

# Shasta Mosquito & Vector Control District



## annual report 2010

Protecting  
Public Health  
Since 1919



## SHASTA MOSQUITO AND VECTOR CONTROL DISTRICT

19200 Latona Road, Anderson, CA 96007  
Telephone: (530) 365-3768 Fax: (530) 365-0305  
Web: [shastamosquito.org](http://shastamosquito.org)

### BOARD OF TRUSTEES

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Manager

To the Residents of the Shasta Mosquito and Vector Control District:

It is with great pleasure that we submit the 2010 Annual Report for the Shasta Mosquito and Vector Control District (SMVCD). The District had another successful year serving the residents of Shasta Mosquito and Vector Control. This report outlines the work performed by the District to fulfill its primary goal of protecting public health.

In addition to performing the same high-level of mosquito control our residents are accustomed to, we have begun the transition into a new evolution of the Shasta Mosquito and Vector Control District. To represent this change, we as a District re-wrote our mission statement. It now reads the following: "To protect the public's health from vector-borne disease and nuisance, through a comprehensive mosquito and vector control program focused on innovation, experience and efficiency." We hope this will provide the direction for the future of the District.

In response to our mission statement the District added several new components to our Vector Control District, delving into the benefits of tick-borne disease surveillance and rodent borne-disease surveillance. These programs add public health value to the District and educate the residents of the District to form a clearer picture of the vector-borne disease transmission in our community. This year we also added new research and surveillance functionality by building a mosquito rearing room and adding over 20 new mosquito surveillance traps.

As a District we continue to focus on the current economic recession and how it not only affects our budget, but also the significant threat foreclosures and the subsequent neglected pools present to our more densely populated areas. These potential mosquito breeding areas are independent of seasonal droughts and are often difficult to locate, providing for a sizable staff challenge. We encourage residents to help us by reporting neglected pools.

Finally, this year we said goodbye to several people that made our District the amazing organization that it is. Two Board of Trustees Henry Hurlhey and Gary Hergert retired their positions and Board of Trustees member Bob Michiels passed away, he served the Board from 2003-2010 and our condolences go out to his family and friends, his passing was an enormous loss for everyone.

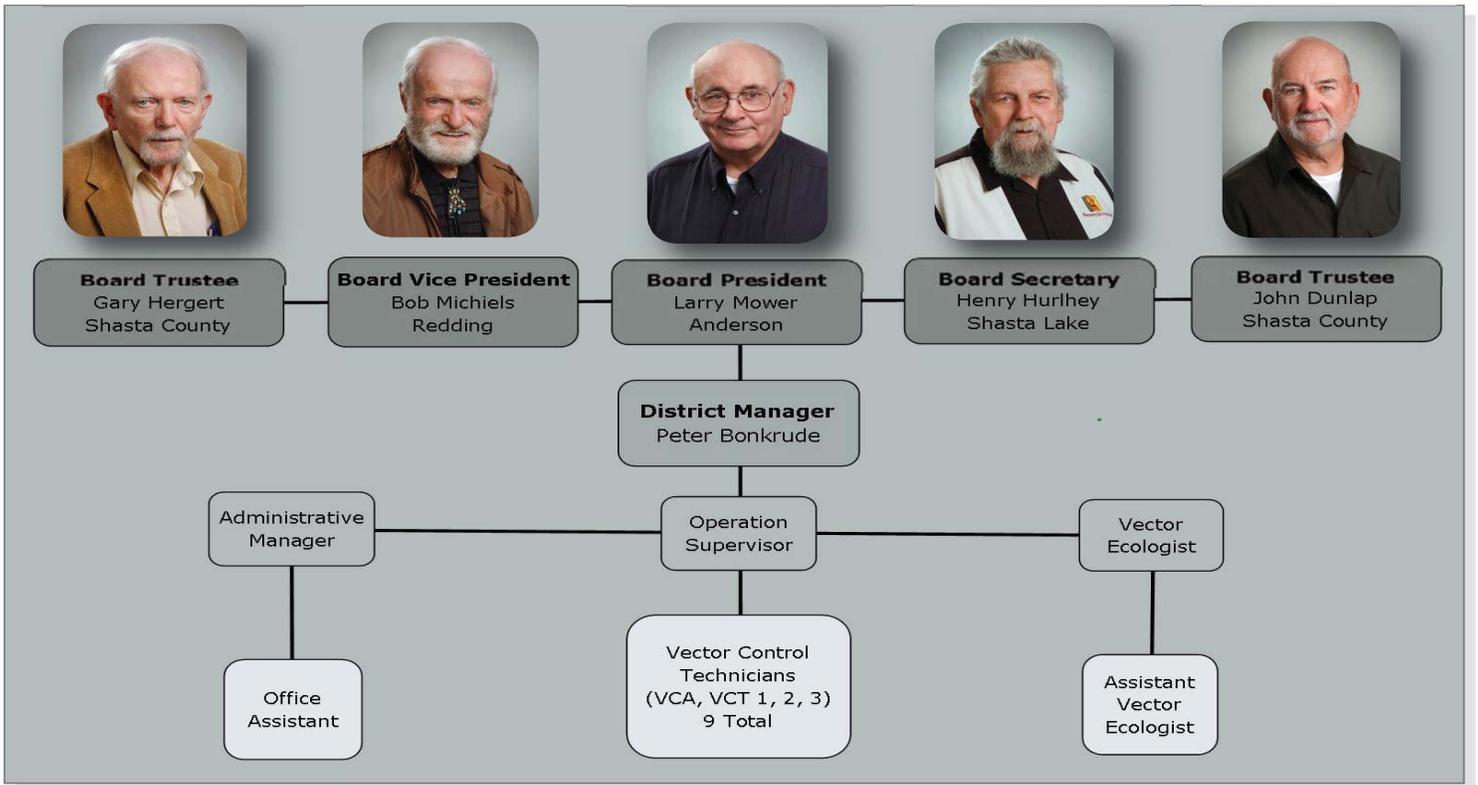
The District continues our firm commitment to the residents of SMVCD. Going forward, we hope to continue fostering cooperation with residents, property owners, community groups, as well as other governmental agencies, to enhance the impact we have on vector control. We look forward to providing our services to you in the future. If you have any questions about this report or District services, please visit our website at [www.shastamosquito.org](http://www.shastamosquito.org) or call us at (530) 365-3768.

Sincerely,

Peter Bonkrude  
District Manager

Larry Mower,  
2010 President, Board of Trustees

# Board of Trustees



## 2010 Staff



**Did you Know?**  
Lyme disease is named after Old Lyme, Connecticut where it was discovered in 1975. Lyme disease is caused by a spirochete transmitted to humans from a tick bite.

Back Row: Audie Butcher, Al Shabazian, Joe Mimbs, Mike Alexander, Betty Willis, Peter Bonkrude, Kelly Cleland, Kevin Pearson, Geoff Taylor  
Front Row: Corey Boyer, Catherine Hasher, Tim Mickela, John Albright, Valerie Peterson, Kendra Angel

# History



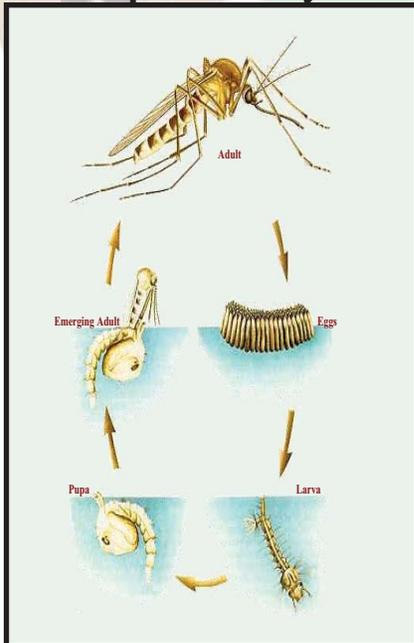
The first local mosquito control district was formed in 1919 in the Redding area charged with combating swarms of mosquitoes that were transmitting malaria, a mosquito borne disease that was prevalent in the region. The formation of other districts in the Anderson and Cottonwood areas quickly followed. The Anderson, Cottonwood, and Redding areas had some of the highest malaria rates in the continental United States.

Through the years, the local mosquito control districts evolved to meet the needs of the growing communities. In the mid 1950's, the three districts consolidated into one comprehensive district. When it became necessary, the district expanded its boundaries to include surrounding areas; effectively providing public health protection to a larger number of Shasta County Residents. Today, Shasta Mosquito and Vector Control serves 1086 square miles of Shasta County.

Decades after the formation of the first local mosquito control district, diseases transmitted by mosquitoes and other vectors are still a serious threat to public health. Shasta Mosquito and Vector Control District (SMVCD) uses the most efficient, reliable and scientifically sound mosquito and vector control techniques to reduce current vector-borne disease issues while maintaining surveillance for future emerging diseases.

## Integrated Vector Management

### Mosquito Life Cycle



### What's a Vector

A vector is an insect or living carrier that transmits an infectious agent.

### What is Integrated Vector Management (IVM)

Shasta Mosquito and Vector Control utilize an Integrated Vector Management approach to controlling mosquitoes within our District boundaries. IVM is defined as "a rational decision-making process for the optimal use of resources in the management of vector populations, so as to reduce or interrupt transmission of vector-borne diseases." (WHO)

Its characteristic features include:

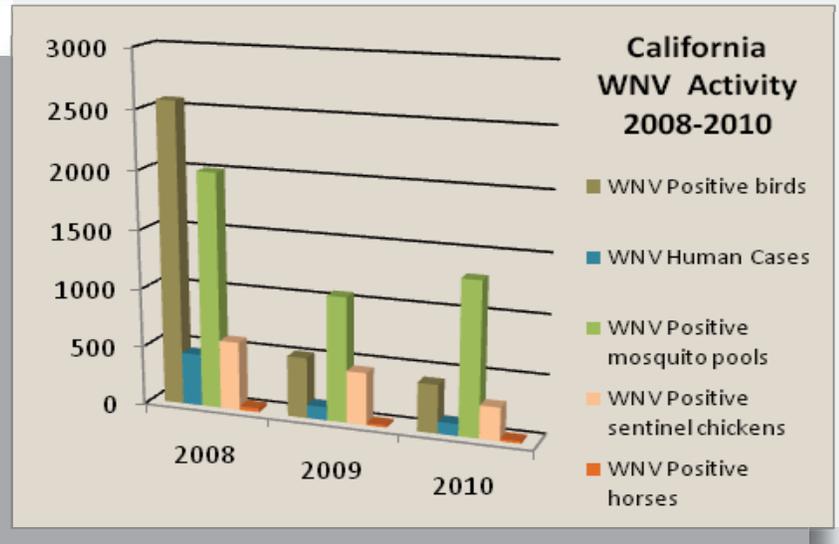
- Selection of proven vector control methods based on knowledge of local vector biology and ecology, disease transmission and morbidity;
- Utilization of a range of interventions, separately or in combination and often synergistically;
- Collaboration within the health sector and with other public and private sectors that impact on vector breeding;
- Engagement with local communities and other stakeholders;
- A public health regulatory and legislative framework;
- Rational use of insecticides;
- Good management practices.

An IVM approach takes into account the available health infrastructure and resources and integrates all available and effective measures, whether chemical biological or environmental (WHO).

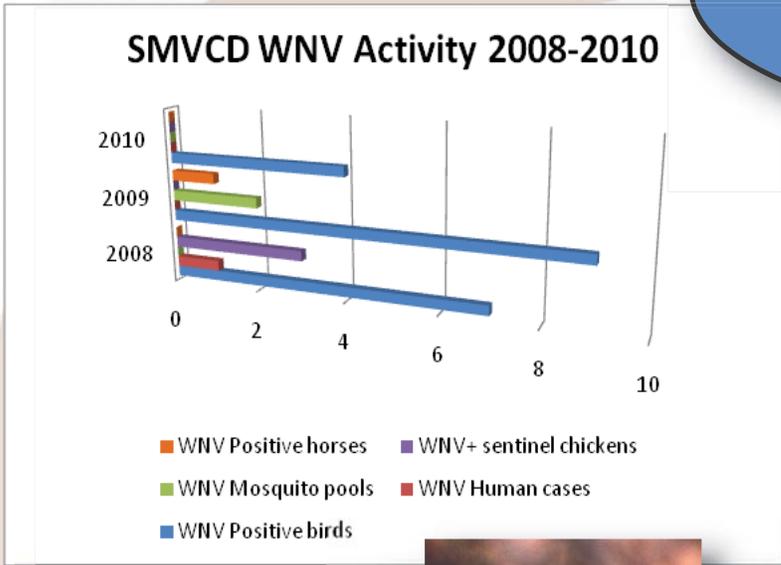
# West Nile virus

WNV has been present in California since 2003 and was first detected in the District in 2004. California has one of the highest incidences of West Nile Virus in humans. With 104 confirmed cases, California is 3rd in the nation behind Arizona (162) and New York (127) for 2010. While this figure may seem high, California has seen less WNV activity in 2009 and 2010 than in previous years (See Chart). The same can be said for SMVCD.

The majority of the WNV activity and cases of human infection were concentrated in the central and southern area of the state.



Is it true that only female mosquitoes bite? Yes. Only the females need to take a blood meal to facilitate egg production and have mouthparts capable of penetrating the skin.



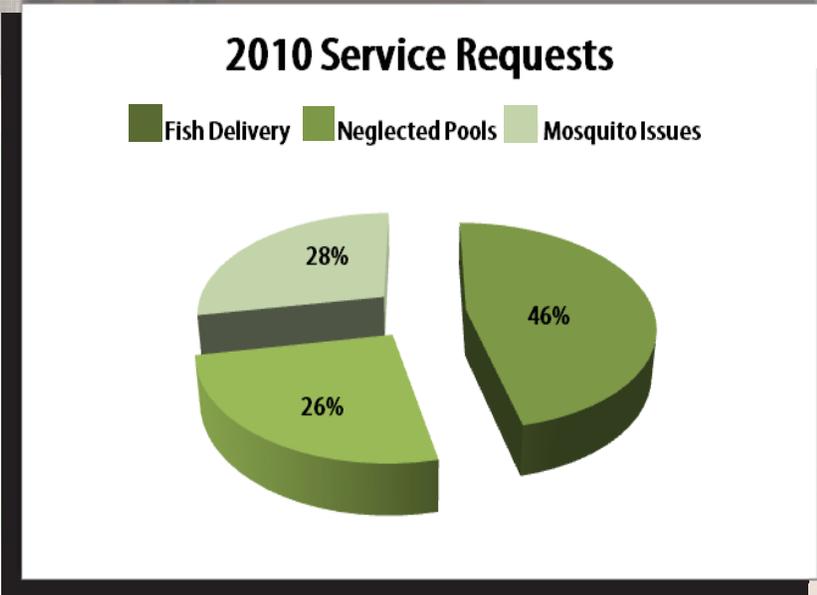
In 2010, the District recorded very low WNV activity. The District tested over 9,000 mosquitoes divided among 325 groups or 'pools'. Even with an 8.7% increase over the number of pools submitted in 2009, no samples were found to be WNV positive. Over 500 blood samples from the sentinel chickens were tested during the year without any WNV positive results. The District collected 35 birds and subsequent testing found 4 recently infected birds. The birds were the only indication of WNV activity in the District.



It is likely that WNV will be a public health concern in the foreseeable future as the District is home to wild birds that serve as reservoir hosts and Culex mosquitoes capable of transmitting the arbovirus. While the low levels of WNV activity are a promising indication of effective mosquito control, the public should continue to be aware of the danger and not expose themselves to any undue risk.

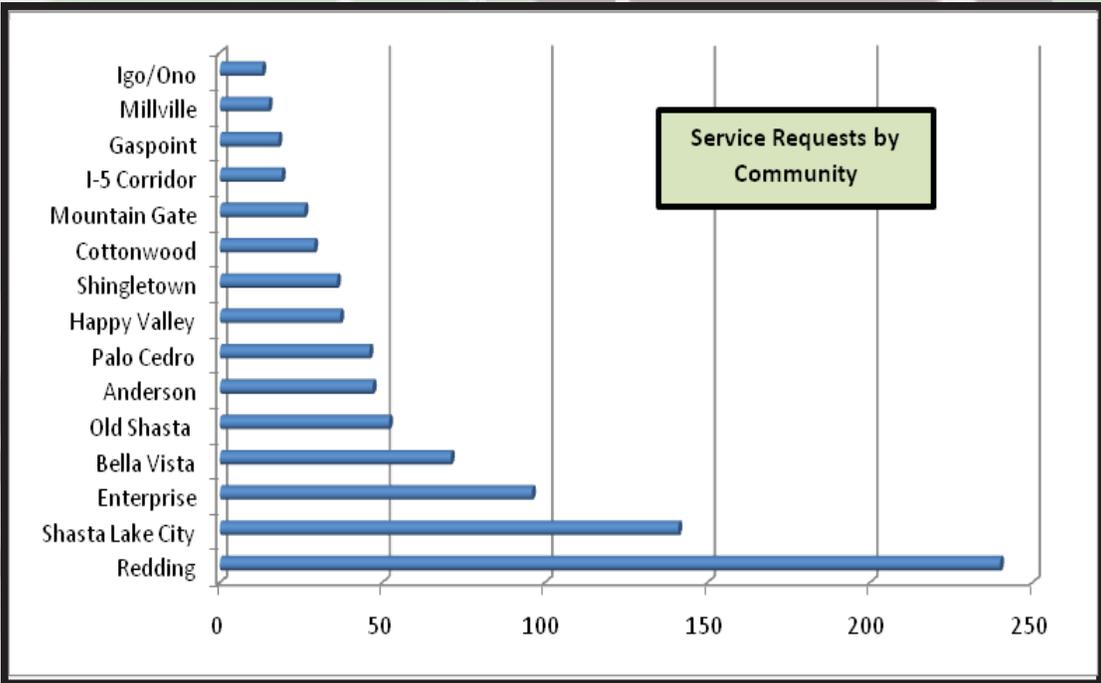
# Service Requests

**Did You Know?**  
Blondes tend to be more attractive to mosquitoes than brunettes.



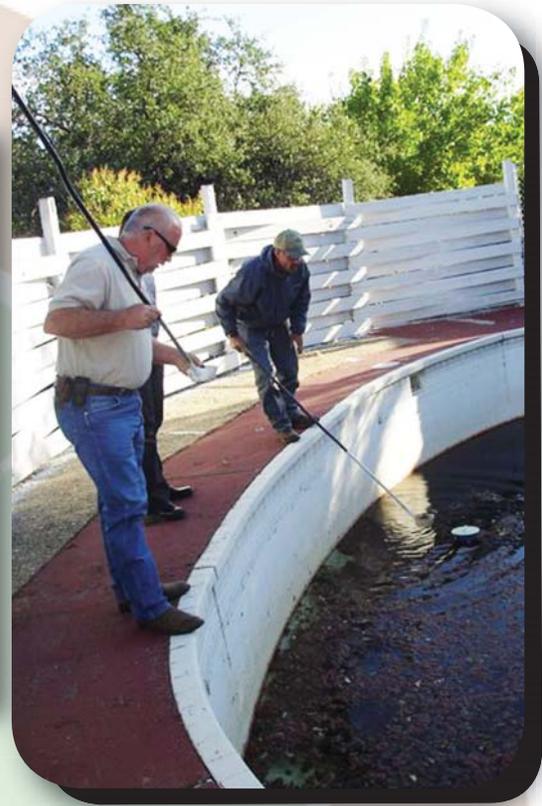
2010 Service Requests	
Request Reason	Number of Requests
Fish Delivery	412
Neglected Pools	227
Mosquito Issues	248
<b>Totals</b>	<b>887</b>

Service requests serve as a forum for the public to interact with our District staff. We rely on the public's input to make us aware of mosquito, vector, and neglected pool issues not yet located. We pride ourselves on maintaining a typical 48 hour response time to all service requests and value the ability service requests give District staff to provide outreach and vector control services. If you live within the Shasta MVCD service area, you can put in a service request by calling the District at (530) 365-3768 between 8:00am and 4:00pm Monday through Friday or use a contact form on our website: [www.shastamosquito.org](http://www.shastamosquito.org)



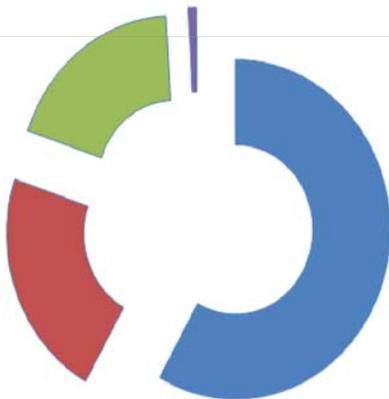
# Neglected Pools

Standing water in pools or spas that have been neglected by property owners has steadily become a major concern for SMVCD over the recent years. As foreclosures have increased and the economy has suffered, the number of neglected water features have been on the rise. The District initiated the neglected pool program in 2008 and it has continued to be an important program. The District's neglected pool program consists of an area warrant for the inspection and abatement of mosquito breeding and an annual aerial surveillance providing the District with information regarding the location of new neglected pools. Additionally, reports of neglected pools come from the public, referrals from realtors, banks, other agencies such as code enforcement and information from service requests. A total of 182 pools were found to be producing mosquitoes. With the number of foreclosed homes currently increasing, the District expects this program to continue to be important into the future.



Neglected Pool Program		
Aerial Surveillance Identified	Service Request Identified	Resolution
87	45	Biological Control
15	35	Chemical Control
16	27	Clean
2	0	Dry

Pool Inspection Results



Total Pools Treated 182

**Did You Know?**

The term malaria is derived from the Italian "mal-aria" or "bad air" because it was thought to come on the wind from swamps and rivers.



# Biological Control



Biological control elements are typically natural predators, parasites, or pathogens that can be used to reduce the levels of mosquito abundance. The District currently utilizes the most successful biological tool against larval or immature mosquitoes; *Gambusia affinis*, or better known to the public as mosquitofish. District staff deliver and stock these fish in areas where they will quickly adopt the habitat and multiply; thereby feeding on and controlling the immature mosquitoes. These areas include: stock ponds, neglected swimming pools, ornamental ponds and water features. This year District staff delivered and stocked over 54.5 lbs. Based on the average stocking rate of 0.5 lbs per acre, this means that SMVCD stocked 109 acres with fish.

**Did you know?**  
In California, mosquitofish have been used since 1922 to control mosquito larvae.

# Physical Control

As part of the District's IVM strategy, SMVCD conducts a physical control program. This program is focused on reducing or eliminating mosquito breeding areas by managing the water sources where mosquitoes breed. Physical control activities include: clearing vegetation around ponds and streams, improving drainage, and providing access for other types of control work. The District works in cooperation with local California Department of Fish and Game on its physical control projects.



The District utilizes the California Department of Forestry Conservation Crews from Sugar Pine Conservation Camp to perform hand brush cutting activities to maintain trails to mosquito breeding sources.

**Did you know?**

In medieval Europe the law allowed pest insects to be put on trial and 'expelled' from the land. If that didn't work, the pest insect was then 'excommunicated' from the church.



A District owned backhoe is used to maintain and clean drainages and improve access on trails.



Technicians installing the Clemson Beaver Pond Leveler which is used to divert water through a pipe and lower the beaver pond to a manageable level.



## Microbial & Chemical Control

When the other levels of IVM do not solve the issue of mosquito production, SMVCD must employ active microbial and chemical control to protect the public from mosquitoes and mosquito-borne diseases. Larvicides (insect growth regulators, microbials, oils) are focused on lowering numbers of mosquitoes in their immature or larval and pupal forms. Adulticides (pyretherins, pyrethroids) are focused on reducing adult mosquito populations and are used when mosquitoes cannot be treated effectively as larvae or pupae. All products applied by the District are registered with the California Environmental Protection Agency.

# Larval & Immature Control

## Immature Control

Community	Inspections	Larval Treatments	Acres Treated
Anderson	974	178	68
Bella Vista	1789	266	223
Cottonwood	1831	266	257
Enterprise	457	70	58
French Gulch	22	8	3.4
Gaspoint	219	23	10.75
Happy Valley	157	2	0.2
I-5 Corridor	18	0	0
Igo/Ono	215	29	9
Millville	825	65	49.75
Mountain Gate	329	33	3
Old Shasta	407	104	14
Palo Cedro	733	133	86
Redding	1526	255	203
Shasta Lake	238	77	69
Shingletown	151	12	6.1
<b>Totals</b>	<b>9891</b>	<b>1521</b>	<b>1060.2</b>



Larviciding is the general term for controlling immature mosquitoes by applying agents. Most mosquitoes spend much of their lifecycle in the larval and pupal stages when they are highly susceptible to control efforts. Also, they are often concentrated within defined water boundaries, immobile with little ability to disperse. Therefore, effective larviciding can reduce the number of adult mosquitoes available to disperse, spread disease and create a nuisance for our residents. Effective larval control is a large part of the District's IVM plan. Products used by the District for effective larval mosquito control include: insect growth regulators, microbial larvicides, organophosphates and surface films.



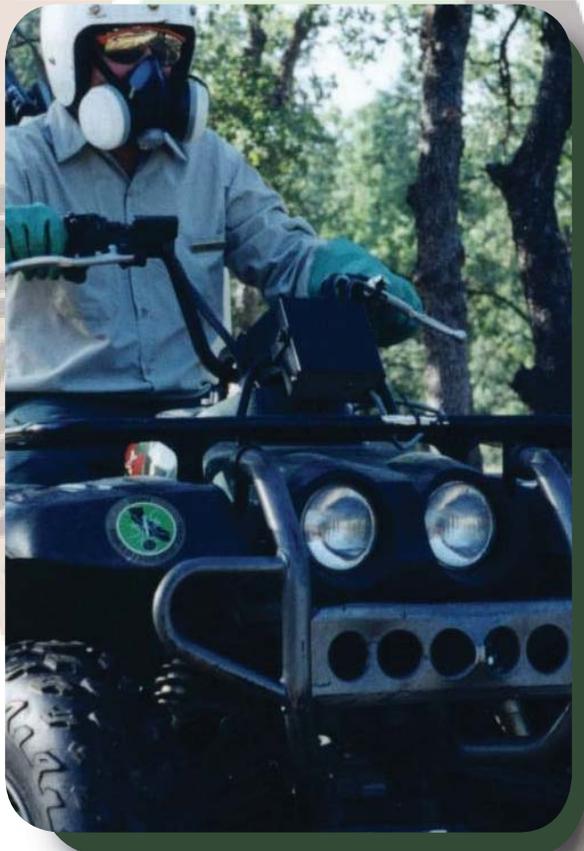
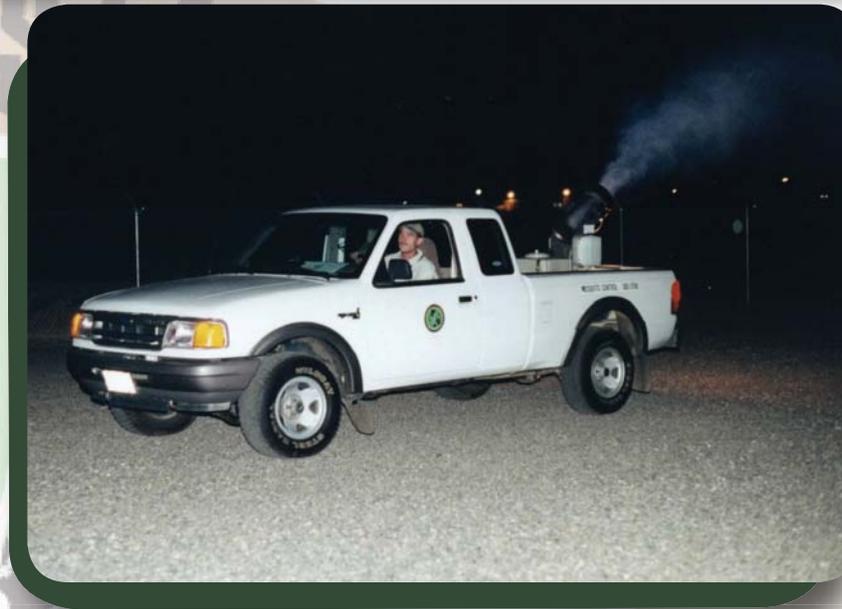
How much blood does a mosquito take in a meal? When feeding to repletion, mosquitoes imbibe anywhere from 0.001 to 0.01 milliliter.

# Adult Control

The process of adulticiding or performing adult mosquito control is a step wise process that is often considered the method of last resort in an IVM program. Information on the biology of the target organism is required and thresholds must be determined that trigger control. The District typically performs Ultra Low Volume (ULV) space sprays to administer the adult control products. Using ULV equipment allows the aerosol to persist in the air column for an appreciable length of time at suitable droplet densities to contact the flying mosquito and is only effective while the droplet remains airborne. Hence, ULV applications are short-lived and not expected to have any residual effect. The District maintains weather stations throughout the area to ensure that the products are being applied in the optimum conditions. Products used by the District for effective adult mosquito control include: pyrethrins, pyrethroids and organo-phosphates.

### Did you know?

Mosquitoes of the Anopheles genus transmit malaria. Poor management of DDT and similar insecticides (called organochlorates) has led to resistance in 58 of the 60 anopheline species capable of harboring the malaria plasmodium.

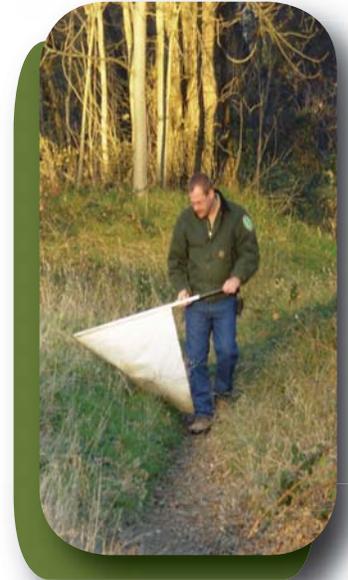


Adult Control			
Community	Applications	Acres Treated	Miles Driven
Anderson	13	4435	122
Bella Vista	17	12033	330.9
Cottonwood	28	18232	501.4
Enterprise	21	9132.77	251.2
French Gulch	2	360.65	9.9
Gaspoint	9	3185.52	87.6
Happy Valley	2	1032.25	28.4
I-5 Corridor	3	2164.66	59.5
Igo/Ono	8	7785.71	214.1
Millville	22	13728.77	377.5
Mountain Gate	12	5570	153.2
Old Shasta	1	1238	34
Palo Cedro	19	9650	265.4
Redding	119	24820.14	682.6
Shasta Lake	23	11696	321.6
Shingletown	48	14055.2	386.5
<b>Totals</b>	<b>347</b>	<b>139119.67</b>	<b>3439.3</b>

# Other Vectors

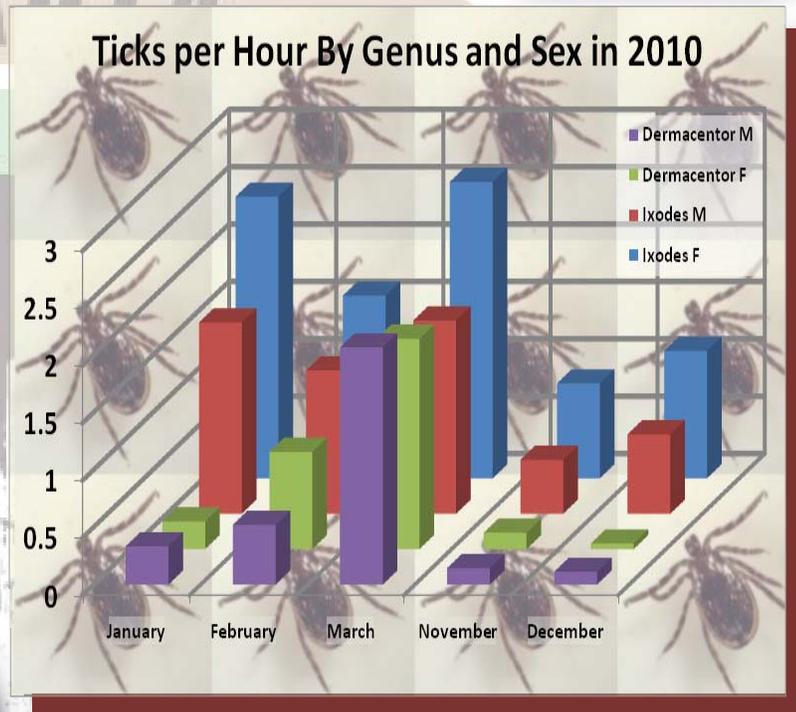


Shasta Mosquito and Vector Control District has a number of employees with training and certification in the biology and control of vectors other than mosquitoes. The District does not provide control services for these vectors, but provides written and oral information and advice to residents and the media about personal protection, and other ways of reducing the public health threat posed by a wide variety of local vectors.



## Tick and Lyme Disease Surveillance

Lyme disease, caused by the bacterium *Borrelia burgdorferi*, is primarily vectored in the District by the tick *Ixodes pacificus*, also known as the western black-legged tick. District staff collects tick specimens from twenty fixed locations from November to April using a technique called tick-flagging, where a sheet of fabric is dragged along the side of a trail. The District then submits these ticks to Shasta County Public Health for laboratory testing. This marked the first year for this program at the District and we are excited to see how it evolves over time.



## Rodent and Rodent-Borne Disease Surveillance

Rodents and the fleas or ticks they carry can transmit several diseases, either through inhalation of droppings or through the bite of an infected flea or tick. This includes such diseases as Hantavirus cardiopulmonary syndrome (HCPS), plague, tularemia, and tick-borne relapsing fever. SMVCD's program focuses preliminary serological surveys in areas within the District where contact with rodents is likely; however the program largely comprises working with concerned citizens on exclusion techniques and cleanup procedures. Each season the District will conduct several surveillance events and as needed consultation inspections.



The District's insectary began sustaining a colony of *Culex tarsalis* mosquitoes in May of 2010. Other mosquito districts supplied the initial egg rafts. The strain reared in the insectary is known statewide for its susceptibility to the pesticides used by many districts, including SMVCD. By treating lab reared and wild caught mosquitoes with the same pesticide in a controlled environment, the District can then determine the efficacy of the product and evaluate the possibility of pesticide resistance in the wild population. While the insectary currently houses only *Culex tarsalis* mosquitoes, the District intends to rear other pest species for similar purposes.

**Did you Know?**  
Mosquito-hawks or Mosquito-eaters are actually crane flies. Crane flies do not feed at all once they reach adulthood.



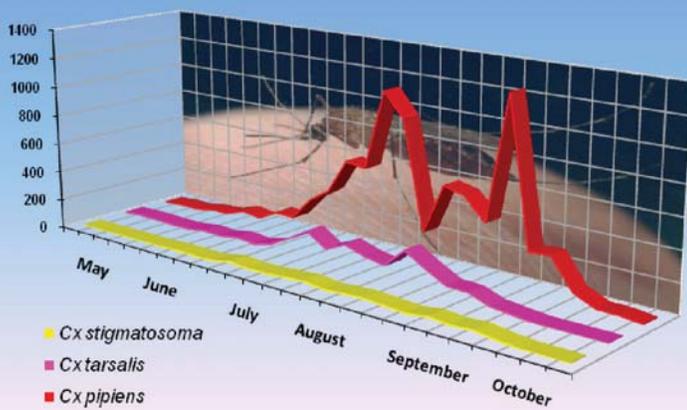
# Vector & Disease Surveillance

## Mosquito and Disease Surveillance

One of the most essential components of a successful IVM program is the surveillance of vectors and the diseases they transmit. The risk of discomfort and/or disease transmission by mosquitoes within the District depends on space, time and prevalence of certain species of mosquitoes and incidences of disease. By effectively monitoring the abundance of vectors and the occurrence of disease, the District is better able to direct its operations and provide efficacious and focused public health intervention. Historically malaria, Saint Louis encephalitis, western equine encephalomyelitis, canine heartworm and West Nile virus have been transmitted by mosquitoes within the District. This year the District utilized two trap types to gather abundance and disease data; New Jersey Light Traps and EVS traps.

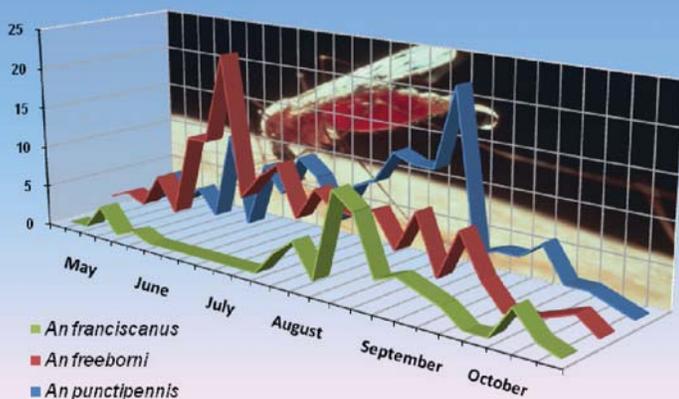
## 2010 Culex Populations by Species

Adult Mosquitoes per Week in 20 CO<sub>2</sub>-Baited Traps



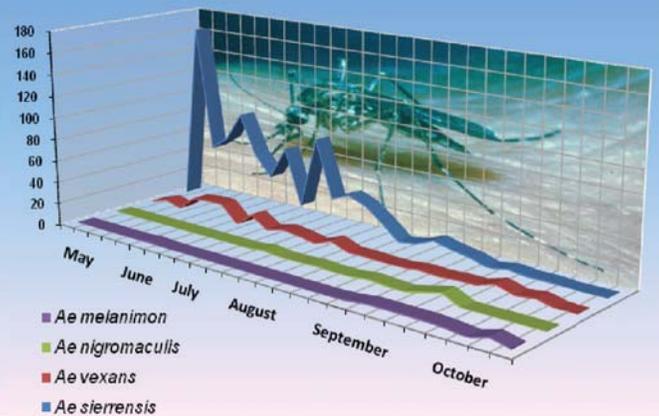
## 2010 Anopheles Populations by Species

Adult Mosquitoes per Week in 20 CO<sub>2</sub>-Baited Traps



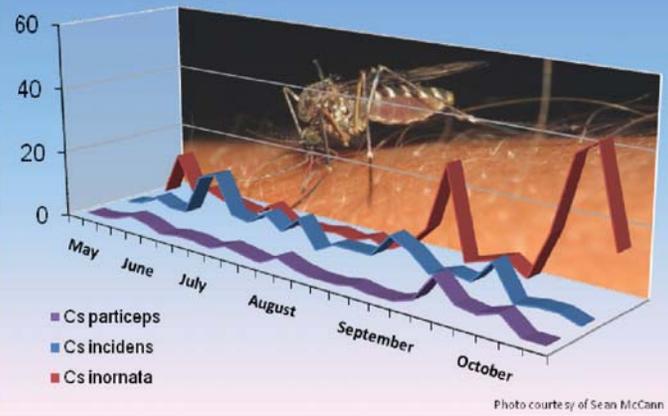
## 2010 Aedes Populations by Species

Adult Mosquitoes per Week in 20 CO<sub>2</sub>-Baited Traps



## 2010 Culiseta Populations by Species

Adult Mosquitoes per Week in 20 CO<sub>2</sub>-Baited Traps



## EVS Trapping

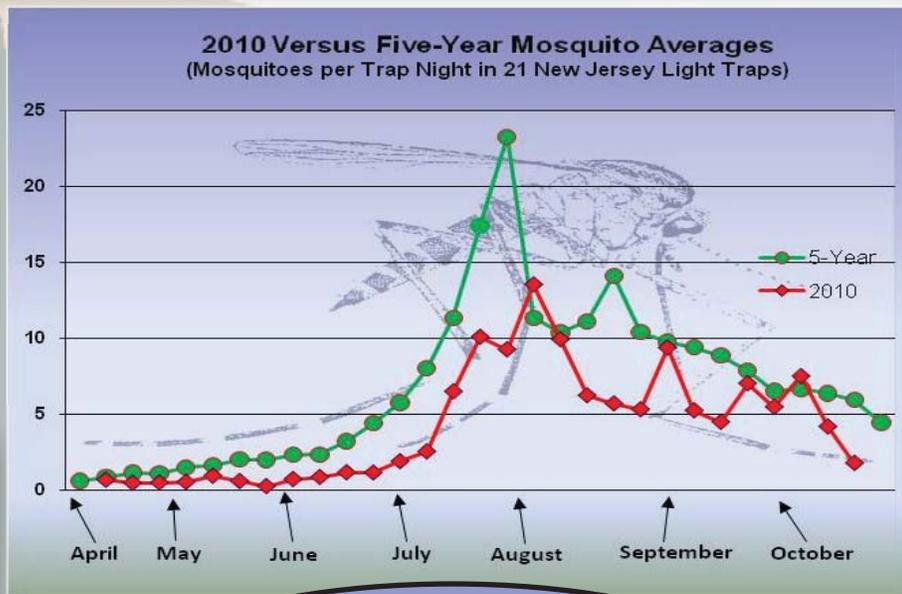
In 2010 Shasta Mosquito and Vector Control District began to set encephalitis virus surveillance (EVS) traps on a regular schedule at 20 locations throughout the District. The traps are baited with carbon dioxide (dry ice) which simulates animal breath and attracts female mosquitoes seeking a blood meal. The traps are set one night per week at each location and the mosquitoes are identified and counted the following morning. In addition to providing mosquito population data, the EVS traps catch mosquitoes that are submitted to UC Davis to be tested for the presence of mosquito-borne virus diseases. In 2010 The District submitted 325 samples of eight to fifty female mosquitoes to be tested for mosquito-borne diseases. No mosquito-borne diseases were detected in any mosquitoes samples submitted from the District in 2010.

# Vector & Disease Surveillance



## New Jersey Light Traps

New Jersey light traps are set at 21 fixed locations throughout the District. Mosquitoes from these traps are collected weekly, tallied by sex and species and recorded in databases at the State and local level. Mosquito population data derived from these traps is used to assess pest and disease risk posed by mosquitoes in the different areas of the District.



## Why do mosquito bites itch?

The itch is caused by an allergic reaction at the site of the bite. When a mosquito bites, it injects a small amount of saliva under the skin to keep the blood from coagulating. The body reacts to the saliva and the severity of the reaction varies from person to person.



## Dead Bird Surveillance

One way that West Nile virus differs from other mosquito-borne diseases is that it often kills birds that it infects, particularly corvids (crows, magpies, ravens and jays). Testing fresh dead birds is one of the ways we detect the transmission of WNV in a general area. Saliva samples from dead corvids are tested in the District's lab for the presence of WNV antigens. The District also sends dead bird samples to UC Davis for more sensitive confirmatory testing for this virus. Four dead birds were found positive for WNV of 35 tested from within the District in 2010.



## Sentinel Chicken Program

Since birds are important reservoir hosts of several mosquito-borne virus diseases, the District uses blood samples from sentinel chicken flocks as an indicator of the presence of mosquito-borne disease transmission within the District. Blood samples from the District's five sentinel flocks (44 total birds) were taken every two weeks from mid April to mid-October in 2010. The samples were tested at the California Department of Public Health Virus and Rickettsial Disease Laboratory (VRDL) in Richmond. No antibodies to mosquito-borne diseases were found in any sentinel chicken blood samples from within the District.

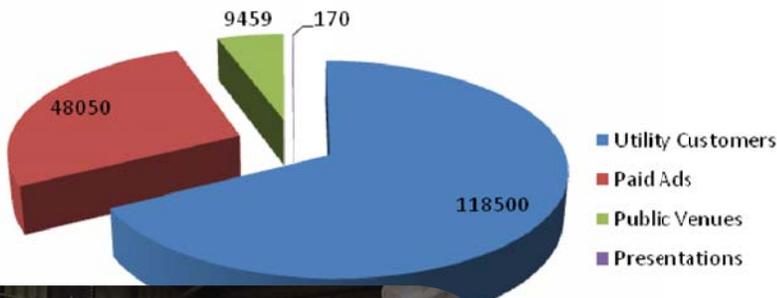
# Outreach

Shasta Mosquito and Vector Control consider public information to be the most important component of its comprehensive vector management program. We attempt to reach District residents in several ways to share vector-related knowledge including: our website, print media and outreach events.

In 2010, the District conducted a total overhaul of its website, [shastamosquito.org](http://shastamosquito.org). The District's website contains a variety of resources to educate, inform and assist visitors to the site. Online information includes details about the District's history, personal protection, annual reports, press releases, Board agendas, meeting minutes and information on vectors and the diseases they carry. In addition, visitors to the website can check the District's schedule for adult mosquito control operations. Finally, forms are available to allow online transmittal of service requests for mosquito issues, dead bird reports and mosquito fish requests. The District website had 5,015 unique visits and over 14,639 page views in 2010.



### Outreach (People Contacted)



In addition to digital media the District has over fifty print brochures on a variety of mosquito and vector-borne disease issues. In 2010 the District included 58,220 flyers or other inserted materials with bills from local utility agencies. Additionally, the District issued press releases to all local print, radio and television news outlets on subjects including winter activities, tick and rodent-borne disease surveillance, the first local West Nile positive dead bird of 2010, aerial surveillance of neglected swimming pools, and the District's warrant for inspection of neglected swimming pools. To enhance Shasta Mosquito and Vector Control District's exposure in the news media paid ads were taken out in the Redding Record Searchlight, Anderson Valley Post and Shasta Lake Bulletin to inform the public about District activities reaching as many as 48,050 subscribers.

SMVCD understands that direct contact with the public can often yield the best results for outreach. In 2010 the District manned booths at the Spring Home and Garden Expo, the Redding Spring Home and Garden Show, and at the Shasta District Fair. The public was also invited to the District to see District operations and speak with personnel at an open house and a classroom field trip in 2010. The District provided speakers to make presentations to government organizations and the public including Shasta Lake City Council, Anderson City Council, Shasta County Board of Realtors, Shasta Dam Kiwanis, the Mariners' Club, Redding Kiwanis, and the Cottonwood Community Library.



# Financial Highlights

## Statement of Financial Position: FY 2009-2010 (June 30, 2010)

2009-2010	
<b>Current Assets</b>	
Cash in Treasury and on hand	1,819,451
Accounts Receivable	178,502
Restricted Assets - cash	1,631,767
<b>TOTAL</b>	<b>3,629,720</b>

<b>Non- Current Assets</b>	
Total Capital Assets	2,239,291
Accumulated Depreciation	(1,462,148)
<b>TOTAL NON-CURRENT ASSETS</b>	<b>777,143</b>
<b>TOTAL ASSETS</b>	<b>4,406,863</b>

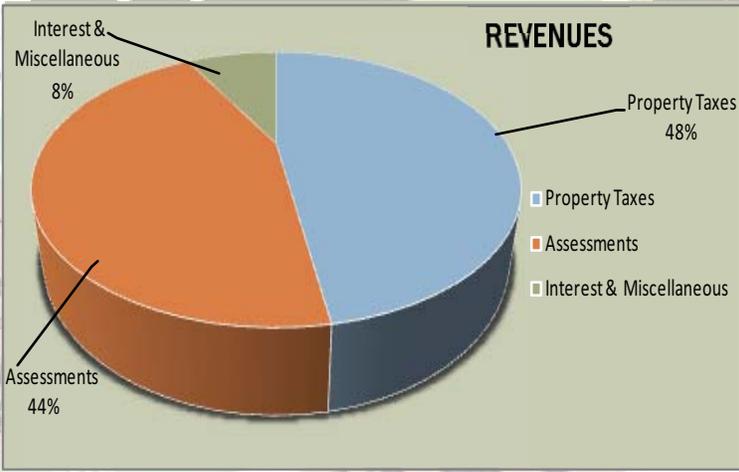
<b>Liabilities</b>	
Total Liabilities	148,141
<b>TOTAL LIABILITIES</b>	<b>148,141</b>

<b>Net Assets</b>	
Investment in Capital Assets, net of related debt	777,143
Restricted for equipment replacement	168,674
Restricted for building replacement	117,908
Restricted for self insurance	713,196
Restricted for emergency	350,465
Unrestricted	2,131,336
<b>TOTAL</b>	<b>4,258,722</b>
<b>TOTAL LIABILITIES AND NET ASSETS</b>	<b>4,406,863</b>

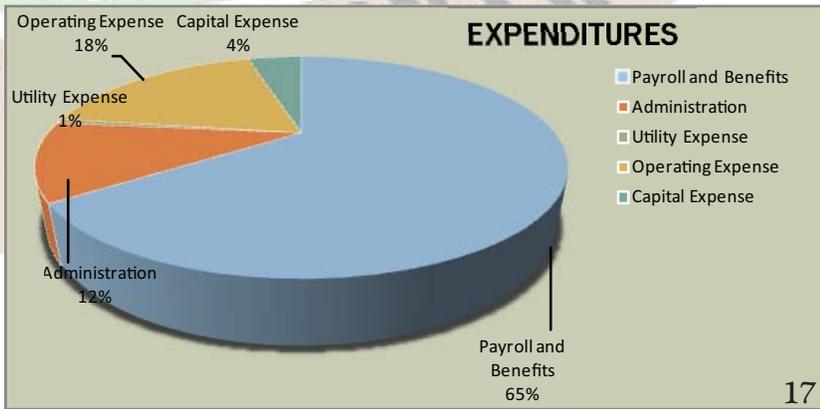
<b>Change in Net Assets</b>	
Net (expense) revenue	(876,174)
Taxes	1,141,583
Investment Income	40,888
Miscellaneous	(8,698)
<b>Change in Net Assets</b>	<b>297,599</b>

<b>Net Assets</b>	
Beginning of Year	3,961,123
Prior Period Adjustment	-
<b>Net Assets End of Year</b>	<b>4,258,722</b>

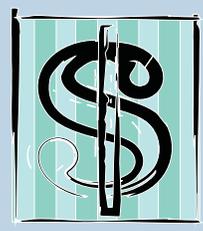
2009-2010 REVENUES		
Property Taxes	1,141,583	47.43%
Assessments	1,066,464	44.31%
Interest & Miscellaneous	198,630	8.25%
<b>TOTAL</b>	<b>2,406,677</b>	<b>100%</b>



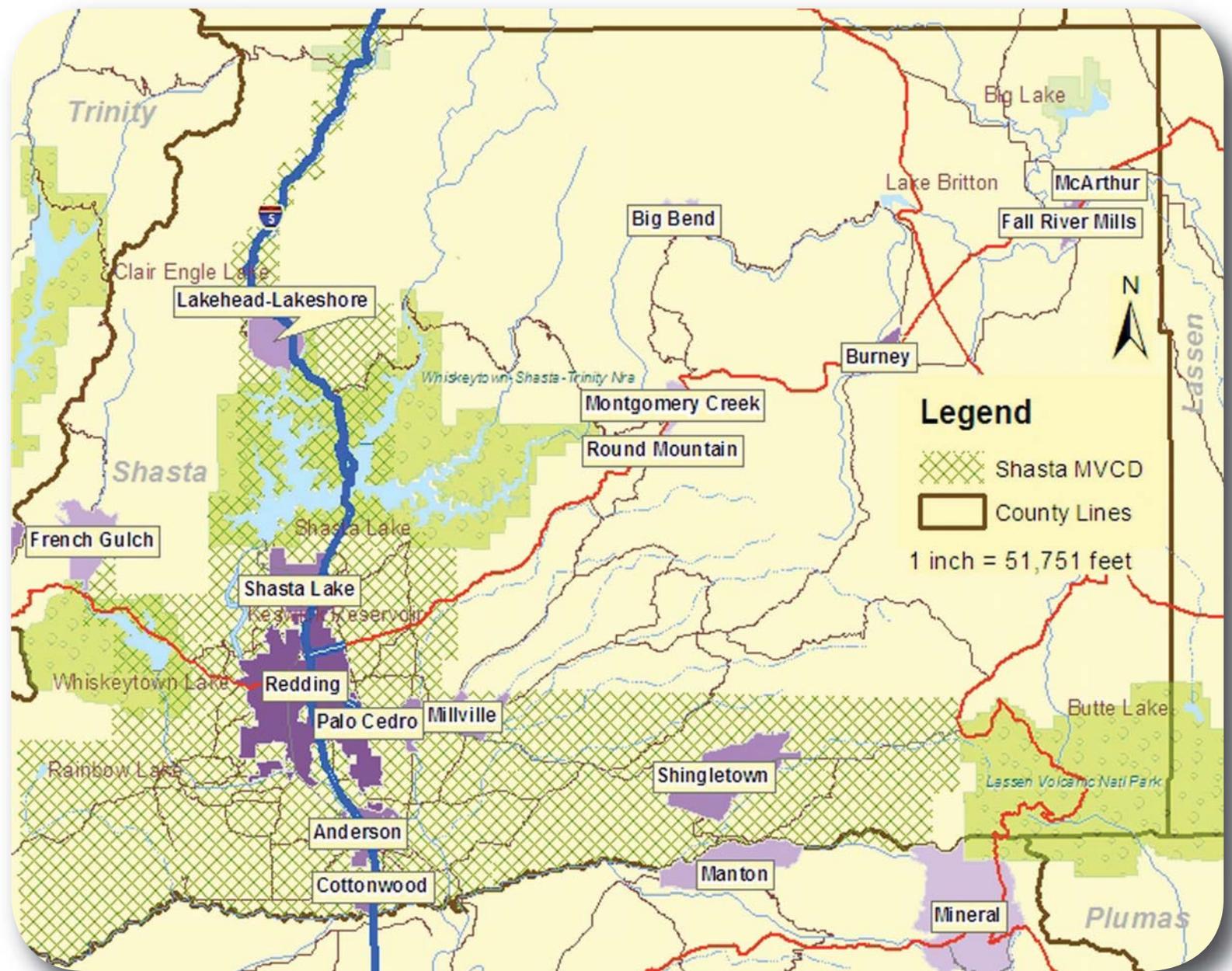
2009-2010 EXPENDITURES		
Payroll and Benefits	1,336,071	65.15%
Administration	235,251	11.47%
Utility Expense	12,880	0.63%
Operating Expense	376,255	18.35%
Capital Expense	90,199	4.40%
<b>TOTAL</b>	<b>2,050,656</b>	<b>100%</b>



Funding Sources - Property taxes represent 47% of the District's funding. This includes Current Secured, Current Supplemental, and Current Unsecured property tax. The District's other main source of revenue is through a benefit assessment that assess individual properties. Benefit Assessment revenue represents 44% of District Funding. The remaining 8% or revenue comes from interest earned and miscellaneous sources.



# Shasta Mosquito & Vector Control District



19200 Latona Road  
Anderson, CA 96007  
(530) 365-3768  
[contact@shastamosquito.org](mailto:contact@shastamosquito.org)  
[www.shastamosquito.org](http://www.shastamosquito.org)