, 9 yrs.
Brian Heine - Mosquito Control Supervisor, (Retired 35 yrs.)
Martin Jucutan - MCTII, 4 yrs.
Michael Corrales Jr.- MCT I, 10 yrs.
Richard Domench - MCT I, 3 yrs
Michael Miller - MCT I, 3 yrs.
Roy Pfeifer - MCT I, 19 yrs.

Laboratory Staff

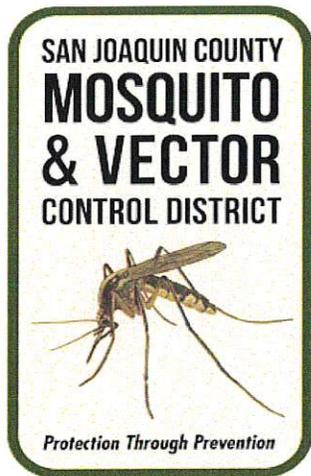
Dr. Shaoming Huang - Entomologist, 8 yrs
Sumiko De La Vega - Assistant Entomologist, 4 yrs.
Mary Iverson - Lab Technician I, 19 yrs.
Adena Why - Vector Ecologist, 1 yr.

Management & Administrative Staff

Ed Lucchesi - Manager, 32 yrs
John Fritz - Assistant Manager, 5 yrs.
Jamie Tuggle - Secretary, 3 yrs.
Aaron Devencenzi - Public Information Officer, 23 yrs.
Emily Nicholas - Bookkeeper / Administrative Asst., 15 yrs.

Mechanic Staff

David Vana - Mechanic II, 22 yrs.
John Moniz - Mechanic I, 8 yrs.



7759 S. Airport Way
Stockton, CA 95206

209.982.4675 or
1.800.300.4675

www.sjmosquito.org