



**SAN DIEGO COUNTY VECTOR CONTROL PROGRAM**  
**MOSQUITO, VECTOR AND DISEASE CONTROL ASSESSMENT**

**ENGINEER'S REPORT**

FISCAL YEAR 2016-17

MAY 2016

PURSUANT TO THE GOVERNMENT CODE, HEALTH AND SAFETY CODE AND  
ARTICLE XIID OF THE CALIFORNIA CONSTITUTION

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**COUNTY OF SAN DIEGO DEPARTMENT OF ENVIRONMENTAL HEALTH, VECTOR CONTROL PROGRAM**

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## INTRODUCTION

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### OVERVIEW

The San Diego County Vector Control Program ("VCP" or "Program") exists within the County of San Diego Department of Environmental Health ("DEH"). The VCP is responsible for mosquito and vector-borne disease surveillance and control services in all 18 incorporated cities and the unincorporated areas of San Diego County. The VCP has been reducing and controlling mosquitoes and other vectors, and protecting against vector-borne diseases for over 30 years. It is managed by County staff and is governed by the San Diego County Board of Supervisors (Board).

The VCP's core services include:

1. Early detection of public health threats through comprehensive vector surveillance.
2. Control and reduction of vectors and exposure to vectors that transmit diseases to humans.
3. Disseminating public health information to provide property owners with empowering tools for active involvement in prevention, protection, and reporting.
4. Appropriate timely response to vector-related customer complaints.
5. Rapid detection of vector-borne pathogens.

Since 1989 funding for the VCP was primarily from a service charge levied against all parcels in the County. When Proposition 218 was passed in 1996 it froze the service charge at \$3.00 for the Coastal Region and \$2.28 for both Inland Regions. This service charge provided limited funding that was not sufficient for the level of mosquito, vector and disease control services desired. In 2005 a new benefit assessment for improved mosquito, vector and disease control services was approved by property owners within the County of San Diego. This new mosquito, vector and disease control assessment was first levied in fiscal year 2005-06 and is continued annually thereafter. This Engineer's Report ("Report") defines the benefit assessment, which provides funding for the mosquito, vector and disease control services throughout the San Diego County ("Assessment Area"). It also provides funding for necessary equipment, capital improvements, services, facilities, and incidentals for mosquito and vector control programs that would be funded for fiscal year 2016-17.

### ASSESSMENT FORMATION

In order to allow property owners to ultimately decide whether funding should be provided for improved mosquito, vector and disease control services, the Board authorized the initiation of proceedings for a benefit assessment in 2005. The assessment was named the Mosquito, Vector and Disease Control Assessment (the "Assessment"). In May and June of 2005, the VCP conducted an assessment ballot proceeding pursuant to the requirements of Article XIID of the California Constitution ("The Taxpayer's Right to Vote on Taxes Act") and the Government Code. During this ballot proceeding, owners of property in the

Assessment Area were provided with a notice and ballot for the proposed benefit assessment. A 45-day period was provided for balloting. A public hearing to conclude the balloting period was conducted on June 22, 2005. The final balloting result was 61.46% weighted support from ballots returned. (Weighted support in excess of 50% is required for the establishment of a new benefit assessment.)

As a result of this support by property owners, the Board gained the authority to approve the levy of the assessments for fiscal year 2005-06 and to continue to levy them in future years. The Board took action by Resolution No. 05-017 passed on July 13, 2005, to approve the first year levy of the assessments for fiscal year 2005-06. The authority granted by the ballot proceeding was for a first year assessment rate of \$8.55 per single family equivalent benefit unit, increased each subsequent year by the San Diego Area CPI (Consumer Price Index) not to exceed 5% per year.

### ASSESSMENT DESCRIPTION

Prior to the Assessment, the VCP provided a “baseline” level of mosquito, vector and rat surveillance services in the County. The services funded by the continuation of the Assessment consist of expanded and improved services, as listed below, over and above the prior baseline level of services.

The Assessment Area, which is coterminous with the County boundaries, includes only those properties that may request and/or receive direct and more frequent service, that are located within the scope of the vector surveillance area, that are located within flying or traveling distance of potential vector sources monitored by the VCP, and that will benefit from a reduction in the amount of vectors reaching and impacting the property as a result of the enhanced vector surveillance and control. The Assessment Diagram included in this report shows the boundaries of the Assessment Area.

The following is an outline of the primary programs, projects, services, and improvements (collectively “Services”) that are funded by the Mosquito, Vector and Disease Control Assessment:

- Mosquito surveillance
- Mosquito control through treatment of mosquito breeding sources
- Public Education/Outreach through the media, and presentations to schools and civic groups
- Emergency Response to disasters and recovery efforts; vector control and surveillance actions
- Provide direction to property owners for control and remediation of habitat or vegetation supporting mosquito breeding
- Distribute mosquito fish for backyard fish ponds and other appropriate habitats
- Rodent-borne and tick-borne disease surveillance
- Surveillance for emerging and historical vector-borne diseases
- Response to service requests and complaints regarding mosquito and fly breeding sources and the presence of rats

- Identification of mosquitoes, ticks, and other arthropods for businesses and the public

As used within this Report for 2016, the following terms are defined:

*“Vector” means any animal capable of transmitting the causative agent of human disease. “Vector” also includes eye gnats. (Title 6, San Diego County Code of Regulatory Ordinances Section 64.202(f)).*

*“Vector Control” means any system of public improvements or services that is intended to provide for the surveillance, prevention, abatement and control of vectors as defined in subsection (h) of Section 64.202 of the San Diego County Code of Regulatory Ordinances.*

The VCP operates under the authority of the Mosquito Abatement and Vector Control District Law of the State of California law. The following are excerpts from the Mosquito Abatement and Vector Control District Law of 2002, codified in the Health and Safety Code, Section 2000, et seq. which serve to summarize the State Legislature's findings and intent with regard to mosquito abatement and other vector control services:

*2001.(a) The Legislature finds and declares all of the following:*

*(1) California's climate and topography support a wide diversity of biological organisms.*

*(2) Most of these organisms are beneficial, but some are vectors of human disease pathogens or directly cause other human diseases such as hypersensitivity, envenomization, and secondary infections.*

*(3) Some of these diseases, such as mosquitoborne viral encephalitis, can be fatal, especially in children and older individuals.*

*(4) California's connections to the wider national and international economies increase the transport of vectors and pathogens.*

*(5) Invasions of the United States by vectors such as the Asian tiger mosquito and by pathogens such as the West Nile virus underscore the vulnerability of humans to uncontrolled vectors and pathogens.*

*(b) The Legislature further finds and declares:*

*(1) Individual protection against the vectorborne diseases is only partially effective.*

*(2) Adequate protection of human health against vectorborne diseases is best achieved by organized public programs.*

*(3) The protection of Californians and their communities against the discomforts and economic effects of vectorborne diseases is an essential public service that is vital to public health, safety, and welfare.*

*(4) Since 1915, mosquito abatement and Vector Control Districts have protected Californians and their communities against the threats of vectorborne diseases.*

*(c) In enacting this chapter, it is the intent of the Legislature to create and continue a broad statutory authority for a class of special districts with the power to conduct effective programs for the surveillance, prevention, abatement, and control of mosquitoes and other vectors.*

*(d) It is also the intent of the Legislature that mosquito abatement and Vector Control Districts cooperate with other public agencies to protect the public health, safety, and welfare. Further, the Legislature encourages local communities and local officials to adapt the powers and procedures provided by this chapter to meet the diversity of their own local circumstances and responsibilities.*

Further the Health and Safety Code, Section 2082 specifically authorizes the creation of benefit assessments for vector control, as follows:

*A district may levy special benefit assessments consistent with the requirements of Article XIIC of the California Constitution to finance vector control projects and programs.*

## LEGAL ANALYSIS

### PROPOSITION 218

This assessment was formed consistent with Proposition 218, The Right to Vote on Taxes Act, which was approved by the voters of California on November 6, 1996, and is now Article XIIC and XIID of the California Constitution. Proposition 218 provides for benefit assessments to be levied to fund the cost of providing services, improvements, as well as maintenance and operation expenses to a public improvement which benefits the assessed property.

Proposition 218 describes a number of important requirements, including a property-owner balloting, for the formation and continuation of assessments, and these requirements were satisfied by the process used to establish this assessment. When Proposition 218 was

initially approved in 1996, it allowed for certain types of assessments to be “grandfathered” in, and these were exempted from the property-owner balloting requirement.

*Beginning July 1, 1997, all existing, new, or increased assessments shall comply with this article. Notwithstanding the foregoing, the following assessments existing on the effective date of this article shall be exempt from the procedures and approval process set forth in Section 4:*

*(a) Any assessment imposed exclusively to finance the capital costs or maintenance and operation expenses for sidewalks, streets, sewers, water, flood control, drainage systems or vector control.*

Vector control was specifically “grandfathered in,” underscoring the fact that the drafters of Proposition 218 and the voters who approved it were satisfied that funding for vector control is an appropriate use of benefit assessments and therefore confers special benefit to property.

#### **SILICON VALLEY TAXPAYERS ASSOCIATION, INC. V. SANTA CLARA COUNTY OPEN SPACE AUTHORITY**

In July of 2008, the California Supreme Court issued its ruling on the Silicon Valley Taxpayers Association, Inc. v. Santa Clara County Open Space Authority (“SVTA vs. SCCOSA”). This ruling is the most significant legal document in further legally clarifying Proposition 218. Several of the most important elements of the ruling included further emphasis that:

- Benefit assessments are for special benefit to property, not general benefits<sup>1</sup>
- The services and/or improvements funded by assessments must be clearly defined
- Special benefits are directly received by and provide a direct advantage to property in the Assessment Area

This Engineer’s Report is consistent with the SVTA vs. SCCOSA decision and with the requirements of Article XIIC and XIID of the California Constitution because the Services to be funded are clearly defined: the Services are available to all benefiting property in the Assessment Area; the benefiting property in the Assessment Area will directly and tangibly benefit from reduced mosquito and vector populations; reduced risk of the presence of diseases; increased safety of property and other special benefits; and such special benefits provide a direct advantage to property in the Assessment Area that is not enjoyed by the public at large or other property. There have been a number of clarifications made to the

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<sup>1</sup> Article XIII D, § 2, subdivision (d) of the California Constitution states defines “district” as “an area determined by an agency to contain all parcels which will receive a special benefit from the proposed public improvement or property-related service.”

analysis, findings and supporting text in this Report to ensure that this consistency is well communicated.

#### **DAHMS V. DOWNTOWN POMONA PROPERTY**

On June 8, 2009, the 4<sup>th</sup> Court of Appeal amended its original opinion upholding a benefit assessment for property in the downtown area of the City of Pomona. On July 22, 2009, the California Supreme Court denied review. On this date, Dahms became good law and binding precedent for assessments. In Dahms the court upheld an assessment that was 100% special benefit (i.e. 0 general benefit) on the rationale that the services and improvements funded by the assessments were directly provided to property in the assessment district. The Court also upheld discounts and exemptions from the assessment for certain properties.

#### **BONANDER V. TOWN OF TIBURON**

On December 31, 2009, the 1<sup>st</sup> District Court of Appeal overturned a benefit assessment approved by property owners to pay for placing overhead utility lines underground in an area of the Town of Tiburon. The Court invalidated the assessments on the grounds that the assessments had been apportioned to assessed property based in part on relative costs within sub-areas of the assessment district instead of proportional special benefits.

#### **BEUTZ V. COUNTY OF RIVERSIDE**

On May 26, 2010, the 4<sup>th</sup> District Court of Appeal issued a decision on the Steven Beutz v. County of Riverside ("Beutz") appeal. This decision overturned an assessment for park maintenance in Wildomar, California, primarily because the general benefits associated with improvements and services were not explicitly calculated, quantified and separated from the special benefits.

#### **GOLDEN HILL NEIGHBORHOOD ASSOCIATION V. CITY OF SAN DIEGO**

On September 22, 2011, the San Diego Court of Appeal issued a decision on the Golden Hill Neighborhood Association v. City of San Diego appeal. This decision overturned an assessment for street and landscaping maintenance in the Greater Golden Hill neighborhood of San Diego, California. The court described two primary reasons for its decision. First, like in Beutz, the court found the general benefits associated with services were not explicitly calculated, quantified and separated from the special benefits. Second, the court found that the City had failed to record the basis for the assessment on its own parcels.

#### **COMPLIANCE WITH CURRENT LAW**

This Engineer's Report is consistent with the requirements of Article XIII C and XIII D of the California Constitution and with the *SITA* decision because the Services to be funded are clearly defined; the Services are available to and will be directly provided to all benefiting property in the Assessment District; and the Services provide a direct advantage to property in the Assessment District that would not be received in absence of the Assessments.

This Engineer's Report is consistent with *Dahms* because, similar to the Downtown Pomona assessment validated in *Dahms*, the Services will be directly provided to property in the Assessment District. Moreover, while *Dahms* could be used as the basis for a finding of 0% general benefits, this Engineer's Report establishes a more conservative measure of general benefits.

This Engineer's Report is consistent with *Bonander* because the Assessments have been apportioned based on the overall cost of the Services and proportional special benefit to each property. Finally, the Assessments are consistent with *Beutz* and Greater Golden Hill because the general benefits have been explicitly calculated and quantified and excluded from the Assessments.

### ASSESSMENT CONTINUATION

In each subsequent year for which the assessments will be continued, an Engineer's Report must be prepared to establish the Services to be funded by the Assessments for the fiscal year, to determine the assessments for each parcel in the Assessment Area, and to make other findings. After the Report has been prepared, it will be reviewed by the Board and a public hearing will be held. A notice of the intent to continue the assessments for the next fiscal year and the date when the Board will hold the public hearing will be published in a local newspaper. At the annual public hearing, members of the public can provide input to the Board prior to the Board's decision on continuing the services and assessments for the next fiscal year. After the conclusion of the public hearing, the Board may take action, by resolution, to approve the Report and the levy of the assessments for the upcoming fiscal year. If the Board approves the continuation of the assessments, they will be included and collected with tax bills.

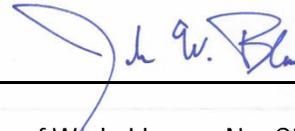
This Report was prepared by SCI Consulting Group ("SCI") to describe the continued Services to be funded by the benefit assessment for fiscal year 2016-17, to establish the estimated costs for those Services, to determine the special benefits and general benefits received by property from the Services, and to apportion the assessments to lots and parcels within the Assessment Area based on the estimated special benefit each parcel receives from the Services funded by the benefit assessment.

Since the initial Single Family Equivalent assessment rate of \$8.55 in 2005, the rate has been reduced to the current proposed rate of \$5.00. The fiscal year 2016-17 budget includes outlays for West Nile Virus Emergency ("WVN") Response activities, WNV prevention education, surveillance and mosquito control, habitat remediation, capital equipment, supplies, vector-borne disease testing programs and vector control programs.

CERTIFICATES

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1. The undersigned respectfully submits the enclosed Engineer's Report and does hereby certify that this Engineer's Report, and the Assessment and Assessment Diagram herein, have been prepared by me.



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Engineer of Work, License No. C52091

2. I, the County Auditor of the County of San Diego, California, hereby certify that Assessment Roll and Assessment Diagram for fiscal year 2016-17 were filed with me on \_\_\_\_\_, 2016.

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County Auditor, County of San Diego

## GENERAL DESCRIPTION OF THE PROGRAM AND PROPOSED SERVICES

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### ABOUT THE VECTOR CONTROL PROGRAM

The Vector Control Program (“VCP” or “Program”) operates within County of San Diego Department of Environmental Health (“DEH”) and monitors disease-carrying insects such as mosquitoes, ticks and other harmful pests including flies and rats. The VCP reduces mosquito populations through the control and abatement of mosquito breeding sources. In addition, the VCP provides property inspections and advice for the control of domestic rats, flies and other pests for properties throughout the Assessment Area. The VCP also conducts surveys and tests for diseases carried by insects and small mammals. Public education and outreach activities are conducted to increase prevention and protection against disease-carrying vectors such as mosquitoes, which are the vectors for West Nile virus (WNV).

The VCP provided a nominal level of services with the limited funding available prior to the Assessment. The Assessment provides the additional funding to improve mosquito, vector and disease control services for all properties in the Assessment Area. These services are over and above the nominal level of services that would be provided in absence of the Assessment.

### DESCRIPTION OF THE VECTOR CONTROL PROGRAM

This year, the VCP successfully provided property owners services and protection from vector-borne disease. The diseases of most concern are: West Nile virus (WNV), Western Equine Encephalitis (WEE), Saint Louis Encephalitis (SLE), malaria which are all transmitted by mosquitoes as well as viral illnesses such as dengue, Zika and chikungunya transmitted by the invasive *Aedes* mosquitoes (*A. aegypti* and *A. albopictus*); plague, transmitted by fleas; Hantavirus Pulmonary Syndrome (HPS), transmitted by certain species of wild mice; and tick-borne diseases including Lyme disease, tularemia, and Rocky Mountain Spotted Fever. In 2015 there was significantly increased WNV activity throughout the state of California including San Diego County. WNV cases within San Diego county included 43 humans, 367 birds, 12 sentinel chickens, 1 horse and 49 batches of mosquitoes testing positive for the virus. Prior to this year, the highest number of locally acquired cases of WNV was 35 in 2008.

Although this was a highly active year for WNV, the VCP continued to reduce the potential for the spread of diseases, and the impact that vectors have on property through ongoing educational outreach, vector surveillance activities, source reduction, source treatment, and abatement. As a result, San Diego County experienced lower numbers of human cases and incident rates than surrounding counties such as Orange, Riverside and Los Angeles. These efforts also minimize the nuisance impact that vectors can have on property and residents. To fulfill this purpose, the VCP may take any and all necessary steps to control mosquitoes, to monitor other vectors, and to perform other related vector control services.

Currently, the VCP provides vector control and disease surveillance services as well as information on how to protect oneself and property from vectors and the diseases they carry. These services are further defined as follows:

- Respond to mosquito problems as well as other disease carrying organisms on property in the Assessment Area.
- Reduce mosquito populations by the application of larvicide to control mosquito larvae via helicopter, boat, blowers and by hand to property in the Assessment Area.
- Prepare to apply adult mosquito control products in the event of an elevated public health risk to prevent spread of diseases.
- Participate in emergency response and recovery vector surveillance and control activities within the Assessment Area.
- Monitor adult mosquito population abundance using carbon dioxide baited traps and Reiter Gravid traps, as well as other species-targeted traps, to assess public health risks and allocate control efforts.
- Collect and test mosquito specimen “batches” for mosquito-transmitted diseases such as WNV, SLE, and WEE.
- Monitor for new and emerging vectors such as the Asian tiger mosquito (ATM), Yellow Fever mosquito and emerging pathogens such as Zika, dengue, and chikungunya.
- Maintain sentinel chicken flocks for analytical blood studies for State and local public health agencies. The results are used to track disease to assess public health risks and allocate control efforts.
- Conduct searches for neglected “green swimming pools” on property in the Assessment Area to identify and stop mosquito breeding occurring in backyard sources.
- Detect vector-borne pathogens and evaluate their threat to public health using molecular tools and science-based methods.
- Assist property owners in the control of rats through onsite inspection and advice, the issuance of a rat control starter kit and public education.
- Monitor hantavirus-bearing rodents, such as deer mice, through trapping and testing on property in the Assessment Area.
- Survey and identify arthropod and rodent-borne diseases such as Lyme disease and plague found in parks, campgrounds, on trails and other locations.
- Conduct a twice yearly trapping program for rodents in ports of entry to test for the presence of plague.
- Educate property owners about the risks of diseases carried by mosquitoes, flies, insects, and small mammals, and emphasize personal protection as well as individual responsibility by providing educational programs on vectors and disease abatement at schools, civic group meetings and community events.
- Develop and distribute printed material and brochures that describe what County residents, employees and property owners in the Assessment Area can do to protect themselves from disease and keep their homes and property free of mosquitoes and other vectors.

- Maintain Program websites (SDFightTheBite.com and SDVector.com) with WNV activity, hantavirus activity, a website for children (SDSwatTeam.com), aerial larvicide application schedule, mosquito fish distribution locations, press releases and any other pertinent vector related information in relation to the protection of public health in San Diego County.
- Implement innovative methods to distribute public health information, such as the use of Facebook (<http://www.facebook.com/pages/San-Diego-CA/County-of-San-Diego-Environmental-Health/71479891529>),

The VCP protects the public from vector-borne disease and mosquito nuisance, while protecting the environment, through a coordinated set of activities collectively known as the Integrated Vector Management Program (IVMP). For all vectors, public education is the primary control strategy. Next, the VCP determines the abundance of vectors and the risk of vector-borne disease or discomfort through evaluation of public service requests, complaints, and field and laboratory surveillance activities. If the populations exceed or are anticipated to exceed the public threshold of tolerance, the VCP will employ the most efficient, effective and environmentally sensitive means of source control.

**FIGURE 1 – SUMMARY OF SERVICES AND PERFORMANCE MEASURES**

CORE FUNCTION	PERFORMANCE MEASURE
Perform comprehensive vector surveillance to detect vector disease threats to public health.	<p>1. Appropriate levels of surveillance for early detection of disease</p> <ul style="list-style-type: none"> <li>▪ Set an average of 10 or more Gravid Traps per week for mosquito surveillance during peak mosquito season</li> <li>▪ Set 35 or more CO2 traps per week for mosquito surveillance during mosquito season</li> <li>▪ Set 10 or more Ovi, BG Sentinel and AGO traps per week for mosquito surveillance during mosquito season</li> <li>▪ Test for hantavirus at 50 locations throughout the year</li> <li>▪ Test for plague at high and low elevations weekly (March – November)</li> <li>▪ Test for plague at Ports-of-Entry twice yearly</li> <li>▪ Sample 40 or more different locations for the presence of tick-borne disease, including Lyme and tularemia, November through May</li> </ul> <p>2.</p>

CORE FUNCTION	PERFORMANCE MEASURE
Protect public health by reducing vectors or exposure to vectors that transmit diseases to humans.	<p>3. Reduce mosquito breeding sources by working with Agencies and owners of mosquito breeding sources</p> <ul style="list-style-type: none"> <li>▪ Evaluate, modify and/or eliminate mosquito breeding habitat through the Habitat Remediation Program</li> </ul> <p>4. Rodent borne disease</p> <ul style="list-style-type: none"> <li>▪ Treat rodent burrows where plague and high numbers of fleas are detected to eliminate fleas and stop the spread of disease</li> <li>▪ Provide guidance to property owners in eradicating mice and removing contaminants from buildings where hantavirus is detected</li> </ul> <p>5. Protect the environment by using least toxic and least invasive means for mosquito control in sensitive habitats</p> <ul style="list-style-type: none"> <li>▪ Train and implement guidelines for Vector staff</li> <li>▪ Review emerging technologies and control methods</li> <li>▪ Work closely with wildlife and MSCP agencies while implementing the Habitat Remediation Program</li> </ul>
Disseminate public health information to provide property owners with empowering tools for active involvement in prevention, protection and reporting	<p>6. Increase awareness of vector-borne disease prevention and control</p> <ul style="list-style-type: none"> <li>▪ Conduct outreach presentations to various community, school and business groups throughout the county</li> <li>▪ Post informative press releases and County News Center articles when diseases are detected</li> <li>▪ Distribute educational materials throughout the assessment area.</li> </ul>
Expand testing capability for new vector-borne pathogens	<ul style="list-style-type: none"> <li>▪ Develop new or optimize existing tests for vector-borne pathogens</li> <li>▪ Identify pathogens in field-collected vectors and characterize genetic variations</li> </ul>

CORE FUNCTION	PERFORMANCE MEASURE
Prevent and control vector-borne diseases through timely response to complaints	<ul style="list-style-type: none"> <li>▪ Review manure management plans at commercial poultry ranches annually for active facilities</li> <li>▪ Inspect poultry ranches quarterly</li> <li>▪ Respond to complaints about mosquitoes, rats, eye gnats and flies by contacting 97% of complainants within 3 days</li> <li>▪ Complete 97% of mosquito control requests for service within 21 days of receipt</li> <li>▪ Investigate and resolve 95% of aerial identified green pools within 21 days of identification</li> </ul>

### WEST NILE VIRUS STRATEGIC RESPONSE PLAN

The purpose of the WNV Strategic Response Plan (“WNVSRP” or “Plan”) is to implement an integrated, risk-based response designed to promote safe and livable communities as well as to educate and involve County agencies and property owners in the year-round effort to control mosquito breeding and minimize environmental and economic impacts associated with WNV.

The WNV Strategic Response Plan is based on conditions established by the California Department of Health Services (“CDHS”), California Mosquito-borne Virus Response Plan and the Centers for Disease Control (“CDC”). In 2003, the Board of Supervisors adopted the WNVSRP to establish an organized and planned response to the virus within the County. The Plan is evaluated regularly to address changing conditions and new or elevated public health risks.

In the summers of 2008 and 2015, the VCP increased its level of response consistent with the WNVSRP. This heightened level of response was due to an increasing number of WNV positive dead birds, mosquito batches and the occurrence of human infections. The VCP increased surveillance and control efforts were increased dramatically. This included helicopter flyovers looking for neglected green swimming pools and stagnant water as well as door-to-door inspections for mosquito breeding sources in the neighborhoods of human cases. Small mosquito breeding sources such as watering cans, pooling irrigation water (overspray), or decorative water features were identified in yards throughout the County.

The VCP enhanced the WNV outreach campaign in 2015 with the development and airing of a new series of Public Service Announcements (“PSAs”) which were shown on two commercial media outlets and resulted in over 9.7 million “impressions”. The VCP also coordinated an effort with the County’s Tire Enforcement Agency (“TEA”) to mail informational letters to operators of waste tire facilities, providing education on the prevention of mosquito breeding in tires which often hold small amounts of water. In addition to these efforts, the Program continued to educate the public by attending health fairs, giving

presentations and distributing educational materials. "Health Alert" letters were also sent to businesses and property owners warning about the presence of WNV as well as the new invasive *Aedes* mosquito in neighborhoods and detailing preventative steps that could be used to eliminate breeding and protect against mosquito-borne illnesses.

A review of the WNV Strategic Response Plan and its implementation was conducted by the VCP in fiscal year 2015/2016. The knowledge gained from the previous year aids in the implementation of the WNVS RP for the upcoming year. This new information is crucial for adapting to changing environmental conditions within the County. These environmental conditions may include previously unidentified breeding sources for mosquitoes such as neglected green swimming pools.

The VCP implements the WNVS RP in a manner that also protects the public from other mosquito-borne diseases. The details for the implementation are included in the next three sections:

- Mosquito-Borne Diseases Surveillance
- Mosquito Control
- Public Education/Outreach

## MOSQUITO-BORNE DISEASES SURVEILLANCE

Of the world's three thousand mosquito species, more than 50 live in California, and 26 have been identified in San Diego County. Seven species of local mosquitoes (*Culex tarsalis*, *Culex quinquefasciatus*, *Culex erythrothorax*, *Anopheles hermsi*, *Culex thriambus*, *Culex restuans* and *Aedes sierrensis*) found in San Diego County can transmit diseases including WNV, malaria, dog heartworm, SLE, and WEE. The two invasive *Aedes* species found in the county since 2014 (*Aedes aegypti* and *Aedes albopictus*) can transmit viruses such as dengue, Zika and chikungunya. VCP conducts surveillance and testing of mosquitoes that could transmit these diseases. In 2015, WNV was detected in 49 batches of mosquitoes through this surveillance.

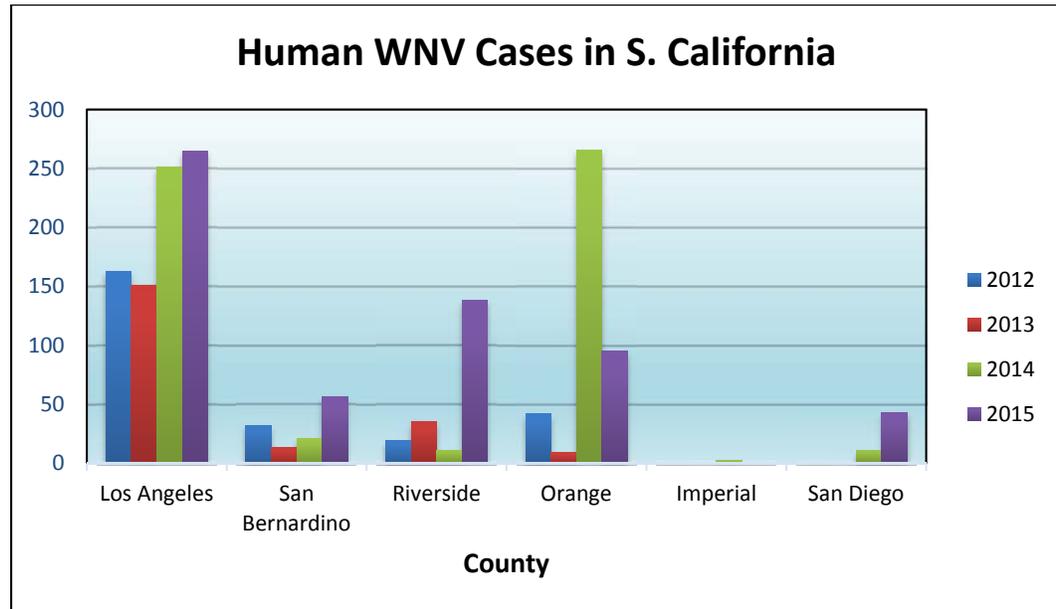
The VCP has identified more than 1,400 regular mosquito breeding sources throughout the County. All properties within the Assessment Area are within mosquito-flying range of one or more mosquito sources, and/or the normal travel range of one or more other vectors.

In addition to transmitting diseases, mosquitoes can negatively impact farm and other outdoor workers, outdoor recreation and tourism industries, real estate values, and the public in general. Mosquitoes are therefore recognized as a public nuisance. The California legislature has found that the protection of "Californians and their communities against the discomforts and economic effects of vector-borne diseases is an essential public service that is vital to public health, safety and welfare." (Health and Safety Code section 2001 (b)(3)).

The progression of WNV in San Diego County began in 2003 when the virus was first discovered within the County. The first confirmed locally acquired human case of WNV was

in 2006. Since then 116 human cases of WNV have occurred within San Diego County through 2015. In 2014 the County experienced its first fatality from the disease. In 2015, 43 human cases were identified in the County, with five fatalities. Figure 2 tracks the number of WNV positive human cases for Southern California counties from 2012 to 2015.

FIGURE 2 – HUMAN WNV CASES IN SOUTHERN CALIFORNIA IN 2012-2015



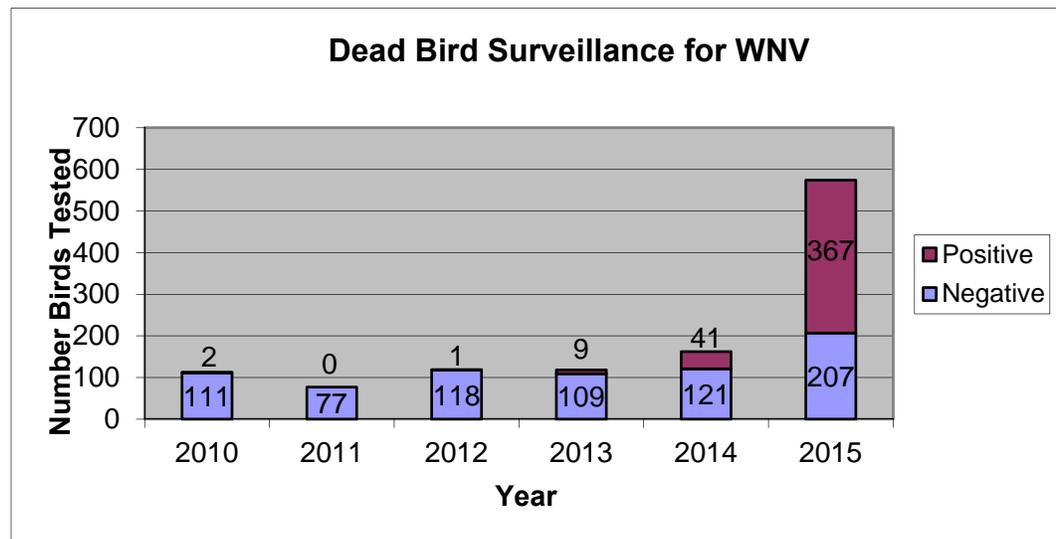
### DEAD BIRD TESTING

Dead bird testing is a valuable surveillance tool in the detection of WNV in the County and State. The VCP requests that residents report dead crows, ravens, jays, hawks and owls. These WNV-susceptible birds are tested in house in the VCP Disease Diagnostic Laboratory. Laboratory staff tests for the presence of WNV in the fluid from the birds' eyes. Figure 3 compares the annual number of dead birds tested since 2010.

By identifying concentrations of positive dead birds in the County, the VCP is able to focus its surveillance and control efforts in the areas of the county which are most affected by WNV.

In 2015, of the 574 total dead birds collected, 367 tested positive for WNV (64%). WNV in dead birds peaked in 2008, with 563 of 815 dead birds testing positive for the virus.

FIGURE 3 – DEAD BIRD SURVEILLANCE DURING 2010-2015



#### SENTINEL CHICKENS

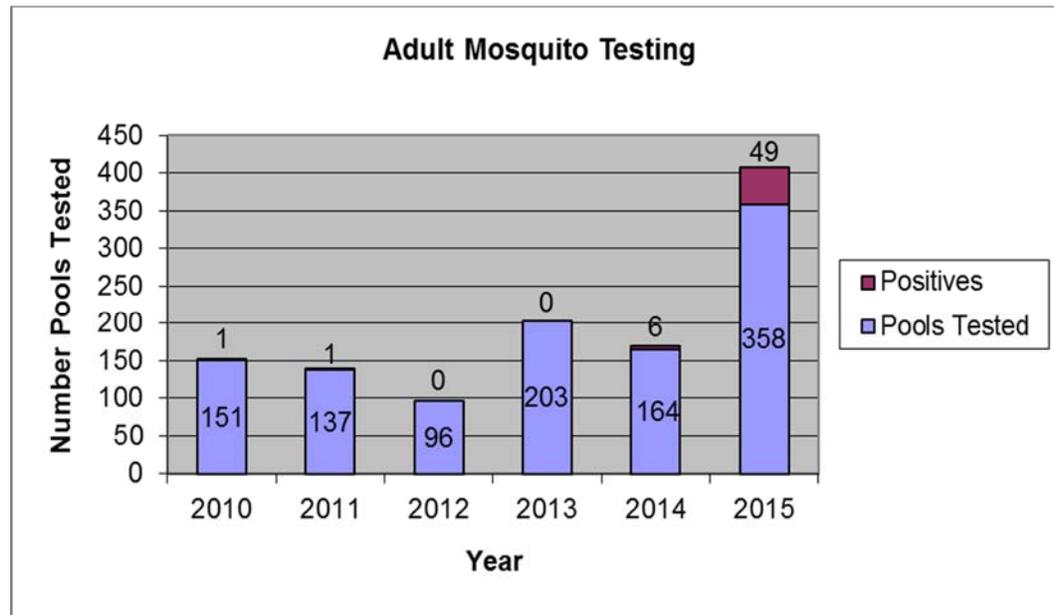
Sentinel chicken testing is an effective early detection technique for WNV. In 2015, the VCP maintained three flocks of sentinel chickens, strategically placed within the County. Each flock consisted of seven chickens. Sentinel chicken flocks were located at Buena Vista Lagoon in Oceanside, Flinn Springs County Park in El Cajon and Peñasquitos Lagoon in the Torrey Pines State Reserve. The chickens were tested for WNV, Western Equine Encephalitis (WEE) and St. Louis Encephalitis (SLE) every other week throughout the season which is typically from April through November.

Twelve sentinel chickens tested positive during 2015.

#### COUNTING MOSQUITO BATCHES

Prior to the impact of WNV on humans, the VCP had been testing approximately 100 mosquito batches (pools of 50 mosquitoes) per season, depending on the mosquito population. Testing increased beyond this baseline as a response to positive human cases. The figure below illustrates the numbers of adult mosquito batches tested since 2010. WNV in mosquito batches peaked in 2015 with 49 of 358 batches testing positive for the virus.

FIGURE 4 – ADULT MOSQUITO TESTING DURING 2010-2015



Surveillance is conducted throughout the VCP Assessment Area, focusing on probable breeding sources. Treatment strategies are based on the results of the surveillance program and are specifically designed for individual areas.

Surveillance devices include carbon dioxide baited traps and Reiter Gravid traps, as well as other species-specific traps. "Gravid traps" are used for the collection of female mosquitoes searching for a place to lay their eggs. The traps are strategically placed to measure mosquito levels throughout the County. The mosquitoes caught in a gravid trap have already taken a blood meal and are a good indicator of WNV infection levels in birds. Since 2008, the use of gravid traps has become one of the primary investigative tools for urban areas. They are especially useful for finding mosquito breeding sources during a WNV positive human investigation. In late 2013, the VCP received BG Sentinel traps which target *Aedes* mosquito species. These traps were deployed for surveillance beginning in the 2014 season to identify any future arrival of the Asian Tiger Mosquito (*Aedes albopictus*) or Yellow Fever Mosquito (*Aedes aegypti*) into the County.

In October of 2014 invasive *Aedes* mosquitoes (*A. aegypti*) were discovered for the first time in the San Diego County. In 2015 many additional detections were made in various parts of the County indicating the rapid spread of this mosquito. The VCP will continue to enhance its surveillance program to monitor and trap in the areas of discovery and beyond to further define the extent of the presence of these new mosquito species.

As a result of the invasive *Aedes* mosquito findings, contact was made at over 34,000 properties in 2015 to provide information to residents on prevention and protection from these mosquitoes.

### **AERIAL SURVEILLANCE**

Homes with neglected green swimming pools and ponds support significant mosquito breeding in residential neighborhoods. In an effort to locate these previously unidentified breeding sites, the VCP conducts aerial surveillance with either the San Diego County Sheriff's helicopter or a contractor. Once neglected pools and ponds are identified and mapped, the VCP inspects and treats these locations. In 2015, 1,144 green pools were identified by helicopter.

### **POSITIVE CASE NOTIFICATION**

The VCP notifies businesses and households within a half mile radius of where people, sentinel chickens, and mosquitoes have tested positive for the WNV in an effort to raise awareness. This notification is completed at the household and business level through mailing of health alert notices and canvassing efforts. The Program also asks property owners to investigate possible back yard sources of mosquitoes that breed in standing water such as buckets, tires, ponds, children's toys, and green pools.

### **MOSQUITO CONTROL**

To control mosquitoes, the VCP conducts inspections and identifies mosquito breeding sources. The sources include privately and publicly held lands with rivers, streams, marshlands, lagoons, ponds, and various other human-made and natural sources of standing water. Land ownership of mosquito breeding sources has been identified using Geographic Information Systems (GIS). This has enabled the VCP to educate property owners regarding their responsibility in managing standing water. Known mosquito breeding sources are evaluated during the winter months to confirm location and design treatment plans for these sources. This off-season effort creates routes for seasonal workers, who then treat locations during the mosquito breeding season.

In order to achieve the County's goal of reducing or eliminating mosquito breeding locations countywide, the VCP first seeks voluntary compliance. In the event that voluntary compliance cannot be attained, the VCP will work with property owners, public agencies and municipalities to ensure appropriate abatement and remediation is taken to protect public health. Formal enforcement action is pursued if voluntary compliance is not achieved.

The VCP's objective is to provide the properties a "Program-wide" level of consistent mosquito control such that all properties would benefit from equivalent reduced levels of mosquitoes and other vectors. Surveillance and monitoring are provided on a Program-wide basis as appropriate.

The County of San Diego also encourages cooperative efforts with other government agencies such as Camp Pendleton Marine Base to support mosquito control on the base which has a positive impact to the residential areas in the Assessment Area by reducing the number of traveling mosquitoes. It is through these cooperative efforts that in 2014, staff on the 32nd Street Naval Base alerted the VCP of its first detection of the invasive *Aedes aegypti* mosquito.

## PHYSICAL CONTROL

The VCP directs and assists property owners to manage mosquito habitat ("breeding sites") to reduce mosquito production. The physical control method primarily targets mosquitoes in their larval stage. This may include the removal of vegetation or sediment, interruption of water flow, rotation of stored water, pumping and/or filling sources, improving drainage and water circulation systems, and installing, improving, or removing culverts, tide gates, and other water control structures in wetlands. The VCP directs the property owner to coordinate water management efforts under the guidance of federal and state regulatory agencies.

## MOSQUITO BIOLOGICAL CONTROLS

Mosquito fish, *Gambusia affinis*, are the VCP's primary biological control agent used against mosquitoes. Mosquito fish are not native to California, but have been widely established in the state since the early 1920's and now inhabit most natural and constructed water bodies. The VCP maintains a population of mosquito fish in large tanks and in a fish rearing facility in San Pasqual. The VCP also periodically uses nets and traps to collect mosquito fish from natural water bodies located in the Assessment Area. Mosquito fish are made available to property owners to control mosquito production only in artificial containers such as ornamental fishponds, water plant barrels, horse troughs, and neglected green swimming pools. The fish are available for free to the property owners at several distribution sites throughout the Assessment Area as well as the office of the Vector Control Program. These locations are published on the [SDFightTheBite.com](http://SDFightTheBite.com) website.

Many mosquito-breeding sources cannot be adequately controlled with physical control measures or mosquito fish, so the VCP also uses natural biological materials and/or insecticides approved by the Federal Environmental Protection Agency, California Environmental Protection Agency and other environmental agencies to control mosquito populations.

Starting in November of 2011, pesticides applied for vector control to waters of the United States by the VCP must be in accordance with the Statewide National Pollutant Discharge Elimination System (NPDES) Permit for Biological and Residual Pesticide Discharges to Waters of the United States from Vector Control Applications. VCP received a Notice of Authorization from the State to operate under the general permit. The first annual report covering November and December 2011 was submitted in February 2012 and annually thereafter.

Order 2014-00038 EXEC amended the NPDES Monitoring and Reporting Program and replaced visual, physical, and chemical monitoring requirements with reporting of visual observations, monitoring and reporting of pesticide application rates, and reporting of non-compliant applications. In 2015, VCP made 6,607 larvicide applications, in 1,163 treatment areas, to the waters of the United States. No adverse incidents were observed and no non-compliant applications occurred in the 1,163 treatment areas.

When field inspections determine the presence of mosquito eggs or larvae, the VCP staff applies larvicides to the source in strict accordance with the label instructions.

Depending on time of year, water temperature, organic content, mosquito species present, larval density, and other variables, larvicide applications may be repeated at continual intervals ranging from weekly to annually. Larvicides included in the Notice of Authorization from the State include the following:

Trade Name	Active Ingredient
Altosid Briquets	methoprene
Altosid Pellets	methoprene
Altosid XR Extended Residual Briquets	methoprene
Altosid XR-G	methoprene
Aquabac 200G	<i>Bacillus thuringensis</i> subspecies <i>israelensis</i>
MetaLarv S-PT	methoprene
Mosquito Dunks	<i>Bacillus thuringensis</i> subspecies <i>israelensis</i>
Mosquito Larvicide GB-1111	mineral oil
VectoLex CG	<i>Bacillus sphaericus</i>
VectoLex WDG	<i>Bacillus sphaericus</i>
VectoLex WSP	<i>Bacillus sphaericus</i>
VectoMax CG & FG	<i>Bacillus thuringensis</i> subspecies <i>israelensis</i> , <i>Bacillus sphaericus</i>
VectoMax WSP	<i>Bacillus thuringensis</i> subspecies <i>israelensis</i> , <i>Bacillus sphaericus</i>
Natular G	Spinosad
Natular G30	Spinosad
Natular XRG	Spinosad
Natular XRT	Spinosad

Order 2014-0106-DWQ amended the Statewide National Pollutant Discharge Elimination System (NPDES) Permit for Biological and Residual Pesticide Discharges to Waters of the United States from Vector Control Applications and did the following: (1) adds to the permit all larvicides and adulticides that are currently registered by Department of Pesticide Regulations (DPR) using the same active ingredients; (2) includes additional receiving water limitations and receiving water monitoring triggers for newly added active ingredients; and (3) includes a provision for reopening the permit to include new active ingredients that DPR registers for vector control.

### **AERIAL MOSQUITO LARVICIDE APPLICATION**

Beginning in 2004, the VCP began an aerial mosquito larvicide application program. Aerial application of mosquito larvicide is the best method of application in inaccessible areas. There are three criteria that need to be met before a source could be considered a candidate for aerial application:

- Breeding source must be a proven mosquito breeding location
- Breeding source must be inaccessible to treat with conventional means
- Breeding source must be in proximity to a significant "at risk" human population

There are a number of wet, marshy areas and ponds that have thick stands of cattails and other vegetation within the Assessment Area. These are prime locations for aerial applications. The VCP contracts with a helicopter application service to apply bacterial larvicides to the vegetation in the water bodies where the mosquito larvae grow. Larvicides are made from bacteria that, when applied in accordance with the manufacturer's label, are very specific to mosquito larvae and will not harm other wildlife. This results in the efficient elimination of larvae before they can develop into biting adults. Larvicides were applied regularly to mosquito breeding locations from April through October in 2015. The number of locations treated in a specific aerial application event varies according to individual site conditions. As discussed previously, starting November of 2011 pesticide application to waters of the United States is conducted in compliance with the General NPDES Permit. Aerial Mosquito Larvicide control efforts reduced the risk of mosquito-borne disease in the Assessment Area as well as nuisance biting mosquitoes.

### **ADULT MOSQUITO CONTROL**

Adult mosquito control with the use of "adulticide" products is not a routine control measure for VCP, but is included as an option in situations with an elevated public health risk, such as when large numbers of disease infected adult mosquitoes are present and public health is threatened. The VCP and/or its contractor may apply aerosolized pesticide (adulticide) to control adult mosquitoes after approval by the Director of the Department of Environmental Health with concurrence from the Public Health Officer.

Adulticides included in the Notice of Authorization from the State include, but are not limited to, the following:

Trade Name	Active Ingredient
Pyrenone 25-5 Public Health Insecticide	Pyrethrins, Piperonyl Butoxide
Pyroicide Mosquito Adulticide 7453	Pyrethrins, Piperonyl Butoxide
Pyroicide Mosquito Adulticide Conc. 7395	Pyrethrins, Piperonyl Butoxide
Pyroicide Mosquito Adulticide Conc. 7396	Pyrethrins, Piperonyl Butoxide
Scourge Insecticide with Resmethrin/Piperonyl Butoxide 18%+54% MF Formula II	Resmethrins, Piperonyl Butoxide
Scourge Insecticide with Resmethrin /Piperonyl Butoxide 4%+12% MF Formula II	Resmethrins, Piperonyl Butoxide

## PUBLIC EDUCATION/OUTREACH

### GENERAL SUMMARY

The VCP conducts public education and outreach to educate residents about vectors and vector-borne diseases within the County. To achieve this goal, the VCP distributed educational materials such as brochures, pamphlets, bookmarks, and tip cards in both English and Spanish. Facebook was used to notify the public of press releases and scheduled aerial treatments. The education campaign is aimed at prevention, protection, reporting and behavior change. The VCP proactively initiated press releases through County Communications, and established the County of San Diego as the local resource for vector-borne disease information. Two web sites have been developed to provide information and enable property owners to report concerns and request services: SDVector.com and SDFightTheBite.com.

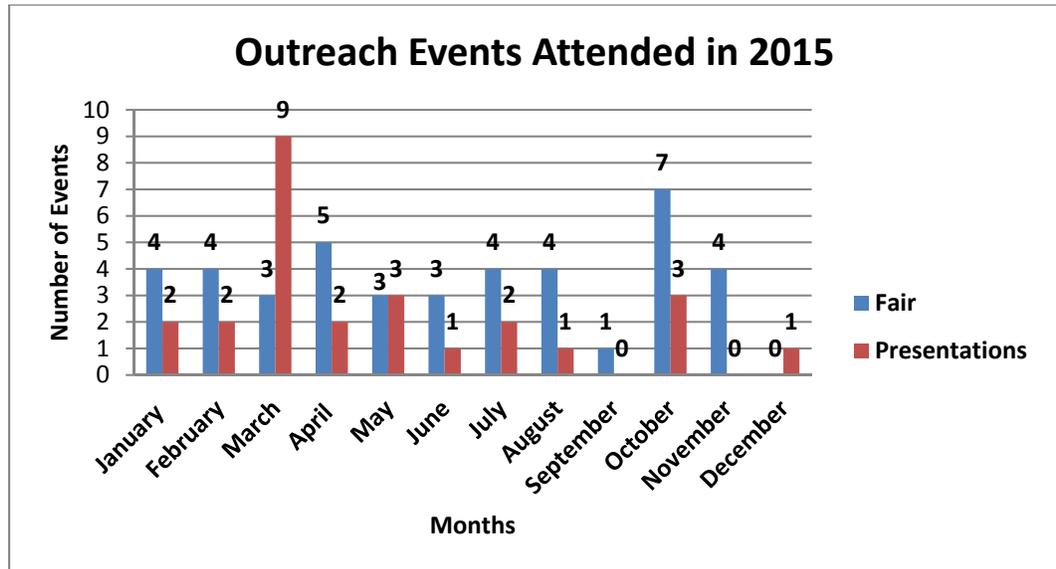
Health education, outreach, and raising awareness in the Assessment Area are all integral parts of the WNVSRP. A proactive approach is used to educate people within the Assessment Area about the risks of WNV and preventive measures they can take to protect themselves and their communities. Strategies include conducting educational presentations to high-risk target groups such as seniors, and the Spanish speaking community, staffing informational displays at health expositions and street fairs, and collaborating with different County and city departments and organizations.

A similar proactive approach is used for educating the public about diseases transmitted by rats, ticks, mice and fleas. Educational presentations, tabletop displays, and pamphlets are used and distributed to people within the Assessment Area by the VCP. Rat control starter kits are provided to property owners during site consultations. In addition to providing rat control, the kits include educational information that focuses on exclusion, baiting, and trapping.

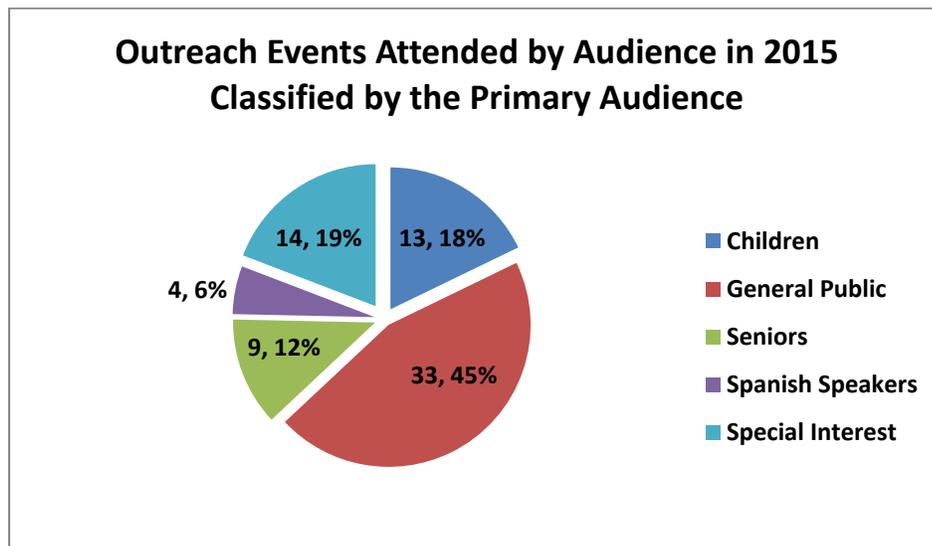
**FAIRS AND PRESENTATIONS**

In 2015, the VCP attended 42 fairs and gave 26 presentations throughout the County to address vector-borne diseases. Thirteen of the outreach events were conducted where the majority of attendees were children, reaching approximately 1665 students under the age of 18.

**FIGURE 5 – OUTREACH EVENTS ATTENDED IN 2015**



**FIGURE 6 – OUTREACH EVENTS ATTENDED BY AUDIENCE TYPE IN 2015**



### CHILDREN'S WEBSITE

An interactive educational website for young children was developed and launched in 2011. The purpose of the [www.SDSwatTeam.com](http://www.SDSwatTeam.com) website is to teach children about West Nile virus, how to identify and eliminate mosquito breeding sources, prevent mosquito breeding, and protect themselves from mosquito bites. The website provides easy-to-understand background information about the mosquito lifecycle and West Nile virus. It includes three interactive games and activity sheets. Children can play the interactive games online or print out the activity sheets. By answering all of the Hazard Hunt questions correctly or successfully navigating through the Mosquito Munch Maze, children learn the importance of eliminating standing water, repairing holes in screens, fixing leaky faucets and more. They can then print an "Official" Swat Team certificate to show their family and friends. The online games are also used by Girl and Boy Scouts to earn a "Fight the Bite" certificate and participation patch. Since its inception in 2013, over 991 patches have been issued. Additionally, these games are available on portable kiosks that are taken to outreach events.

### EDUCATION MATERIALS

The VCP distributes a number of educational materials that include a dual English/Spanish WNV DVD, English & Spanish WNV pamphlets and bookmarks, WNV magnets, mosquito pamphlets, and English and Spanish dead bird reporting cards. These materials are used to increase the visibility of the VCP and to reach a larger audience. In addition, WNV activity books, WNV temporary tattoos, and WNV stickers are distributed with the specific goal of educating children. Due to the 2015 findings of *Aedes aegypti* and *Aedes albopictus* in the County, a new educational pamphlet was created to address the risks the new invasive *Aedes* mosquitoes pose. In 2015, the outreach program distributed over 30,304 educational WNV materials and 6,169 *Aedes* mosquito materials in addition to 10,569 other vector-borne disease materials. Materials were distributed to retail businesses, public libraries, public health and recreation centers, County public counters, homeless shelters, WIC offices, City Halls, and schools.

The VCP has incorporated quick-response (QR) codes to disseminate educational information about vectors and vector-borne diseases to San Diego County residents. QR codes are two dimensional barcodes that can be decoded with camera phones equipped with QR code readers. In 2015 QR codes were incorporated into a Mosquito Larvicide Aerial Fact Sheet to allow the public to immediately access the aerial treatment webpage and schedule. For customer convenience, the VCP also maintains an electronic brochure library on its website to allow viewers the ability to read and download many of its educational brochures.

FIGURE 7 – 2015 OUTREACH ACTIVITY LOCATIONS

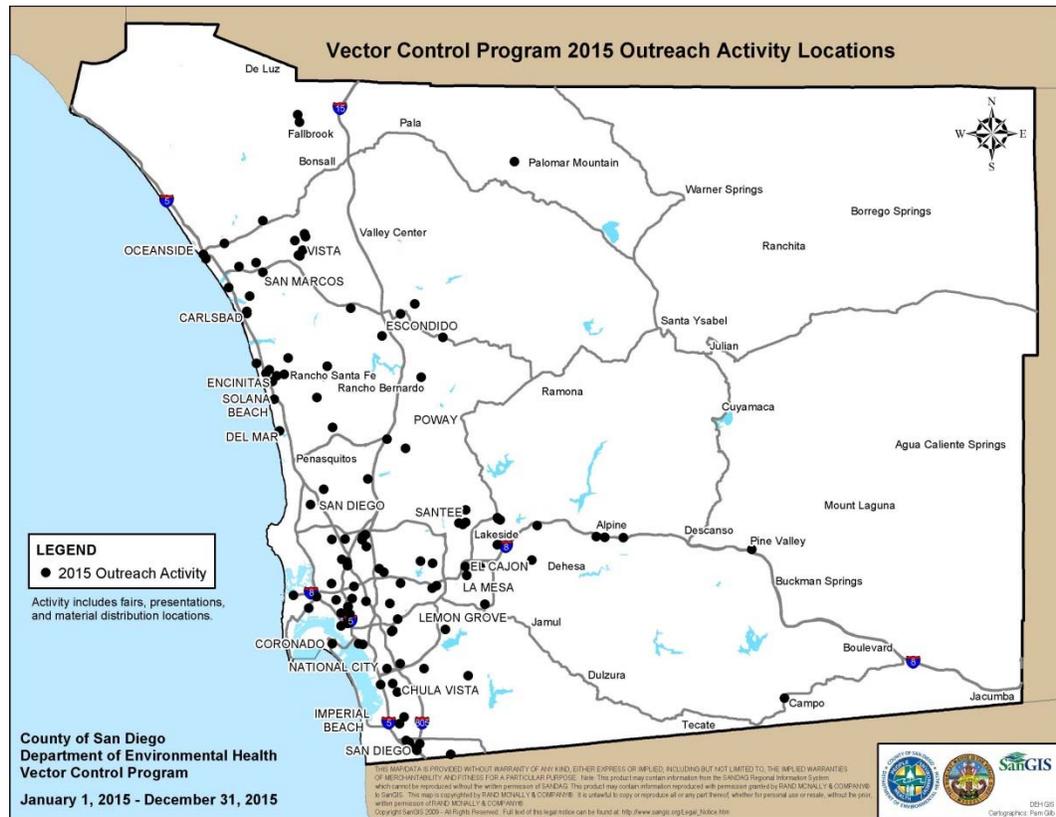


FIGURE 8 – MATERIAL DISTRIBUTED BY SUBJECT IN 2015

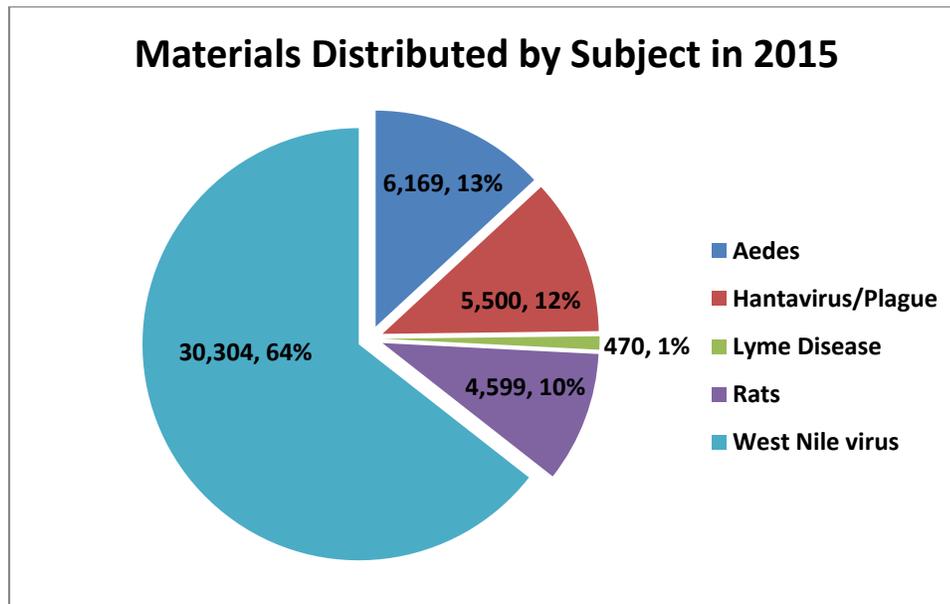


FIGURE 9 – MATERIAL DISTRIBUTED BY LANGUAGE IN 2015

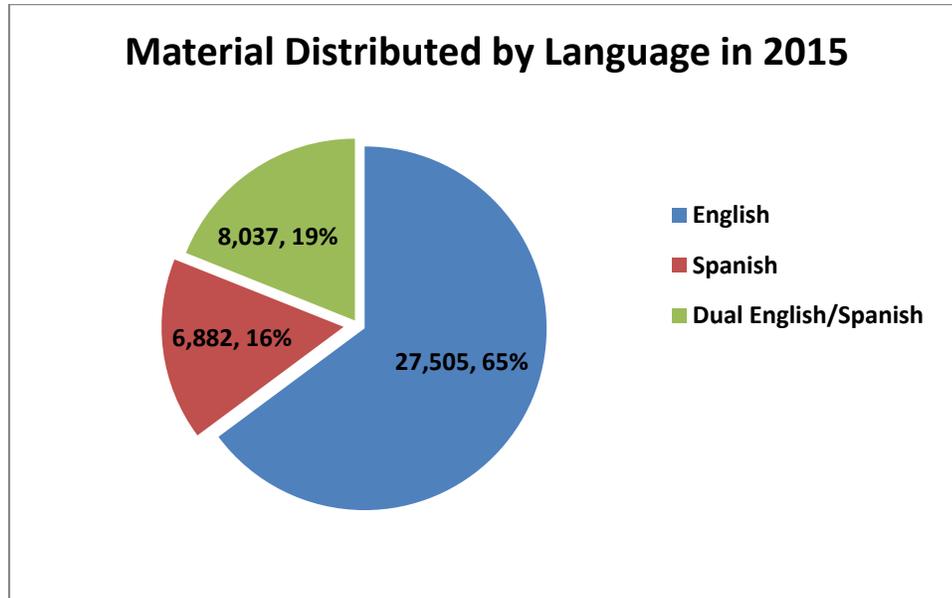
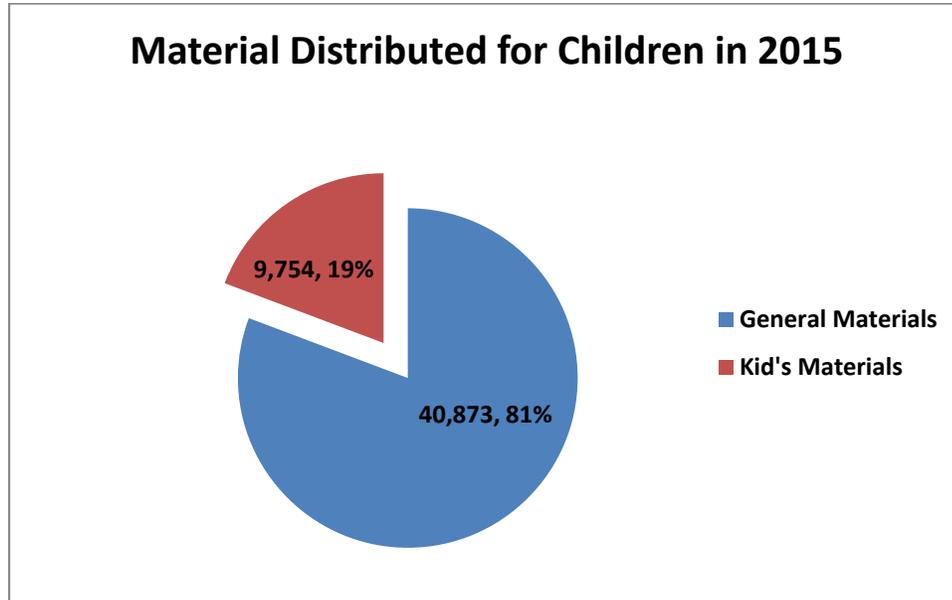


FIGURE 10 – MATERIAL DISTRIBUTED FOR CHILDREN IN 2015



**SOCIAL MEDIA**

The VCP further developed and improved the County's WNV website (SDFightTheBite.com) in 2015 providing valuable up-to-date information to property owners about personal protection and elimination of mosquito breeding sources around their properties. In addition,

information about WNV activity in the Assessment Area, in humans, birds, horses, sentinel chickens, and mosquitoes, was continually updated. The VCP also utilized press releases, press conferences and media events to help deliver WNV prevention information.

In 2015, the VCP maintained geocaches to be found by adventure-seekers equipped with GPS devices in three San Diego County Parks: Sweetwater Regional Park, Goodan Ranch Sycamore Canyon Preserve, and Mt. Gower Preserve. A total of 13 adventure seekers reported retrieval of VCP's caches. Each cache is stocked with insect repellent wipes, tick identification cards, "Fight the Bite" temporary tattoos, and magnets with the VCP's contact information on them.

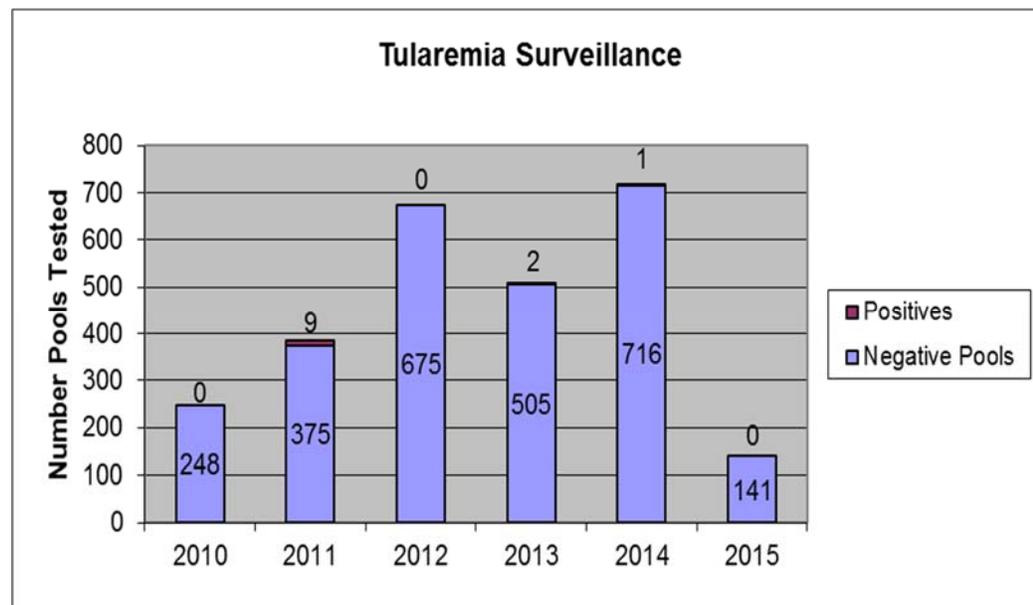
## TICK BORNE DISEASES

### TULAREMIA

Tularemia is a disease caused by the bacteria *Francisella tularensis*. It is typically found in smaller mammals, particularly rabbits. The primary vectors for this disease are the Pacific Coast tick and the American Dog tick. Both of these ticks are members of the *Dermacentor* genus. These ticks are commonly found in rural or undeveloped areas of the Assessment Area. They contract *F. tularensis* when they feed on infected animals and transmit the bacteria to the next animal or person on which they feed. This disease can also be transmitted by direct contact with an infected animal.

Tick surveillance conducted for tularemia over the past six years is shown in Figure 11. Tick populations vary from year to year, but for 2015 the numbers of ticks in the *Dermacentor* genus have been rather low which only allowed for 141 pools (up to 10 ticks per pool) to be submitted for tularemia testing. In 2015, no tick pools tested positive for tularemia.

FIGURE 11 – TULAREMIA SURVEILLANCE DURING 2010-2015

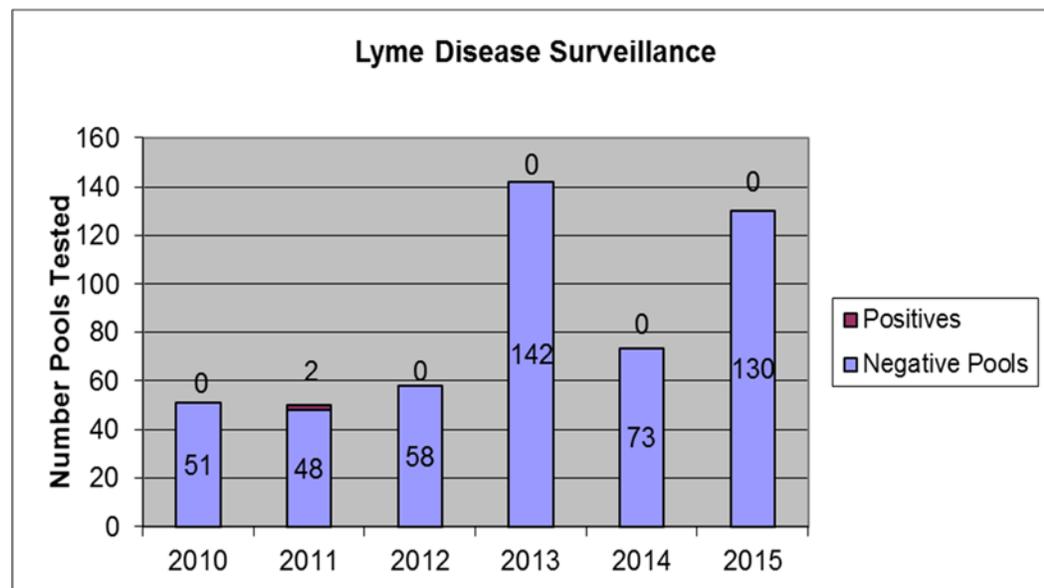


## LYME DISEASE

Lyme disease, caused by the bacteria *Borrelia burgdorferi*, was detected in ticks in 1994 and 1995 in San Diego County. The primary vector for this disease is the *Ixodes pacificus* or the Western Black-Legged tick. It is commonly found in most rural or undeveloped areas of the Assessment Area.

In 2006 only eight tick pools were tested due to a low population of ticks. By 2009 the tick population rebounded and has remained stable through 2015 when 130 pools were tested for Lyme disease. None were found to be positive.

FIGURE 12 – LYME DISEASE SURVEILLANCE DURING 2010-2015



Investigations of cases of Lyme disease diagnosed in San Diego County usually point to out of county exposure as being the most likely source. However, there are usually one or two cases each year which don't seem to have resulted from travel outside of San Diego County. For this reason, the VCP continues to test ticks and to actively distribute information about tick identification, disease prevention and personal protection.

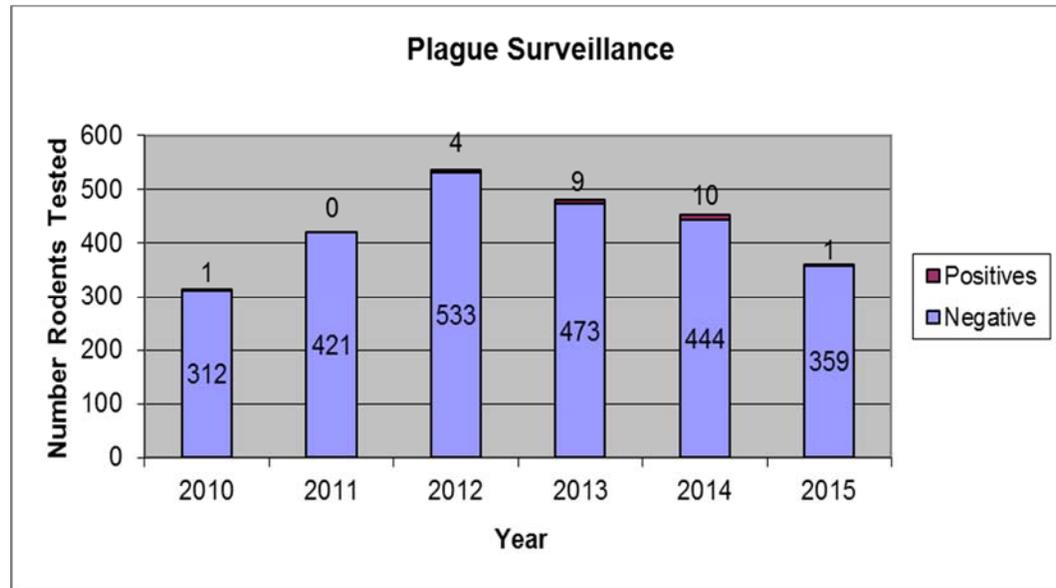
## RODENT BORNE DISEASE SURVEILLANCE

### PLAGUE

No human cases of plague, a disease caused by the bacteria *Yersinia pestis*, were reported within the Assessment Area in 2015. This disease is transmitted by the bite of infected fleas and direct contact with infected rodents, particularly ground squirrels. These rodents can act as reservoirs for the disease. Humans and their pets are vulnerable for infection when visiting areas abundant with rodents and fleas such as campgrounds or other rural areas. Ground squirrels are routinely tested at campgrounds by combing for fleas and collecting blood samples for plague testing.

Plague surveillance has been conducted, mostly at higher elevations, and has often yielded one or more plague-seropositive ground squirrels each year. In 2006, plague surveillance was expanded to lower elevations of the County and this continued in 2015. In 2015, 360 ground squirrels were tested for plague and one individual tested positive. Whenever positive cases are found, precautionary notices are posted in the affected area to inform the public. Due to the continued presence of plague in San Diego County, the VCP continues to actively distribute information about disease prevention and personal protection.

FIGURE 13 – PLAGUE SURVEILLANCE DURING 2010-2015



The VCP has continued trapping rodents in Ports of Entry to test for the presence of plague. This testing occurs where freight is received by boat, plane or truck from foreign points of origin. This surveillance is conducted twice a year. As in all prior years, zero rodents tested positive for plague in 2014.

### HANTAVIRUS

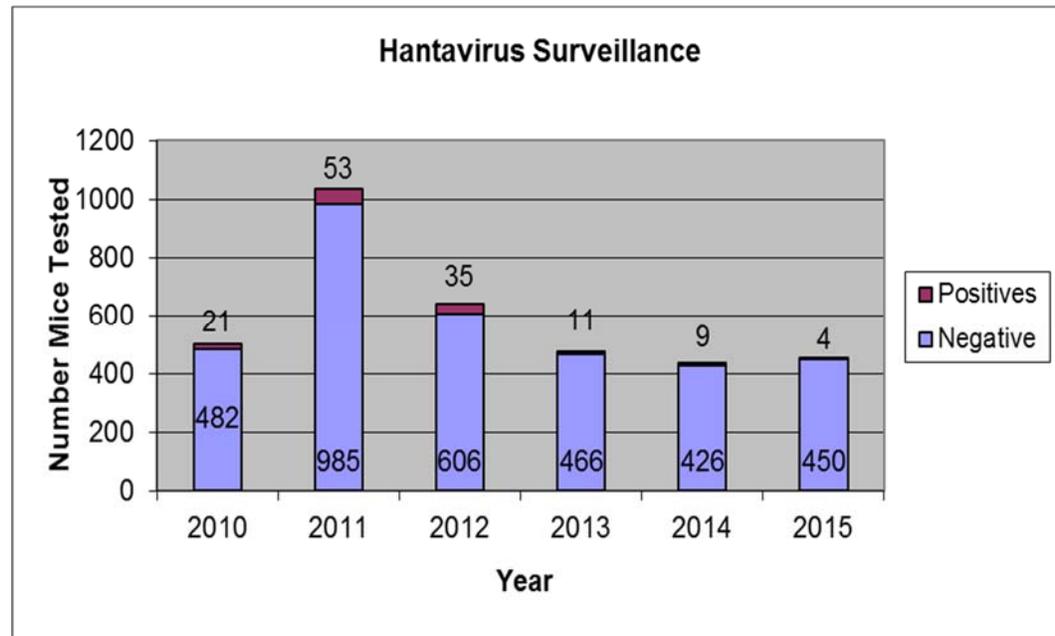
Both the hemorrhagic and respiratory strains of hantavirus occur in wild mice and voles within the Assessment Area. In 2004, the first locally acquired human case of Hantavirus Pulmonary Syndrome (HPS) was reported from the east county community of Campo. Humans typically develop Hantavirus Pulmonary Syndrome (HPS) by breathing aerosolized particles of wild mouse droppings containing hantavirus. Most human cases occur when people open up and occupy cabins or cleanup other small enclosed structures where wild mice have been present long enough to leave droppings.

The VCP routinely conducts surveillance in numerous locations around the Assessment Area by trapping for wild mice. Blood samples are collected from these mice and submitted for hantavirus testing. The testing occurs within its Disease Diagnostic Lab decreasing result

turnaround to within 48 hours and allowing for rapid deployment of prevention awareness campaigns.

In 2015, 454 samples were collected and 4 tested positive which reflects an overall decrease from 2.11% positive detections in 2014 to just under 1% in 2015.

FIGURE 14 – HANTAVIRUS SURVEILLANCE DURING 2010-2015



Outreach efforts for hantavirus include press releases for positive cases, informational videos posted on the County's YouTube page and the Vector Control website (SDVector.com), and educational materials that discuss the presence and risk of hantavirus with emphasis on proper cleaning techniques for rodent droppings to avoid exposure to the disease.

## RODENT AND FLY

### RODENTS

Common rodents found in the County of San Diego include the Norway rat (*Rattus norvegicus*), and the Roof rat or Black rat (*Rattus rattus*). These rats are specifically included in the rodent prevention and control program for the VCP. Native rats and mice such as the Dusky-Footed Wood rat (*Neotoma fuscipes*) and the Deer mouse (*Peromyscus maniculatus*) do not commonly coexist with humans and are not the focus of control efforts; however, control advice is offered.

In addition to being unsanitary, rodents harbor and may transmit a variety of organisms that are capable of infecting humans. Rodent urine may contain the bacteria that cause

leptospirosis, and their feces may contain Salmonella bacteria. Infected rat fleas may transmit plague and murine typhus.

Rats can also cause significant property damage. Rats can cause damage to woodwork and electrical wiring in buildings, potentially resulting in shorted circuits and fires. Rats are commonly known for chewing hoses and belts in automobiles, potentially causing accidents. An abundance of rats in public areas such as community parks can discourage use by the public.

The VCP assists property owners with their rat control efforts by providing inspections and consultations. The VCP performs exterior site inspections to educate property owners about structural weaknesses that may allow rats to enter the home. During these consultations, a rat control starter kit is provided to the property owner. These kits include a rat station, a rat snap trap, and a DVD and educational pamphlet with helpful information for control measures focusing on exclusion and elimination. The VCP webpage (SDVector.com) provides the public with information about domestic rat control. This site also enables the public to request service online.

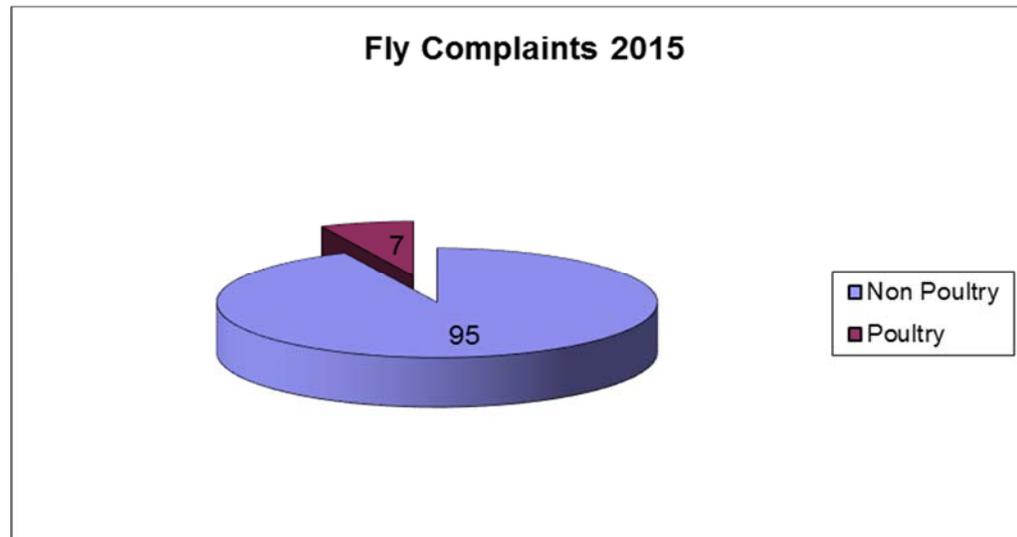
The VCP educates the public on rodents through presentations on rat control to homeowners and community groups and the distribution of educational materials at community events. The VCP collaborates with other regional agencies to prevent and eliminate rat infestations and harborages. In 2015, the VCP responded to nearly 1800 complaints from residents pertaining to domestic rodents. The Program primarily relies on public education and public cooperation for domestic rat control.

## FLIES

The VCP's Fly Abatement Program operates under the authority of Chapter 3, Division 4, Title 6 of the San Diego County Code of Regulatory Ordinances Relating to the Prevention and Control of Fly Breeding on Commercial Poultry Ranches. Annual Manure Management Proposals are prepared by each rancher for approval by the VCP. The poultry ranch operator is required to follow this plan in the management of manure. This can help reduce fly abundance generated by the ranch. Routine and complaint-based inspections, along with enforcement measures, are used to assure the prevention and abatement of flies which may constitute a threat to public health and welfare.

The VCP responds to general backyard sources of fly complaints with on-site visits. The Program also provides public education about sanitation, fly exclusion and control. Flies can be a threat to public health and a nuisance in the unincorporated areas of the County of San Diego. In 2015, San Diego County property owners lodged over 100 complaints concerning nuisance flies, seven of which involved commercial poultry ranches. This is a slight increase in poultry related complaints from 2014.

FIGURE 15 – FLY COMPLAINTS IN 2015



Common backyard fly sources include poultry, horse, and other livestock manure. Flies can also be found within the city limits breeding in garbage cans, dumpsters, compost piles, and organic matter. The most common fly is the House fly (*Musca domestica*). These flies are most abundant in the summer months. In warmer months flies can fully develop in less than one week. House fly populations can grow to large numbers depending on the availability of food sources. This can be particularly troublesome around poorly managed poultry ranches or other livestock operations where manure accumulates and is not able to dry. House flies are strong fliers and are known to fly as far as 20 miles.

The Lesser House fly (*Fannia canicularis*) is typically encountered in the spring or cooler months. This is the second most common pest species and can be particularly troublesome in poultry ranches. In some areas, the Lesser House fly may rival the House fly as the predominant pest species.

#### EYE GNAT PROGRAM

Eye gnats are small, shiny black flies approximately 1/6 inch in size. They breed in organically rich soil and are normally found at very low numbers in many parts of San Diego County. To produce their eggs, eye gnats feed on the protein found in body secretions such as mucus from the eyes and nose. In large numbers, they can be an annoyance to both people and animals.

In past years, residents in Jacumba and Escondido submitted hundreds of complaints about eye gnats impacting their quality of life. The County of San Diego recognizes the concerns of the homeowners and residents of these communities in relation to large eye gnat populations generated from nearby agricultural activities.

The subject agricultural activities included two organic farms where traditional pesticides cannot be used to control the eye gnats in order to maintain their organic certification in

compliance with the United States Department of Agriculture National Organic Program as implemented by the State of California Organic Program. In response to community concerns, research was conducted by the University of California Cooperative Extension, San Diego County, to understand the dynamics of the increased eye gnat population in Jacumba and Escondido. Several emergence trials were conducted which resulted in the development of eye gnat population reduction best management practices for the farms.

These recommendations were included in the voluntary "Eye Gnat Nuisance Prevention Plan (2012)" for the organic farm in Jacumba. Based on monitoring traps in the community, a decrease in the number of eye gnats captured was observed during the period that the plan was implemented. The Jacumba farm closed in June 2012.

Additionally the south area of Escondido had been experiencing an increased eye gnat population for several years. The University of California Cooperative Extension, San Diego County, was tasked with determining the source and understanding the dynamics of the eye gnat population in southern Escondido. A voluntary Eye Gnat Nuisance Prevention Plan was implemented in 2012 and continued in 2015 for the Be Wise Ranch organic farm.

On December 5, 2012, the Board of Supervisors of the County of San Diego approved ordinances amending Title 6 of the San Diego County Code relating to vector control to establish a County-wide (incorporated cities and unincorporated area) Eye Gnat Program and the County Administrative Code to establish an Eye Gnat Abatement Appeals Board. The amendments added eye gnats to the definition of a "vector" in Chapter 2 of Division 4 of Title 6 of the San Diego County Code thereby allowing abatement actions to be taken when it is determined that eye gnats are causing a nuisance to the public. The Director does not have the authority to issue orders that pesticides be used to abate eye gnats.

The amendments apply to all land within the County of San Diego that supports the development, attraction or harborage of eye gnats, including organic farms. A Negative Declaration was prepared and adopted by the Board of Supervisors for this project and is on file with the Department of Environmental Health as Environmental Review Number 12-00-001. The ordinances became effective on January 4, 2013. Modifications to the eye gnat program to clarify for commercial organic growers and their customers how the County intends to implement the Eye Gnat Program and to resolve litigation in San Diego Superior Court Case No. 37-2013-00030966 was adopted by the Board of Supervisors on March 20, 2013. Those amendments went into effect on May 10, 2013. The Eye Gnat Program is complaint driven and seeks voluntary compliance before escalating into enforcement. Staff conducts routine inspections during gnat season, approximately March – October, to verify implementation of a voluntary plan, respond to complaints and monitor both on-farm and DEH community eye gnat traps. Currently, one farm is under a voluntary plan.

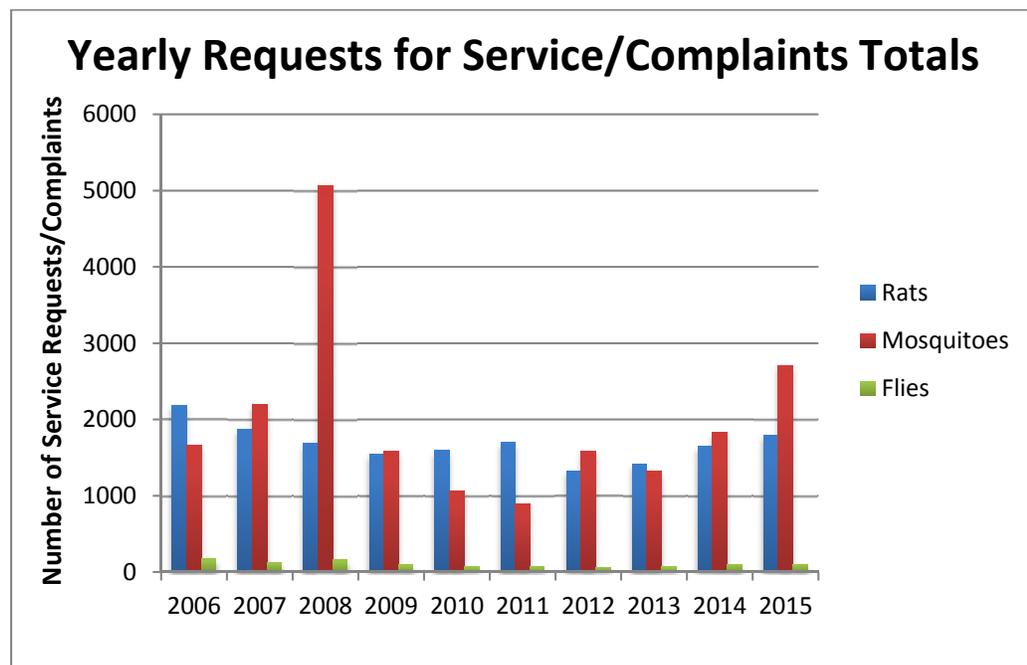
## RESPONSE/CUSTOMER SERVICE

The VCP responds to service requests throughout the Assessment Area. Any property owner, business or resident of a property in the Assessment Area may contact the VCP to request vector control related services or inspections. A VCP field technician will promptly

respond to a service request to evaluate the situation and to provide appropriate surveillance and control services. The VCP responds to all service requests in a timely manner, regardless of location, within the Assessment Area.

In 2015, the VCP responded to 2,711 complaints or service requests involving mosquito nuisance and breeding. While many complaints involved major mosquito breeding sources, the majority involved smaller or intermittent backyard sources. In addition, the VCP responded to 1,799 complaints or service requests relating to domestic rodents and a total of 102 complaints or service requests regarding flies from private residences and poultry farms.

FIGURE 16 – VECTOR CONTROL SERVICE REQUEST DURING 2006-2015



During 2015, VCP surpassed its performance measure standards for customer service as shown in the table below:

Performance Measure	2015 Average	Standard
Days to Initial Contact	1 day	97.2% within 3 days
Days to Completion for Mosquito Control complaints and requests for service	5 days	99.1% within 21 days

## VECTOR CONTROL HABITAT REMEDIATION PROGRAM

The Vector Habitat Remediation Program was launched in 2010 after the certification of a Programmatic Environmental Impact Report (PEIR) and modified in 2011 and 2012. A Regional General Permit for the Vector Habitat Remediation Program was issued in 2011 by the resource agencies. The General Permit is beneficial to the program because it streamlines the resource agencies' process for projects that have minimal habitat impacts. The PEIR identified mitigation measures that must be implemented for projects that impact those resources. While the PEIR is useful to applicants in obtaining compliance with the California Environmental Quality Act (CEQA), each project must comply with CEQA individually and additional environmental analysis may be required. The VHRP offers two types of grants, competitive and directed. Competitive projects have an upper limit of \$500,000 and involve a source selection committee process. Directed projects have a limit of \$50,000 and are awarded to smaller projects that are limited in scope. Directed projects are not subjected to a competitive process, but are carefully reviewed for their ability to reduce mosquito breeding and comply with program requirements. Applications for directed projects can be submitted at any time. Notice of solicitation for applications for the competitive projects is provided to stakeholders and placed on the website along with the application forms.

In 2015, awards were made for three projects submitted as competitive projects. The total value of the 2015 awards is approximately \$1,034,727. The grants will fund projects to evaluate, design physical modifications, secure permits and in some cases complete the implementation work for wetlands restoration, watercourse circulation improvement, and scour pond removal.

## DISEASE AND DIAGNOSTIC LABORATORY

The Disease and Diagnostic Laboratory was added to VCP in July 2010. This lab provides diagnostics and research to support the VCP. Scientists use state-of-the-art molecular tests to detect vector-borne pathogens in a wide variety of samples ranging from mosquitoes and ticks, to birds, rodents and other animals.

In response to an ongoing outbreak of the lethal disease Rocky Mountain Spotted Fever in Mexicali and Tijuana, Mexico, the Program performed a broad spectrum analysis of bacteria and potential pathogens within *Dermacentor occidentalis* ticks. In collaboration with experts at San Diego State University, the microbiome of over 100 *D. occidentalis* ticks was analyzed using 16S rRNA gene analysis and massive parallel DNA sequencing. This powerful diagnostic tool revealed that, fortunately, other pathogens, such as *Anaplasma*, *Ehrlichia*, *Bartonella* and *Coxiella*, were not present in these ticks but confirmed the presence of the pathogen *Rickettsia philipii* 364D. In addition, the data strongly suggested that certain bacteria within ticks may competitively exclude *R. philipii* 364D and other SFGR from co-infecting the ticks. This may lead to novel ways to prevent *Rickettsia* pathogens from being vectored by ticks. The findings are currently being further analyzed and prepared for publication.

In 2015, the Program implemented a test developed by the Centers for Disease Control to detect dengue virus serotypes 1-4. The Program is now prepared to find these viruses in invasive *Aedes* mosquitoes that have appeared in different regions of the County. The Program also implemented a test for chikungunya virus which can also potentially be spread by invasive *Aedes* mosquitoes.

## **EFFORTS PLANNED FOR 2016**

### **DISEASE AND DIAGNOSTIC LABORATORY**

The Disease and Diagnostic Laboratory is developing new in-house test for Zika virus, a virus transmitted by invasive *Aedes* mosquitoes and now spreading in Central and South America.

### **WNV STRATEGIC RESPONSE PLAN**

An updated WNV Strategic Response Plan will be adopted in 2016 that incorporates lessons learned from the past 12 years of WNV being present within the county. It will include revised risk level analyses that will guide the VCP in protecting the public from WNV.

### **INVASIVE AEDES MOSQUITO STRATEGIC RESPONSE PLAN**

An Invasive *Aedes* Strategic Response Plan (ASRP) is being developed. The purpose of the ASRP is to implement an integrated, risk-based response to the potential transmission of disease by invasive *Aedes* mosquitoes such as *Ae. albopictus* (Asian tiger mosquito) and *Aedes aegypti* (yellow fever mosquito). Invasive *Aedes* mosquitoes have been detected various regions in San Diego since 2014. The ASRP is designed to address surveillance, reduction of breeding locations, disease outbreak planning, control, and mitigation actions. A separate plan for *Aedes* is necessary because of the behavior and life cycle differences between the invasive *Aedes* mosquitoes and the other types of mosquitoes associated with West Nile virus transmission in the County.

### **MOSQUITO BREEDING IN UNDERGROUND CONVEYANCE SYSTEMS**

The Program plans to finalize and implement the strategy for evaluating and controlling mosquito breeding in underground conveyance systems (i.e., stormdrains) initiated in 2014.

### **PROPOSED DEVELOPMENT PROJECT REVIEWS**

During the public comment period, the Program will review and offer comments on development projects undergoing the California Environmental Quality Act to reduce the potential for future mosquito breeding sources being created.

## Estimate of Cost

FIGURE 17 – COST ESTIMATE FOR FISCAL YEAR 2016-17

Mosquito, Vector and Disease Control Assessment Estimate of Cost Fiscal Year 2016-17			<i>Total Budget</i>
Vector Control Services and Related Expenditures			
Vector Control and Disease Prevention Operations			\$5,141,824
Materials, Utilities and Supplies			\$2,703,013
Capital Equipment and Fixed Assets			\$362,496
Total Vector Control Services and Related Expenditures			<b>\$8,207,333</b>
Less:			
Contributions from other Sources			(\$2,576,979)
Contributions from Trust Fund			(\$1,582,734)
Total Revenue from Other Sources <sup>1</sup>			(\$4,159,713)
Net Cost of Vector Control, Fixed Asset Equipment, Operation			<b>\$4,047,620</b>
Reserve/Contingency Funds			(\$0)
Incidental Costs <sup>2</sup>			
County Collection, Levy Administration, and Other Incidentals			\$552,380
<b>Total Mosquito, Vector &amp; Disease Control Services and Incidentals (Net Amount to be Assessed)</b>			<b>\$4,600,000</b>
Budget Allocation to Property			
	Total SFE Units <sup>3</sup>	Assessment per SFE <sup>4</sup>	Total Assessment <sup>5</sup>
	920,000	\$5.00	\$4,600,000

## Notes:

- As determined in the following section, at least 7% of the cost of the Services must be funded from sources other than the assessments to cover any general benefits from the Services. Therefore, out of the total cost of Services of \$4,600,000 the VCP must contribute at least \$460,000 from sources other than the assessments. The VCP will contribute over \$4,159,713, which is well over the estimated general benefits.
- Incidental Costs includes allowance for uncollectible assessments from assessments on public agency parcels, County collection charges, and assessment administration costs.
- SFE Units means Single Family Equivalent benefit units. See method of assessment in the following Section for further definition.
- The assessment rate per SFE is the total amount of assessment per Single Family Equivalent benefit unit.

5. The proceeds from the assessments will be deposited into a special fund for the Assessment. Funds raised by the assessment shall be used only for the purposes stated within this Report. Any balance remaining at the end of the fiscal year, June 30, must be carried over to the next fiscal year. The assessment amounts are rounded down to the even penny for purposes of complying with the collection requirements from the County Auditor. Therefore, the total assessment amount for all parcels subject to the assessments may vary slightly from the net amount to be assessed.

## METHOD OF ASSESSMENT

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This section of the Report explains the benefits to be derived from the Services provided for property in the VCP and the methodology used to apportion the total assessment to properties within the Mosquito, Vector and Disease Control Assessment Area.

The Mosquito, Vector and Disease Control Assessment Area consists of all Assessor Parcels within the County, as defined by the approved boundary description (boundary will be coterminous with the County of San Diego).

The method used for apportioning the assessment is based upon the proportional special benefits to be derived by the properties in the Assessment Area over and above general benefits conferred to the public at large or real property in the Assessment Area. Special benefit is calculated for each parcel in the Assessment Area using the following process:

1. Identification of total benefit to the properties derived from the Services
2. Calculation of the proportion of these benefits that are special vs. general
3. Determination of the relative special benefit within different areas within the Assessment Area
4. Determination of the relative special benefit per property type and property characteristic
5. Calculation of the specific assessment for each individual parcel based upon special vs. general benefit; location, property type and property characteristics

### DISCUSSION OF BENEFIT

In summary, the assessments can only be levied based on the special benefit to property. This benefit is received by property over and above any general benefits. This special benefit is received by property over and above any general benefits from the additional Services. With reference to the engineering requirements for property related assessments, under Proposition 218, an engineer must determine and prepare a report evaluating the amount of special and general benefit received by property within the Assessment Area as a result of the improvements or services provided by a local agency. That special benefit is to be determined in relation to the total cost to that local entity of providing the service and/or improvements.

Proposition 218 as described in Article XIID of the California Constitution has confirmed that assessments must be based on the special benefit to property:

*"No assessment shall be imposed on any parcel which exceeds the reasonable cost of the proportional special benefit conferred on that parcel."*

The below benefit factors, when applied to property in the Assessment Area, confer special benefits to property and ultimately improve the safety, utility, functionality and usability of property in the Assessment Area. These are special benefits to property in the Assessment

Area in much the same way that storm drainage, sewer service, water service, lighting, sidewalks and paved streets enhance the safety, utility and functionality of each parcel of property served by these improvements, providing them with more utility of use and making them safer and more usable for occupants.

It should also be noted that Proposition 218 included a requirement that existing assessments in effect upon its effective date were required to be confirmed by either a majority vote of registered voters in the Assessment Area, or by weighted majority property owner approval using the new ballot proceeding requirements. However, certain assessments were excluded from these voter approval requirements. Of note is that in California Constitution Article XIID Section 5(a) this special exemption was granted to assessments for sidewalks, streets, sewers, water, flood control, drainage systems and vector control. The Howard Jarvis Taxpayers Association explained this exemption in their Statement of Drafter's Intent:

*"This is the "traditional purposes" exception. These existing assessments do not need property owner approval to continue. However, future assessments for these traditional purposes are covered."<sup>2</sup>*

Therefore, the drafters of Proposition 218 acknowledged that vector control assessments were a "traditional" and therefore acknowledged and accepted use.

The Legislature also made a specific determination after Proposition 218 was enacted that vector control services constitute a proper subject for special assessment. Health and Safety Code section 2082, which was signed into law in 2002, provides that a district may levy special assessments consistent with the requirements of Article XIID of the California Constitution to finance vector control projects and programs. The intent of the Legislature to allow and authorize benefit assessments for vector control services after Proposition 218 is shown in the Assembly and Senate analysis the Mosquito Abatement and Vector Control District Law where it states that the law:

*Allows special benefit assessments to finance vector control projects and programs, consistent with Proposition 218.<sup>3</sup>*

Therefore, the State Legislature unanimously found that vector control services are a valuable and important public service that can be funded by benefit assessments. To be funded by assessments, vector control services must confer special benefit to property.

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<sup>2</sup> Howard Jarvis Taxpayers Association, "Statement of Drafter's Intent", January 1997.

<sup>3</sup> Senate Bill 1588, Mosquito Abatement and Vector Control District Law, Legislative bill analysis

## MOSQUITO AND VECTOR CONTROL IS A SPECIAL BENEFIT TO PROPERTIES

As described below, this Engineer's Report concludes that mosquito and vector control is a special benefit that provides direct advantages to property in the Assessment Area. For example, if approved, the assessment would provide reduced levels of mosquitoes and other vectors on property throughout the Assessment Area. Moreover, the assessment will reduce the risk of the presence of diseases on property throughout the Assessment Area, which is another direct advantage received by property in the Assessment Area. Moreover, the assessment will fund Services that improve the use of property and reduce the nuisance and harm created by vectors on property throughout the Assessment Area. These are tangible and direct special benefits that will be received by property throughout the specific area covered by the Assessment.

The following section, Benefit Factors, describes how and why vector control services specially benefit properties in the Assessment Area. These benefits are particular and distinct from its effect on property in general or the public at large.

### BENEFIT FACTORS

In order to allocate the assessments, the assessment engineer identified the types of special benefit arising from the aforementioned Services and that would be provided to property in the Assessment Area. The following benefit factors have been established that represent the types of special benefit to parcels resulting from the Services to be financed with the assessment proceeds. These types of special benefit are as follows:

#### **REDUCED MOSQUITO AND VECTOR POPULATIONS ON PROPERTY AND AS A RESULT, ENHANCED DESIRABILITY, UTILITY, USABILITY AND FUNCTIONALITY OF PROPERTY IN THE ASSESSMENT AREA.**

The assessments will provide enhanced services for the control and abatement of nuisance and disease-carrying mosquitoes. These Services will materially reduce the number of vectors on properties throughout the Assessment Area. The lower mosquito and vector populations on property in the Assessment Area are a direct advantage to property that will serve to increase the desirability and "usability" of property. Clearly, properties are more desirable and usable in areas with lower mosquito populations and with a reduced risk of vector-borne disease. This is a special benefit to residential, commercial, agricultural, industrial and other types of properties because all such properties will directly benefit from reduced mosquito and vector populations and properties with lower vector populations are more usable, functional and desirable.

Excessive mosquitoes and other vectors in the area can materially diminish the utility and usability of property. For example, prior to the commencement of mosquito control and abatement services, properties in many areas in the State were considered to be nearly

uninhabitable during the times of year when the mosquito populations were high.<sup>4</sup> The prevention or reduction of such diminished utility and usability of property caused by mosquitoes is a clear and direct advantage and special benefit to property in the Assessment Area.

The State Legislature made the following finding on this issue:

*“Excess numbers of mosquitoes and other vectors spread diseases of humans, livestock, and wildlife, reduce enjoyment of outdoor living spaces, both public and private, reduce property values, hinder outdoor work, reduce livestock productivity; and mosquitoes and other vectors can disperse or be transported long distances from their sources and are, therefore, a health risk and a public nuisance; and professional mosquito and vector control based on scientific research has made great advances in reducing mosquito and vector populations and the diseases they transmit.”<sup>5</sup>*

Mosquitoes and other vectors emerge from sources throughout the Assessment Area, and with an average flight range of two miles, mosquitoes from known sources can reach all properties in the Assessment Area. These sources include standing water in rural areas, such as marshes, pools, wetlands, ponds, drainage ditches, drainage systems, tree holes and other removable sources such as old tires and containers. The sources of mosquitoes also include numerous locations throughout the urban areas in the Assessment Area. These sources include underground drainage systems, containers, unattended swimming pools, leaks in water pipes, tree holes, flower cups in cemeteries, over-watered landscaping and lawns and many other sources. By controlling mosquitoes at known and new sources, the Services will materially reduce mosquito populations on property throughout the Assessment Area.

An increasing source of mosquitoes is unattended swimming pools:

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4 Prior to the commencement of modern mosquito control services, areas in the State of California such as the San Mateo Peninsula, Napa County, Lake County, areas in Marin and Sonoma Counties and many other areas in the State had such high mosquito populations or other vector populations that they were considered to be nearly unlivable during certain times of the year and were largely used for part-time vacation cottages that were occupied primarily during the months when the natural vector populations were lower.

5 Assembly Concurrent Resolution 52, chaptered April 1, 2003

*“Anthropogenic landscape change historically has facilitated outbreaks of pathogens amplified by peridomestic vectors such as Cx. pipiens complex mosquitoes and associated commensals such as house sparrows. The recent widespread downturn in the housing market and increase in adjustable rate mortgages have combined to force a dramatic increase in home foreclosures and abandoned homes and produced urban landscapes dotted with an expanded number of new mosquito habitats. These new larval habitats may have contributed to the unexpected early season increase in WNV cases in Bakersfield during 2007 and subsequently have enabled invasion of urban areas by the highly competent rural vector Cx. tarsalis. These factors can increase the spectrum of competent avian hosts, the efficiency of enzootic amplification, and the risk for urban epidemics.”<sup>6</sup>*

#### **INCREASED SAFETY OF PROPERTY IN THE ASSESSMENT AREA.**

The Assessments will result in improved year-round proactive Services to control and abate mosquitoes and other vectors that otherwise would occupy properties throughout the Assessment Area. Mosquitoes and other vectors are transmitters of diseases, so the reduction of mosquito and vector populations makes property safer for use and enjoyment. In absence of the assessments, these Services would not be provided, so the Services funded by the assessments make properties in the Assessment Area safer, which is a distinct special benefit to property in the Assessment Area.<sup>7</sup> This is not a general benefit to property in the Assessment Area or the public at large because the Services are tangible mosquito, vector and disease control services that will be provided directly to the properties in the Assessment Area and the Services are over and above what otherwise would be provided by the VCP or any other agency.

This finding was confirmed in 2003 by the State Legislature:

*“Mosquitoes and other vectors, including but not limited to, ticks, Africanized honey bees, rats, fleas, and flies, continue to be a source of human suffering, illness, death, and a public nuisance in California and around the world. Adequately funded mosquito and vector control, monitoring and public awareness programs are the best way to prevent outbreaks of West Nile Virus and other diseases borne by mosquitoes and other vectors.”<sup>8</sup>*

Also, the Legislature, in Health and Safety Code Section 2001, finds that:

<sup>6</sup> Riesen William K. (2008). Delinquent Mortgages, Neglected Swimming Pools, and West Nile Virus, California. Emerging Infectious Diseases. Vol. 14(11).

<sup>7</sup> By reducing the risk of disease and increasing the safety of property, the proposed Services will materially increase the usefulness and desirability of certain properties in the Assessment Area.

<sup>8</sup> Assembly Concurrent Resolution 52, chaptered April 1, 2003

*"The protection of Californians and their communities against the discomforts and economic effects of vectorborne diseases is an essential public service that is vital to public health, safety, and welfare."*

#### **REDUCTIONS IN THE RISK OF NEW DISEASES AND INFECTIONS ON PROPERTY IN THE ASSESSMENT AREA.**

Mosquitoes have proven to be a major contributor to the spread of new diseases such as West Nile Virus, among others. A highly mobile population combined with migratory bird patterns can introduce new mosquito-borne diseases into previously unexposed areas.

*"Vector-borne diseases (including a number that are mosquito-borne) are a major public health problem internationally. In the United States, dengue and malaria are frequently brought back from tropical and subtropical countries by travelers or migrant laborers, and autochthonous transmission of malaria and dengue occasionally occurs. In 1998, 90 confirmed cases of dengue and 1,611 cases of malaria were reported in the USA and dengue transmission has occurred in Texas."<sup>9</sup>*

*"During 2004, 40 states and the District of Columbia (DC) have reported 2,313 cases of human WNV illness to CDC through ArboNET. Of these, 737 (32%) cases were reported in California, 390 (17%) in Arizona, and 276 (12%) in Colorado. A total of 1,339 (59%) of the 2,282 cases for which such data were available occurred in males; the median age of patients was 52 years (range: 1 month--99 years). Date of illness onset ranged from April 23 to November 4; a total of 79 cases were fatal."<sup>10</sup> (According to the Centers for Disease Control and Prevention on January 19, 2004, a total of 2,470 human cases and 88 human fatalities from WNV have been confirmed).*

A study of the effect of aerial spraying conducted by the Sacramento-Yolo Mosquito and Vector Control District (SYMVCD) to control a West Nile Virus disease outbreak found that the SYMVCD's mosquito control efforts materially decreased the risk of new diseases in the treated areas:

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<sup>9</sup> Rose, Robert. (2001). Pesticides and Public Health: Integrated Methods of Mosquito Management. Emerging Infectious Diseases. Vol. 7(1); 17-23.

<sup>10</sup> Center for Disease Control. (2004). West Nile Virus Activity --- United States, November 9--16, 2004. Morbidity and Mortality Weekly Report. 53(45); 1071-1072.

*After spraying, infection rates decreased from 8.2 (95% CI 3.1–18.0) to 4.3 (95% CI 0.3–20.3) per 1,000 females in the spray area and increased from 2.0 (95% CI 0.1–9.7) to 8.7 (95% CI 3.3–18.9) per 1,000 females in the untreated area. Furthermore, no additional positive pools were detected in the northern treatment area during the remainder of the year, whereas positive pools were detected in the untreated area until the end of September (D.-E.A Elnaiem, unpub. data). These independent lines of evidence corroborate our conclusion that actions taken by SYMVCD were effective in disrupting the WNV transmission cycle and reducing human illness and potential deaths associated with WNV.<sup>11</sup>*

The Services funded by the assessments will help prevent on a year-round basis the presence of vector-borne diseases on property in the Assessment Area. This is another tangible and direct special benefit to property in the Assessment Area that would not be received in absence of the assessments.

#### **PROTECTION OF ECONOMIC ACTIVITY ON PROPERTY IN THE ASSESSMENT AREA.**

As recently demonstrated by the SARS outbreak in China and outbreaks of Avian Flu, outbreaks of pathogens can materially and negatively impact economic activity in the affected area. Such outbreaks and other public health threats can have a drastic negative effect on tourism, business and residential activities in the affected area. The assessments will help to prevent the likelihood of such outbreaks in the Assessment Area.

Mosquitoes hinder, annoy and harm residents, guests, visitors, farm workers, and employees. A vector-borne disease outbreak and other related public health threats would have a drastic negative effect on agricultural, business and residential activities in the Assessment Area.

The economic impact of diseases is well documented. According to a study prepared for the Centers for Disease Control and Prevention, economic losses due to the transmission of West Nile Virus in Louisiana was estimated to cost over \$20 million over approximately one year:

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<sup>11</sup> Carney, Ryan. (2008), Efficiency of Aerial Spraying of Mosquito Adulticide in Reducing the Incidence of West Nile Virus, California, 2005. Emerging Infectious Diseases, Vol 14(5)

*The estimated cost of the Louisiana epidemic was \$20.1 million from June 2002 to February 2003, including a \$10.9 million cost of illness (\$4.4 million medical and \$6.5 million nonmedical costs) and a \$9.2 million cost of public health response. These data indicate a substantial short-term cost of the WNV disease epidemic in Louisiana.*<sup>12</sup>

Moreover, a study conducted in 1996-97 of La Crosse Encephalitis (LACE), a human illness caused by a mosquito-transmitted virus, found a lifetime cost per human case at \$48,000 to \$3,000,000 and found that the disease significantly impacted lifespans of those who were infected. Following is a quote from the study which references the importance and value of active vector control services of the type that would be funded by the assessments:

*The socioeconomic burden resulting from LACE is substantial, which highlights the importance of the illness in western North Carolina, as well as the need for active surveillance, reporting, and prevention programs for the infection.*<sup>13</sup>

The Services to be funded by the assessments will help prevent the likelihood of such outbreaks on property in the Assessment Area and will reduce the harm to economic activity on property caused by existing mosquito populations. This is another direct advantage received by property in the Assessment Area that would not be received in absence of the assessments.

#### **PROTECTION OF ASSESSMENT AREA'S AGRICULTURE, TOURISM, AND BUSINESS INDUSTRIES.**

The agriculture, tourism and business industries will benefit from reduced levels of harmful or nuisance mosquitoes and other vectors. Conversely, any outbreaks of emerging vector-borne pathogens such as West Nile Virus could also materially negatively affect these industries. Diseases transmitted by mosquitoes and other vectors can adversely impact business and recreational functions.

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<sup>12</sup> Zohrabian A, Meltzer MI, Ratard R, Billah K, Molinari NA, Roy K, et al. West Nile Virus economic impact, Louisiana, 2002. Emerging Infectious Disease, 2004 Oct. Available from <http://www.cdc.gov/ncidod/EID/vol10no10/03-0925.htm>

<sup>13</sup> Utz, J. Todd, Apperson, Charles S., Maccormack, J. Newton, Salyers, Martha, Dietz, E. Jacquelin, Mcpherson, J. Todd, Economic And Social Impacts Of La Crosse Encephalitis In Western North Carolina, Am J Trop Med Hyg 2003 69: 509-518

*A study prepared for the United States Department of Agriculture in 2003 found that over 1,400 horses died from West Nile Virus in Colorado and Nebraska and that these fatal disease cases created over \$1.2 million in costs and lost revenues. In addition, horse owners in these two states spent over \$2.75 million to vaccinate their horses for this disease. The study states that "Clearly, WNV has had a marked impact on the Colorado and Nebraska equine industry."<sup>14</sup>*

*Pesticides for mosquito control impart economic benefits to agriculture in general. Anecdotal reports from farmers and ranchers indicate that cattle, if left unprotected, can be exsanguinated by mosquitoes, especially in Florida and other southeast coastal areas. Dairy cattle produce less milk when bitten frequently by mosquitoes<sup>15</sup>*

The assessments will serve to protect the businesses and industries and the employees and residents that benefit from these businesses and industries. This is a direct advantage and special benefit to property in the Assessment Area.

#### **REDUCED RISK OF NUISANCE AND LIABILITY ON PROPERTY IN THE ASSESSMENT AREA**

In addition to health related factors, uncontrolled mosquito and vector populations create a nuisance for the occupants of property in the Assessment Area. Properties in the Assessment Area, therefore, will benefit from the reduced nuisance factor that will be created by the Services. Agricultural and rangeland properties also benefit from the reduced nuisance factor and harm to livestock and employees from lower mosquito and vector populations.

Agricultural, range, golf course, cemetery, open space and other such lands in the Assessment Area contain large areas of mosquito and vector habitat and are therefore a significant source of mosquito and vector populations. In addition, residential and business properties in the Assessment Area can also contain significant sources.<sup>16</sup> It is conceivable that sources of mosquitoes could be held liable for the transmission of diseases or other harm. For example, in August 2004, the City of Los Angeles approved new fines of up to \$1,000 per day for property owners who don't remove standing water sources of mosquitoes on their property.

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<sup>14</sup> S. Geiser, A. Seitzinger, P. Salazar, J. Traub-Dargatz, P. Morley, M. Salman, D. Wilmot, D. Steffen, W. Cunningham, Economic Impact of West Nile Virus on the Colorado and Nebraska Equine Industries: 2002, April 2003, Available from

[http://www.aphis.usda.gov/vs/ceah/cnahs/nahms/equine/wnv2002\\_CO\\_NB.pdf](http://www.aphis.usda.gov/vs/ceah/cnahs/nahms/equine/wnv2002_CO_NB.pdf)

<sup>15</sup> Jennings, Allen. (2001). USDA Letter to EPA on Fenthion IRED. United States Department of Agriculture, Office of Pest Management Policy. March 8, 2001.

<sup>16</sup> Sources of mosquitoes on residential, business, agricultural, range and other types of properties include removable sources such as containers that hold standing water.

The Services will serve to protect the businesses and industries in the Assessment Area. This is a direct advantage and a special benefit to property in the Assessment Area.

#### IMPROVED MARKETABILITY OF PROPERTY

As described previously, the Services will specially benefit properties in the Assessment Area by making them more useable, livable and functional. The Services also make properties in the Assessment Area more desirable, and more desirable properties also benefit from improved marketability. This is another tangible and direct special benefit to property which will not be enjoyed in absence of the Services.<sup>17</sup>

#### BENEFIT FINDING

In summary, the special benefits described in this Report and the improved Services in the Assessment Area directly benefit and protect the real properties in the Assessment Area in excess of the assessments for these properties. Therefore, the assessment engineer finds that the cumulative special benefits to property from the Services are reasonably equal to or greater than the proposed annual assessment amount per benefit unit.

#### GENERAL VS. SPECIAL BENEFIT

Article XIIC of the California Constitution requires any local agency proposing to increase or impose a benefit assessment to “separate the general benefits from the special benefits conferred on a parcel.” The rationale for separating special and general benefits is to ensure that property owners subject to the benefit assessment are not paying for general benefits. The assessment can fund the special benefits to property in the Assessment Area but cannot fund any general benefits. Accordingly, a separate estimate of the special and general benefit is given in this section.

In other words:

<b>Total Benefit</b>	<b>=</b>	<b>General Benefit</b>	<b>+</b>	<b>Special Benefit</b>
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There is no widely-accepted or statutory formula for general benefit from vector control services. General benefits are benefits from improvements or services that are not special in nature, are not “particular and distinct” and are not “over and above” benefits received by

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<sup>17</sup> If one were to compare two hypothetical properties with similar characteristics, the property with lower mosquito infestation and reduced risk of vector-borne disease will clearly be more desirable, marketable and usable.

other properties. General benefits are conferred to properties located “in the district,”<sup>18</sup> but outside the narrowly-drawn Assessment Area and to “the public at large.” SVTA vs. SCCOSA provides some clarification by indicating that general benefits provide “an indirect, derivative advantage” and are not necessarily proximate to the improvements and services funded by the assessments.

A formula to estimate the general benefit is listed below:

<b>General Benefit</b>	=	<b>Benefit to Real Property Outside the Assessment District</b>	+	<b>Benefit to Real Property Inside the Assessment District that is Indirect and Derivative</b>	+	<b>Benefit to the Public at Large</b>
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Special benefit, on the other hand, is defined in the state constitution as “a particular and distinct benefit over and above general benefits conferred on real property located in the district or to the public at large.” The SVTA v. SCCOSA decision indicates that a special benefit is conferred to a property if it “receives a direct advantage from the improvement (e.g., proximity to a park).” In this assessment, the overwhelming proportion of the benefits conferred to property is special, since the advantages from the mosquito, vector and disease control/protection funded by the Assessments are directly received by the properties in the Assessment Area and are only minimally received by property outside the Assessment Area or the public at large.

Proposition 218 twice uses the phrase “over and above” general benefits in describing special benefit. [Art. XIID, sections 2(i) & 4(f)]. There currently are some mosquito and vector related services being provided to the Assessment Area. Consequently, there currently are some mosquito control related benefits being provided to the Assessment Area and any new and extended service provided by the Assessment Area would be over and

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<sup>18</sup> SVTA vs. SCCOSA explains as follows:

OSA observes that Proposition 218’s definition of “special benefit” presents a paradox when considered with its definition of “district.” Section 2, subdivision (i) defines a “special benefit” as “a particular and distinct benefit over and above general benefits conferred on real property located in the district or to the public at large.” (Art. XIII D, § 2, subd. (i), italics added.) Section 2, subdivision (d) defines “district” as “an area determined by an agency to contain all parcels which will receive a special benefit from a proposed public improvement or property-related service.” (Art. XIII D, § 2, subd. (d), italics added.) In a well-drawn district — limited to only parcels receiving special benefits from the improvement — every parcel within that district receives a shared special benefit. Under section 2, subdivision (i), these benefits can be construed as being general benefits since they are not “particular and distinct” and are not “over and above” the benefits received by other properties “located in the district.”

We do not believe that the voters intended to invalidate an assessment district that is narrowly drawn to include only properties directly benefiting from an improvement. Indeed, the ballot materials reflect otherwise. Thus, if an assessment district is narrowly drawn, the fact that a benefit is conferred throughout the district does not make it general rather than special.

above this baseline. Arguably, all of the Services to be funded by the assessment therefore would be a special benefit because the additional Services would particularly and distinctly benefit and protect the Assessment Area over and above the previous baseline benefits and service.

Nevertheless, arguably some of the Services would benefit the public at large and properties outside the Assessment Area. In this report, the general benefit is conservatively estimated and described, and then budgeted so that it is funded by sources other than the assessment.

In the 2009 Dahms case, the court upheld an assessment that was 100% special benefit on the rationale that the services funded by the assessments were directly provided to property in the assessment district. Similar to the assessments in Pomona that were validated by Dahms, the Assessments described in this Engineer's Report fund mosquito, vector and disease control services directly provided to property in the assessment area. Moreover, as noted in this Report, the Services directly reduce mosquito and vector populations on all property in the assessment area. Therefore, Dahms establishes a basis for minimal or zero general benefits from the Assessments. However, in this report, the general benefit is more conservatively estimated and described, and then budgeted so that it is funded by sources other than the assessment.

#### **CALCULATING GENERAL BENEFIT**

Without this assessment the Assessment Area would lack the funds to extend the additional Services to the Assessment Area. The only additional service that is being provided is the vector control program assessment-funded Services. Consistent with footnote 8 of SVTA v. SCCOSA, and for the reasons described above, the Assessment Area has determined that all parcels in the Assessment Area receive a shared direct advantage and special benefit from the Services. The Services directly and particularly serve and benefit each parcel, and are not a mere indirect, derivative advantage. As explained above, Proposition 218 relies on the concept of "over and above" in distinguishing special benefits from general benefits. As applied to an assessment proceeding concurrent with the annexation this concept means that all vector control services, which provide direct advantage to property in the Assessment Area, are over and above the baseline and therefore are special.

Nevertheless, the Services may provide a degree of general benefit, in addition to the predominant special benefit. This section provides a conservative measure of the general benefits from the Assessments.

#### **BENEFIT TO PROPERTY OUTSIDE THE ASSESSMENT AREA**

Properties within the Assessment Area receive almost all of the special benefits from the Services because the Services funded by the Assessments will be provided directly to protect property within the Assessment Area from mosquitoes and vector-borne diseases. However, properties adjacent to, but just outside of, the boundaries may receive some benefit from the Services in the form of reduced mosquito populations on property outside the Assessment Area. Since this benefit, is conferred to properties outside the Assessment

Area boundaries, it contributes to the overall general benefit calculation and will not be funded by the assessment.

A measure of this general benefit is the proportion of Services that would affect properties outside of the Assessment Area. Each year, the Assessment Area will provide some of its Services in areas near the boundaries of the Assessment Area. By abating mosquito populations near the borders of the Assessment Area, the Services could provide benefits in the form of reduced mosquito populations and reduced risk of disease transmission to properties outside the Assessment Area. If mosquitoes were not controlled inside the Assessment Area, more of them would fly from the Assessment Area. Therefore, control of mosquitoes within the Unprotected Areas provides some benefit to properties outside the Assessment Area but within the normal travel range of vectors, in the form of reduced mosquito populations and reduced vector-borne disease transmission. This is a measure of the general benefits to property outside the Assessment Area because this is a benefit from the Services that is not specially conferred upon property in the assessment area.

The mosquito potential outside the Assessment Area is based on studies of mosquito dispersion concentrations. Mosquitoes can travel up to two miles, on average, so this destination range is used. Based on studies of mosquito destinations, relative to parcels in the Assessment Area average concentration of mosquitoes from the Unprotected Areas on properties within two miles of the Assessment Area is calculated to be 6%.<sup>19</sup> This relative vector population reduction factor within the destination range is combined with the number of parcels outside the Assessment Area and within the destination range to measure this general benefit and is calculated as follows:

#### CRITERIA

- Mosquitoes may fly up to 2 miles from their breeding source.
- 233,032 parcels within 2 miles of, but outside of the Assessment Area, may receive some mosquito and disease protection benefit
- 6% portion of relative benefit that is received
- 1,034,810 Parcels in the Assessment Area

#### CALCULATIONS

Total Benefit = 233,032 parcels \* 6% = 13,982 parcels equivalents

Percentage of overall parcel equivalents = 13,982 / 1,062,777 = 1.32 %

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<sup>19</sup> Tietze, Noor S., Stephenson, Mike F., Sidhom, Nader T. and Binding, Paul L., "Mark-Recapture of Culex Erythrothorax in Santa Cruz County, California", Journal of the American Mosquito Control Association, 19(2):134-138, 2003.

Therefore, for the overall benefits provided by the Services to the Assessment Area, it is determined that 1.32% of the benefits is received by the parcels within two miles of the Assessment Area boundaries. Recognizing that this calculation is an approximation, this benefit will be rounded up to 2.0%.

#### **BENEFIT TO PROPERTY *INSIDE* THE ASSESSMENT AREA THAT IS *INDIRECT AND DERIVATIVE***

The "indirect and derivative" benefit to property within the Assessment Area is particularly difficult to calculate. As explained above, all benefit within the Assessment Area is special because the mosquito and disease control services in the Assessment Area would provide direct service and protection that is clearly "over and above" and "particular and distinct" when compared with the level of such protection under current conditions. Further the properties are within the Assessment Area boundaries and this Engineer's Report demonstrates the direct benefits received by individual properties from mosquito and disease control services.

In determining the Assessment Area, the VCP was careful to limit it to an area of parcels that would directly receive the Services. All parcels directly benefit from the surveillance, monitoring and treatment that will be provided on an equivalent basis throughout the Assessment Area in order to maintain the same improved level of protection against mosquitoes and other vectors and reduced mosquito and vector populations throughout the area. The surveillance and monitoring sites are spread on a balanced basis throughout the area. Mosquito and vector control and treatment are provided as needed throughout the area based on the surveillance and monitoring results. The shared special benefit - reduced mosquito levels and reduced presence of vector-borne diseases - are received on an equivalent basis by all parcels in the Assessment Area. Furthermore, all parcels in the Assessment Area directly benefit from the ability to request service from the VCP and to have a VCP field technician promptly respond directly to the parcel and address the owner's or resident's service need. The SVTA vs. SCCOSA decision indicates that the fact that a benefit is conferred throughout the Assessment Area does not make the benefit general rather than special, so long as the Assessment Area is narrowly drawn and limited to the parcels directly receiving shared special benefits from the service. This concept is particularly applicable in situations involving a landowner-approved assessment-funded extension of a local government service to benefit lands previously not receiving that particular service. We therefore conclude that, other than the small general benefit to properties outside the Assessment Area (discussed above) and to the public at large (discussed below), all of the benefits of the Services to the parcels within the Assessment Area are special benefits and it is not possible or appropriate to separate any general benefits from the benefits conferred on parcels in the Assessment Area.

#### **BENEFIT TO THE PUBLIC AT LARGE**

With the type and scope of Services to be provided to the Assessment Area, it is very difficult to calculate and quantify the scope of the general benefit conferred on the public at large. Because the Services directly serve and benefit all of the property in the Assessment Area, any general benefit conferred on the public at large is small. Nevertheless, there is some indirect general benefit to the public at large.

The public at large uses the public highways, streets and sidewalks, and when traveling in and through the Assessment Area they will benefit from the Services. A fair and appropriate measure of the general benefit to the public at large therefore is the amount of highway, street and sidewalk area within the Assessment Area relative to the overall land area. An analysis of maps of the Assessment Area shows that approximately 1.5% of the land area in the Assessment Area is covered by highways, streets and sidewalks. This 1.5% therefore is a fair and appropriate measure of the general benefit to the public at large within the Assessment Area

#### SUMMARY OF GENERAL BENEFITS

Using a sum of the measures of general benefit for the public at large and land outside the Assessment Area, we find that approximately 3.5% of the benefits conferred by the Mosquito and Disease Control Assessment may be general in nature and should be funded by sources other than the Assessment.

<p>General Benefit =</p> <p>1.5 % (Outside the Assessment Area)</p> <p>+ 0.0 % (Inside the Assessment Area - indirect and derivative)</p> <p>+ 2.0 % (Public at Large)</p> <hr/> <p>=3.5 % (Total General Benefit)</p>
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Although this analysis supports the findings that 3.5% of the assessment may provide general benefit only, this number is doubled by the Assessment Engineer to 7% to conservatively ensure that no assessment revenue is used to support general benefit. This additional amount allocated to general benefit also covers general benefit to parcels in the Assessment Area, if it is later determined that there is some general benefit conferred on those parcels.

The proposed Mosquito, Vector and Disease Control assessment total budget for mosquito and vector abatement, disease control, and capital improvement is \$8,207,333. Of this total budget amount, the VCP will contribute approximately \$4,159,713, or 51% of the total budget from sources other than the Mosquito, Vector and Disease Control assessment. This contribution more than offsets any general benefits from the Mosquito, Vector and Disease Control Assessment Services.

#### ZONES OF BENEFIT

In *SVTA v. SCCOSA*, the court noted that a local agency-wide assessment district is appropriate under the right conditions: "Thus, if an assessment district is narrowly drawn, the fact that a benefit is conferred throughout the district does not make it general rather than special. In that circumstance, the characterization of a benefit may depend on whether the parcel receives a direct advantage from the improvement (e.g., proximity to a park) or receives an indirect, derivative advantage resulting from the overall public benefits of the

improvement (e.g., general enhancement of the district's property values)." The court therefore acknowledged the appropriateness of a District-wide assessment so long as each parcel receives a direct advantage from the assessment-funded improvement or service. As demonstrated in this Report, each parcel in the Assessment Area receives a direct advantage and special benefit from the Services.

The VCP's mosquito, vector, and disease control programs, projects and services that will be funded by the Assessments will be provided in all areas within the County. Since the Services will be provided throughout the County and will result in reduced vector populations and the other special benefits for property throughout the County, the boundaries of the Assessment Area have been drawn to match the boundaries of the County. Parcels of similar type in the Assessment Area would receive similar mosquito and vector abatement services and benefits on a per parcel and land area basis. The VCP is currently developing tools to evaluate and confirm that special benefit is consistent throughout the Assessment District. The results will be incorporated into the Engineer's Reports in subsequent years.

## METHOD OF ASSESSMENT

As previously discussed, the Assessments fund enhanced, comprehensive, year-round mosquito and vector control, disease surveillance and control Services that will reduce mosquito and vector populations on property and will clearly confer special benefits to properties in the Assessment Area. These benefits can partially be measured by the property owners, guests, employees, tenants, pets and animals on property in the Assessment Area who will enjoy a more habitable, safer and more desirable place to live, work or visit. Therefore, the apportionment of benefit is partially based the population density of parcels. It should be noted that many other types of "traditional" assessments also use parcel population densities to apportion the assessments. For example, the assessments for sewer systems, roads and water systems are typically allocated based on the population density of the parcels assessed.

Moreover, assessments have a long history of use in California and are in large part based on the principle that any benefits from a service or improvement funded by assessments that is enjoyed by tenants and other non-property owners ultimately is conferred directly to the underlying property.<sup>20</sup>

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<sup>20</sup> For example, in *Federal Construction Co. v. Ensign* (1922) 59 Cal.App. 200 at 211, the appellate court determined that a sewer system specially benefited property even though the direct benefit was to the people who used the sewers: "Practically every inhabitant of a city either is the owner of the land on which he resides or on which he pursues his vocation, or he is the tenant of the owner, or is the agent or servant of such owner or of such tenant. And since it is the inhabitants who make by far the greater use of a city's sewer system, it is to them, as lot owners or as tenants, or as the servants or agents of such lot owners or tenants, that the advantages of actual use will redound. But this advantage of use means that, in the final analysis, it is the lot owners themselves who will be especially benefited in a financial sense."

With regard to benefits and source locations, the assessment engineer determined that since mosquitoes and other vectors readily fly from their breeding locations to all properties in their flight range and since mosquitoes are actually attracted to properties occupied by people or animals, the benefits from mosquito and vector control extend beyond the source locations to all properties that would be a "destination" for mosquitoes and other vectors. In other words, the control and abatement of mosquito and vector populations ultimately confers benefits to all properties that are a destination of mosquitoes and vectors, rather than just those that are sources of mosquitoes.

Although some primary mosquito and vector sources may be located outside of residential areas, residential properties can and do generate their own, often significant, populations of mosquitoes and vector organisms. For example, storm water catch basins in residential areas are a common source of mosquitoes. Since the typical flight range for a female mosquito, on average is 2 miles, most homes in the Assessment Area are within the flight zone of many mosquito sources. Moreover, there are many other common residential sources of mosquitoes, such as miscellaneous backyard containers, neglected swimming pools, leaking water pipes and tree holes. Clearly, there is a potential for mosquito sources on virtually all types of property. More importantly, all properties in the Assessment Area are within the destination range of mosquitoes and most properties are actually within the destination range of multiple mosquito source locations.

Because the Services will be provided throughout the Assessment Area with the same level of control objective, mosquitoes can rapidly and readily fly from their breeding locations to other properties over a large area, and because there are current or potential breeding sources literally everywhere in the Assessment Area, the Assessment Engineer determined that all similar properties in the Assessment Area have generally equivalent mosquito "destination" potential and, therefore, receive equivalent levels of benefit throughout the Assessment Area.

In the process of determining the appropriate method of assessment, the Engineer considered various alternatives. For example, a fixed assessment amount per parcel for all residential improved property was considered but was determined to be inappropriate because agricultural lands, commercial property and other property also receive benefits from the assessments. Likewise, an assessment exclusively for agricultural land was considered but deemed inappropriate because other types of property, such as residential and commercial, also receive the special benefit factors described previously.

A fixed or flat assessment was deemed to be inappropriate because larger residential, commercial and industrial properties receive a higher degree of benefit than other similarly used properties that are significantly smaller. (For two properties used for commercial purposes, there is clearly a higher benefit provided to a property that covers several acres in comparison to a smaller commercial property that is on a 0.25-acre site. The larger property generally has a larger coverage area and higher usage by employees, customers, tourists and guests that would benefit from reduced mosquito and vector populations, as well as the reduced threat from diseases carried by mosquitoes and other vectors. This

benefit ultimately flows to the property) Larger commercial, industrial and apartment parcels, therefore, receive an increased benefit from the assessments.

In conclusion, the assessment engineer determined that the appropriate method of assessment apportionment should be based on the type and use of property, the relative size of the property, its relative population and usage potential, and its destination potential for mosquitoes. This method is further described below.

### ASSESSMENT APPORTIONMENT

The special benefits derived from the Mosquito, Vector and Disease Control Assessment are conferred on property and are not based on a specific property owner's occupancy of property or the property owner's demographic status, such as age or number of dependents. However, it is ultimately people who do or could use the property and who enjoy the special benefits described above. Therefore, the opportunity to use and enjoy the region within the Assessment Area without the excessive nuisance, diminished "livability" or the potential health hazards brought by mosquitoes, vectors, and the diseases they carry is a special benefit to properties in the county. This benefit can be in part measured by the number of people who potentially live on, work at, visit or otherwise use the property, because people ultimately determine the value of the benefits by choosing to live, work and/or recreate in the area, and by choosing to purchase property in the area.<sup>21</sup>

In order to apportion the cost of the Services to property, each property in the Assessment Area is assigned a relative special benefit factor. This process involves determining the relative benefit received by each property in relation to a single family home, or, in other words, on the basis of Single Family Equivalents (SFE). This SFE methodology is commonly used to distribute assessments in proportion to estimated special benefit. For the purposes of this Engineer's Report, all properties are designated a SFE value, which is each property's relative benefit in relation to a "benchmark" parcel in the Assessment Area. The "benchmark" property is the single family detached dwelling on a parcel of less than one acre. This benchmark parcel is assigned one Single Family Equivalent benefit unit or one SFE.

The calculation of the special benefit apportionment and relative benefit to properties in the Assessment Area from the Services is summarized in the following equation:

$$\text{Special Benefit (per property)} = \sum f(\text{Special Benefits}) * \sum f(\text{Property Specific Attributes1})$$

<sup>21</sup> . It should be noted that the benefits conferred upon property are related to the average number of people who could potentially live on, work at or otherwise could use a property, not how the property is currently used by the present owner.

1. Such as use, property type, size, as well as vector-specific attributes such as destination potential and population potential.

## RESIDENTIAL PROPERTIES

Certain residential properties in the Assessment Area that represent a single residential dwelling unit are assigned one Single Family Equivalent or 1.0 SFE. Traditional houses, zero-lot line houses, and townhomes are included in this category.

Single family residential properties in excess of one acre receive additional benefit relative to a single family home on up to one acre, because the larger parcels provide more area for mosquito sources and Assessment Area vector services. Therefore, such larger parcels receive additional benefits relative to a single family home on less than one acre and are assigned 1.0 SFE for the residential unit and an additional rate equal to the agricultural rate described below 0.002 SFE per one-fifth acre of land area in excess of one acre. Mobile home parcels on a separate parcel and in excess of one acre also receive this additional acreage rate.

Other types of properties with residential units, such as agricultural properties, are assigned the residential SFE rates for the dwelling units on the property and are assigned additional SFE benefit units for the agricultural-use land area on the property.

Properties with more than one residential unit are designated as multi-family residential properties. These properties, along with condominiums, benefit from the services and improvements in proportion to the number of dwelling units that occupy each property, the average number of people who reside in each property, and the average size of each property in relation to a single family home in San Diego County. This Report analyzed San Diego County population density factors from the 2000 US Census as well as average dwelling unit size for each property type. After determining the Population Density Factor and Square Footage Factor for each property type, an SFE rate is generated for each residential property structure, as indicated in Figure 18 below.

The SFE factor of 0.40 per dwelling unit for multifamily residential properties applies to such properties with 20 or fewer units. Properties in excess of 20 units typically offer on-site management, monitoring and other control services that tend to offset some of the benefits provided by the Services. Therefore, the benefit for properties in excess of 20 units is determined to be 0.40 SFE per unit for the first 20 units and 0.10 SFE per each additional unit in excess of 20 dwelling units.

FIGURE 18 – SAN DIEGO COUNTY RESIDENTIAL ASSESSMENT FACTORS

	<i>Total Population</i>	<i>Occupied Households</i>	<i>Persons per Household</i>	<i>Pop. Density Equivalent</i>	<i>SqFt Factor</i>	<i>Proposed Rate</i>
Single Family Residential	1,562,129	513,948	3.04	1.00	1.00	<b>1.00</b>
Condominium	250,673	93,642	2.68	0.88	0.79	<b>0.70</b>
Duplex, Triplex, Fourplex	189,407	73,620	2.57	0.85	0.62	<b>0.53</b>
Multi-Family Residential, 5+ Units	622,092	270,015	2.30	0.76	0.52	<b>0.40</b>
Mobile Home on Separate Lot	88,674	41,225	2.15	0.71	0.47	<b>0.33</b>

Source: 2000 Census, San Diego County and property dwelling size information from the San Diego County Assessor data and other sources.

### COMMERCIAL/INDUSTRIAL PROPERTIES

Commercial and industrial properties are generally open and operated for more limited times, relative to residential properties. Therefore, the relative hours of operation can be used as a measure of benefits, since residents and employees also provide a measure of the relative benefit to property. Since commercial and industrial properties are typically open and occupied by employees approximately one-half the time of residential properties, it is reasonable to assume that commercial land uses receive one-half of the special benefit on a land area basis relative to single family residential property.

The average size of a single family home with 1.0 SFE factor in San Diego County is 0.20 acres. Therefore, a commercial property with 0.20 acres receives one-half the relative benefit, or a 0.50 SFE factor.

The SFE values for various commercial and industrial land uses are further defined by using average employee densities because the special benefit factors described previously are also related to the average number of people who work at commercial/industrial properties.

To determine employee density factors, this Report utilizes the findings from the San Diego Association of Governments Traffic Generators Study (the "SANDAG Study") because these findings were approved by the State Legislature which determined the SANDAG Study to be a good representation of the average number of employees per acre of land area for commercial and industrial properties. As determined by the SANDAG Study, the average number of employees per acre for commercial and industrial property is 24. As presented in Figure 21, the SFE factors for other types of businesses are determined relative to their typical employee density in relation to the average of 24 employees per acre of commercial property.

Commercial and industrial properties in excess of 5 acres generally involve uses that are more land intensive relative to building areas and number of employees (lower coverage ratios). As a result, the benefit factors for commercial and industrial property land area in excess of 5 acres is determined to be the SFE rate per fifth acre for the first 5 acres and the relevant SFE rate per each additional acre over 5 acres. Institutional properties that are used for residential, commercial or industrial purposes are also assessed at the appropriate residential, commercial or industrial rate.

Figure 19 below, lists the benefit assessment factors for business properties.

#### AGRICULTURAL/OTHER PROPERTIES

Utilizing research and agricultural employment reports from UC Davis and the California Employment Development Department and other sources, this Report calculated an average employee density of 0.05 employees per acre for agriculture property, 3.0 for golf courses, 0.01 for rangelands and timber and 1.2 for cemeteries. Since these properties typically are a source of mosquitoes and/or are typically closest to other sources of mosquitoes and other vectors, it is reasonable to determine that the benefit to these properties is twice the employee density ratio of commercial properties. The SFE factors per 0.20 acres of land area for these types of property are also shown in Figure 21.

FIGURE 19 – COMMERCIAL/INDUSTRIAL BENEFIT ASSESSMENT FACTORS

<i>Type of Commercial/Industrial Land Use</i>	<i>Average Employees Per Acre <sup>1</sup></i>	<i>SFE Units per 1/5th Acre <sup>2</sup></i>	<i>SFE Units per Acre After 5</i>
Commercial	24	0.500	0.500
Office	68	1.420	1.420
Shopping Center	24	0.500	0.500
Industrial	24	0.500	0.500
Self Storage or Parking Lot	1	0.050	
Golf Course	3.00	0.125	
Cemetery	1.20	0.050	
Agriculture	0.05	0.002	
Rangeland, Dry Farming and Timber	0.01	0.0004	

1. Source: San Diego Association of Governments Traffic Generators Study, University of California, Davis and other sources.

2. The SFE factors for commercial and industrial parcels indicated above are applied to each fifth acre of land area or portion thereof. (Therefore, the minimum assessment for any assessable parcel in these categories is the SFE Units listed herein.)

#### VACANT PROPERTIES

The benefit to vacant (undeveloped) properties is determined to be proportional to the corresponding benefits for similar type developed properties. However, vacant properties are assessed at a lower rate due to the lack of active benefits, as measured by use by residents, employees, customers and guests. A measure of the benefits accruing to the underlying land is the average value of land in relation to improvements for developed property. An analysis of the assessed valuation data from the County of San Diego found that 50% of the assessed value of improved properties is classified as land value. Since vacant properties have very low to zero population/use densities until they are developed, a 50% benefit discount is applied to the valuation factor of 0.50 to account for the current low use density and potential for harm or nuisance to the property owner or his residents, employees, customers and guests. The combination of these measures results in a 0.25 factor. It is reasonable to assume, therefore, that approximately 25% of the benefits are

related to the underlying land and 75% are related to the day-to-day use of the property. Using this ratio, the SFE factor for vacant parcels is 0.25 per parcel.

#### **OTHER PROPERTIES**

Article XIID stipulates that publicly owned properties must be assessed unless there is clear and convincing evidence that those properties receive no special benefit from the assessment.

All properties that are specially benefited are assessed. Publicly owned property that is used for purposes similar to private residential, commercial, industrial or institutional uses is benefited and assessed at the same rate as such privately owned property.

Other public properties such as watershed parcels, parks, open space parcels are determined to, on average, receive similar benefits as a single family home. Therefore, such parcels are assessed an SFE benefit factor of 1. Miscellaneous, small and other parcels such as roads, right-of-way parcels, and common areas typically do not generate significant numbers of employees, residents, customers or guests and have limited economic value. These miscellaneous parcels receive minimal benefit from the Services and are assessed an SFE benefit factor of 0.

Church parcels, institutional properties, and property used for educational purposes typically generate employees on a less consistent basis than other non-residential parcels. Therefore, these parcels receive minimal benefit and are assessed an SFE factor of 1.

#### **DURATION OF ASSESSMENT**

The Assessment was levied for fiscal year 2005-06 and continued every year thereafter, so long as mosquitoes and vectors remain in existence and the San Diego County Vector Control Program requires funding from the Assessment for its Services. As noted previously, the Assessment and the continuation of the Assessment were approved by property owners in an assessment ballot proceeding, the Assessment has been continued to be levied annually after the San Diego County Board of Supervisors approved an annually updated Engineer's Report, budget for the Assessment, Services to be provided, and other specifics of the Assessment. In addition, the Board of Supervisors must hold an annual public hearing to continue the Assessment.

#### **APPEALS AND INTERPRETATION**

Any property owner who feels that the assessment levied on the subject property is in error as a result of incorrect information being used to apply the foregoing method of assessment, may file a written appeal with the Chief of the San Diego Mosquito and Vector Control Program or his or her designee. Any such appeal is limited to correction of an assessment during the then current Fiscal Year or, if before July 1, the upcoming fiscal year. Upon the filing of any such appeal, the Chief or his or her designee will promptly review the appeal and any information provided by the property owner. If the Chief or his or her designee finds that the assessment should be modified, the appropriate changes shall be made to the

assessment roll. If any such changes are approved after the assessment roll has been filed with the San Diego County for collection, the Chief or his or her designee is authorized to refund to the property owner the amount of any approved reduction. Any dispute over the decision of the Chief, or his or her designee, shall be referred to the Board. The decision of the Board shall be final.

## ASSESSMENT

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WHEREAS, the Board of Supervisors contracted with the undersigned Engineer of Work to prepare and file a report presenting an estimate of costs of the continued Services, a diagram for a benefit assessment district, an assessment of the estimated costs of the Services, and the special and general benefits conferred thereby upon all assessable parcels within San Diego County - Mosquito, Vector and Disease Control Assessment;

NOW, THEREFORE, the undersigned, by virtue of the power vested in me under Article XIID of the California Constitution, the Government Code and the Health and Safety Code and the order of the Board of Supervisors of San Diego County, hereby make the following determination of an assessment to cover the portion of the estimated cost of the Services, and the costs and expenses incidental thereto to be paid by the Mosquito, Vector and Disease Control Assessment.

The amount to be paid for the services and improvements and the expenses incidental thereto, to be paid by the San Diego County Vector Control Program for the fiscal year 2016-17 is generally as follows:

**FIGURE 20 – SUMMARY COST ESTIMATE FISCAL YEAR 2016-17**

Vector & Disease Control Services	\$7,844,837
Fixed Asset & Capital Equipment	\$362,496
Reserve/Contingencies	\$0
Incidentals	\$552,380
<b>TOTAL BUDGET</b>	<b>\$8,759,713</b>
Less:	
District Contribution & Current Rev.	(\$4,159,713)
<b>Net Amount To Assessments</b>	<b>\$4,600,000</b>

An Assessment Diagram is hereto attached and made a part hereof showing the exterior boundaries of the Assessment Area. The distinctive number of each parcel or lot of land in the Assessment Area is its Assessor Parcel Number appearing on the Assessment Roll.

I do hereby determine and apportion the net amount of the cost and expenses of the Services, including the costs and expenses incidental thereto, upon the parcels and lots of land within the Mosquito, Vector and Disease Control Assessment, in accordance with the

special benefits to be received by each parcel or lot, from the Services, and more particularly set forth in this Engineer's Report.

The assessment determination is made upon the parcels or lots of land within the assessment area in proportion to the special benefits to be received by the parcels or lots of land, from the Services.

The assessment will be annually adjusted. The amount of the adjustment will be tied to the Consumer Price Index for the San Diego Area as of December of each succeeding year (the "CPI"), with a maximum annual adjustment not to exceed 5%. Any change in the CPI in exceeds 5%, shall be cumulatively reserved as the "Unused CPI" and can be added to the annual change in the CPI for years in which the CPI change is less than 5%. The maximum authorized assessment rate is equal to the maximum assessment rate in the first fiscal year the assessment was levied adjusted annually by the minimum of 1) 5% or 2) the change in the CPI plus any Unused CPI as described above.

The change in the CPI from December to December was 1.61% and the Unused CPI carried forward from the previous fiscal year is 0%. Therefore, the maximum authorized assessment rate for fiscal year 2016-17 is increased by 1.61% which equates to \$10.82 per single family equivalent benefit unit. The estimate of cost and budget in this Engineer's Report proposes assessments for fiscal year 2016-17 at the rate of \$5.00, which is less than the maximum authorized assessment rate.

Each parcel or lot of land is described in the Assessment Roll by reference to its parcel number as shown on the Assessor's Maps of the County of San Diego for the fiscal year 2016-17. For a more particular description of the property, reference is hereby made to the deeds and maps on file and of record in the office of the County Assessor of the County of San Diego.

I hereby place opposite the Assessor Parcel Number for each parcel or lot within the Assessment Roll, the proposed amount of the assessment for the fiscal year 2016-17 for each parcel or lot of land within the Mosquito, Vector and Disease Control Assessment Area.<sup>22</sup>

Dated: May 11, 2016



Engineer of Work

By John W. Bliss  
 John W. Bliss, License No. C52091

<sup>22</sup> Each parcel has a uniquely calculated assessment based on the estimated level of special benefit to the property as determined in accordance with this Engineer's Report.

## ASSESSMENT DIAGRAM

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The Mosquito, Vector and Disease Control Assessment area includes all properties within the boundaries of the San Diego County.

The boundaries of the Mosquito, Vector and Disease Control Assessment Area are displayed on the following Assessment Diagram. Indian reservation land, as a Sovereign Nation, is excluded from the Assessment Area. Also, federally owned lands that receive minimal to no services, are depicted with a two-tone diagonal line shade.

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## ASSESSMENT ROLL

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Reference is hereby made to the Assessment Roll in and for the assessment proceedings on file in the office of the Program Manager of the of the San Diego Mosquito and Vector Control Program, as the Assessment Roll is too voluminous to be bound with this Engineer's Report.