County of Santa Cruz

OFFICE OF THE AGRICULTURAL COMMISSIONER
MOSQUITO AND VECTOR CONTROL CSA 53
640 Capitola Road, Santa Cruz, California 95062
(831) 454-2590 Fax (831) 464-9161 Internet www.agdept.com

MARY LOU NICOLETTI
AGRICULTURAL COMMISSIONER

PAUL L. BINDING
MANAGER

0023

May 29, 2012 **Agenda: June 12, 2012**

BOARD OF SUPERVISORS
County of Santa Cruz
701 Ocean Street
Santa Cruz, CA 95060

MOSQUITO AND VECTOR CONTROL ANNUAL REPORT

Dear Members of the Board:

The Santa Cruz County Mosquito Abatement / Vector Control (MAVC) CSA 53 is pleased to present an Annual Report for calendar year 2011. This Report summarizes the program and operations, including highlights of our efforts in mosquito control, vector disease surveillance, public information and habitat protection. Our goal is to continue to provide effective mosquito and vector-borne disease control to County residents in an environmentally sensitive way.

With your acceptance MAVC will begin to distribute this Report and post it on our County website http://www.agdept.com/mvc.html . We will also send it electronically to your office so that you may distribute it as you wish. It will also be distributed to the City Councils with a cover letter.

Our California legislature had declared April 22 through April 28, 2012 as Mosquito Control and West Nile Virus Awareness Week, and MAVC used the opportunity to provide announcements to news media asking residents to check their yards for mosquito breeding in containers and pools. MAVC also kicked off the week with educational booths at Santa Cruz and Watsonville's Earth Day weekend.

On a related note, June 24 through June 30, 2012, has been declared National Mosquito Control Awareness Week by Congress. MAVC will hold its annual Open House and community forum on Tuesday, June 26, 2012 from 5:00 p.m. to 7:00 p.m., so the public can learn about and comment on our services.

I trust you will find the Annual Report both useful and educational and can find the time to visit the Open House and see the 640 Capitola Road facilities.

IT IS THEREFORE RECOMMENDED that your Board accept and file this Mosquito and Vector Control Annual Report for 2011.

Respectfully Submitted,

Paul Binding for MLN

Mary Lou Nicoletti
Agricultural Commissioner / Director, Mosquito Abatement and Vector Control

MLN/PB/pb

Susan A. Mauriello
County Administrative Officer

Attachments

Cc: County Administrative Officer
Clerk of the Board

15

COUNTY OF SANTA CRUZ MOSQUITO AND VECTOR CONTROL

COUNTY SERVICE AREA 53

Established 1993

0025

OPEN HOUSE AND WORKSHOP

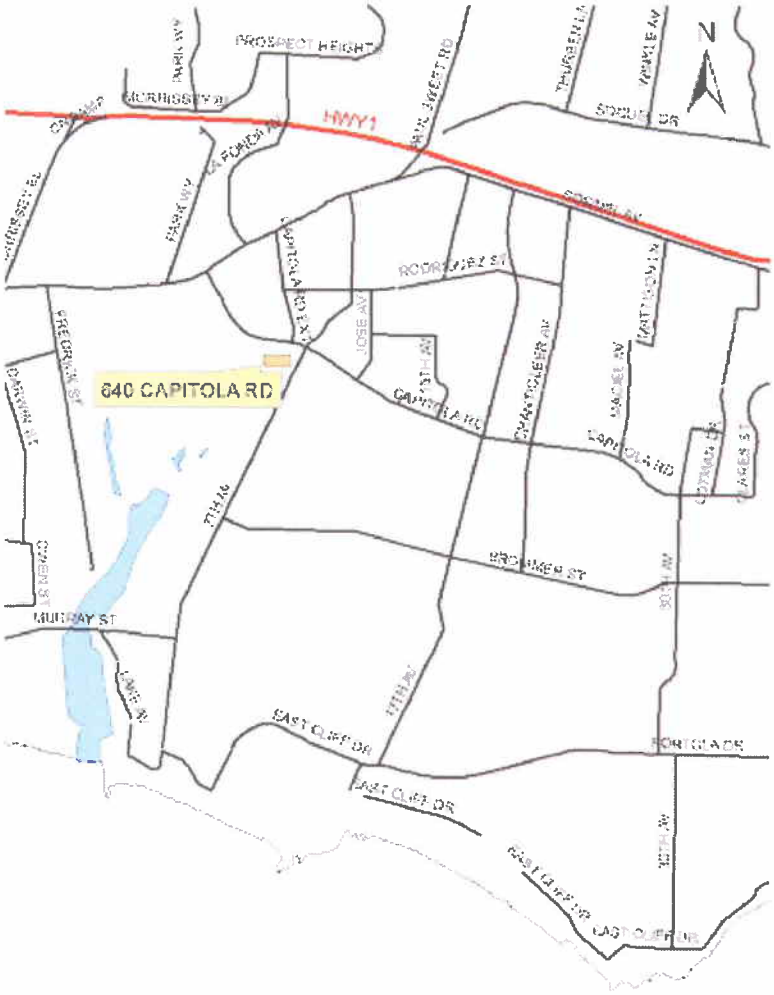
TUESDAY – JUNE 26, 2012 5:00 PM -7:00 PM

Mosquitoes ----- Ticks ----- Flies ----- Yellow Jackets ----- Rodents

The community is invited to attend our Open House and learn about and comment on our services. There will be food, games and a repellant and tick remover giveaway. Bring in a bug for identification!

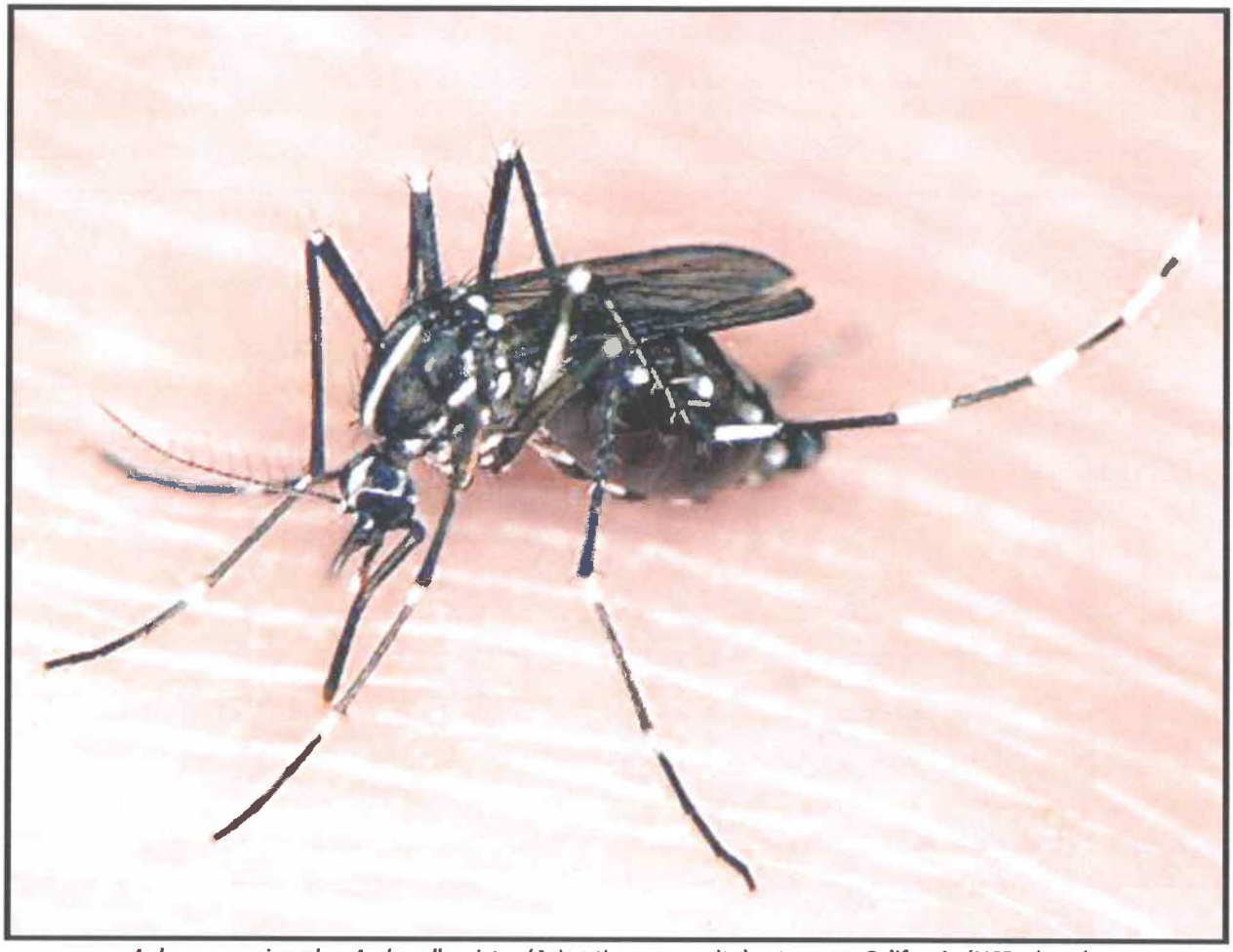
We are located at: 640 Capitola Road in Santa Cruz.
Contact info: 831-454-2590 or http://www.agdept.com/mvc.html

Directions: From Highway 1 take the Soquel Drive exit, proceed west on Soquel Drive, turn left onto Capitola Road then right into our driveway



The mosquito and Vector Control District is dedicated to the protection of the public health through management of disease carrying mosquitoes and assistance with other nuisance and disease carrying vectors.

2011 ANNUAL REPORT



A dangerous invader, Aedes albopictus (Asian tiger mosquito) returns to California (UCR photo)

Santa Cruz County
Mosquito and Vector Control

640 Capitola Road, Santa Cruz, CA 95062
(831) 454-2590
Write to us at: Pesthelp@agdept.com
Visit our website at: www.agdept.com/mvc.html

Manager's Introduction:

Your Mosquito and Vector Control program is now in its 19th year. Formed in 1993 by the Santa Cruz County Board of Supervisors as a result of public demand, Mosquito Abatement / Vector Control CSA53 is a section of the Agricultural Commissioner. The program went countywide in 2005 with additional funding as a result of approved annexations and successful public balloting with property-based benefit assessments. Our mission is to provide responsive and effective protection to the public and improve the quality of life here in Santa Cruz County by managing pests that are a threat to public health.

We are proud of the efficiency of our operations in the control of vectors such as mosquitoes, rodents, flies and yellow jackets, the education of the public regarding ticks and the monitoring and reduction of diseases transmitted by these pests. Staff practices conservation biology in finding non-pesticide and least-toxic solutions in the control of vectors.

We are grateful for a supportive and cooperative community that appreciates our hard work and also the assistance of the State, other County departments, the universities and the Mosquito and Vector Control Association of California. Please enjoy this record of our achievements and provide your feedback so that we can further enhance our public health services. We strive to serve and be transparent. Call us at (831)454-2590 or visit our website at http://www.agdept.com/mvc.html.

Respectfully, Paul Binding

Pictured from left to right: Paul Binding, Ray Travers, Lori Filiau, Melanie Benedetti, Steve Driscoll, Jacob Jones, Nader Sidhom

Staff 2011:

Ken Corbishley	Director / Agricultural Commissioner (retired September 2011)
Mary Lou Nicoletti	Deputy Director / Agricultural Commissioner (Director January, 2012)
Paul Binding	Assistant Vector Control Manager
Ray Travers	Vector Control Specialist
Nader Sidhom	Vector Control Specialist
Andria Hernandez	Vector Control Specialist (left April 2011)
Jacob Jones	Vector Control Specialist (start September 2011)
Melanie Benedetti	Vector Control Specialist
Steve Driscoll	Vector Control Specialist
Eric Berris	Seasonal Aide
Lori Filiau	Senior Account Clerk

Mission Statement

At Santa Cruz County Mosquito and Vector Control we are committed to protecting the public from pests capable of transmitting disease or creating a nuisance through:

- Accountable, efficient service to safely suppress mosquitoes in an environmentally sustainable manner.
- Inspection, identification, consultation or providing literature for the management of vectors such as bees, wasps, ticks, rodents, flies, bed bugs, etc.
- Control of nuisance yellow jackets in public areas.
- Monitoring for the presence of mosquito-borne encephalitis, West Nile virus, rodent-transmitted hantavirus and tick-borne Lyme disease.
- Providing mosquito fish for biological mosquito control to residents with ponds, animal troughs and fountains.
- Educational presentations about vector biology and control to public groups and schools.

A History of Service

The Santa Cruz County Mosquito Abatement and Vector Control (MAVC) was established in 1993 as a program within the Agricultural Commissioner's Office, in response to public demand for mosquito relief. In August 2005 the service area expanded from the south county (approximately 70 square miles, population 85,430) to the entire county (446 square miles, population 265,000).

The MAVC recorded 315 requests for service in 2011 with the majority of calls coming from the Santa Cruz area (Figure 1). Seventy six percent of calls were in regard to mosquitoes, 10% for rodents, 4% for bees and wasps, and 4% for ticks, flies, and various vertebrates (raccoon, skunk, ground squirrel, etc.). The percentage of calls regarding other vectors including mites, fleas, bedbugs, spiders, and parasitic worms was above average at 5% (Figure 2). While mosquitoes are actively controlled county wide, yellowjacket wasps are controlled when they occur on public property and present a danger. Exterior home inspections and consultation are offered for rodent problems around homes and businesses. Consultation and education are provided for all other vectors to enable callers to resolve problems with an understanding of vector biology and the diseases they may spread. (see bed bug picture below)

Figure 1.

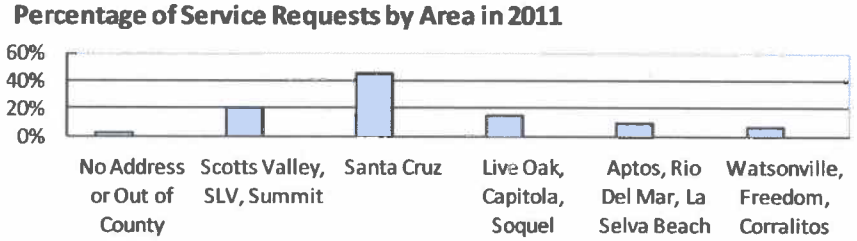
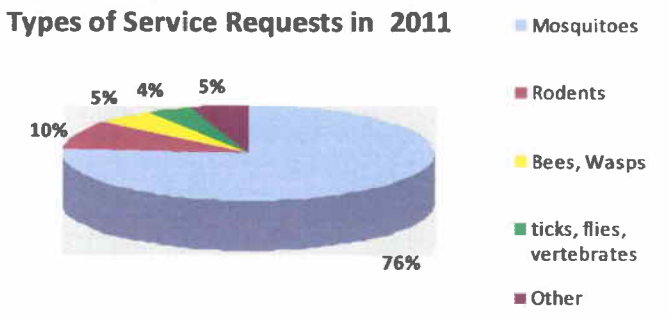


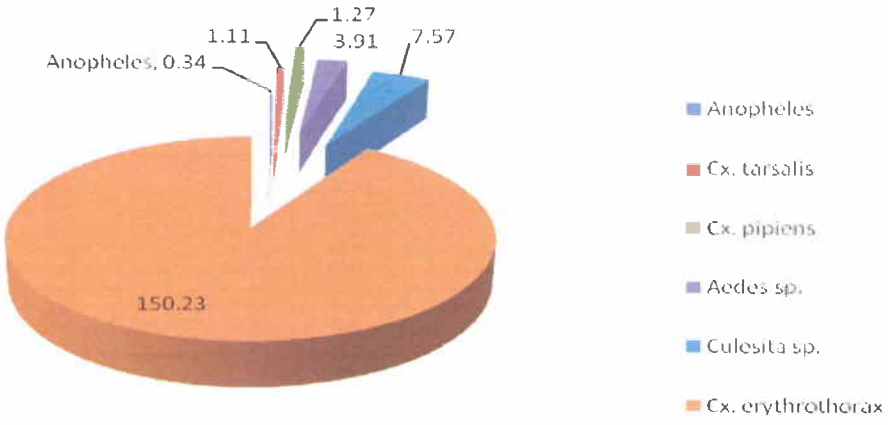
Figure 2.



Mosquito Control

Our county is home to at least 19 mosquito species, and 9 of these are considered important according to their ability to spread nuisance or disease (see page 15). The tule mosquito, *Culex erythrothorax,* is the County's most abundant mosquito, in 2011 averaging over 150 per night per CO2-baited trap (Figure 3). Tule mosquitos can present a significant biting nuisance near their source, but do not fly far and are not considered competent vectors of encephalitis or West Nile virus. They are still important however in spreading the viruses in wild birds, which can then infect competent disease vectors including *Culex tarsalis* and *Culex pipiens* when bitten. Though the percentage of competent disease vectors is relatively low, they occur in significant numbers seasonally and around homes, and their control is prioritized accordingly. *Anopheles* mosquitoes are capable of transmitting malaria.

Figure 3. 2011 CO2 Trap Mosquito Species Abundance per Trap Night



The functional elements of our mosquito management program include reducing sources of breeding, informing the public, stocking mosquitofish, and using biorational larvicides to break their development cycle in the aquatic stages. The need to use mosquito adulticides is thus averted. Fogging adult mosquitoes is less selective than the more targeted use of larvicides. Decisions to control mosquitoes are based on the species of mosquitoes found, their potential to spread disease and nuisance, their proximity to human activity and the presence of protected wildlife species, in cooperation with State and Federal natural resource management agencies and public and private landowners.

Helicopter treatments in South County sloughs and lakes are timed to reduce mosquitoes during the peak-breeding season using *Bacillus* and methoprene larvicides, which are largely non-toxic to non-target organisms (see page 12).

Table 1. Mosquito Source Treatments from 2007 to 2011

Year	Larvicide Applications*	Complaint Inspections	Locations Stocked With Mosquitofish**	Acres Treated by Helicopter
2007	2012	288	96	295
2008	1546	324	142	293
2009	1815	367	163	402
2010	1706	322	145	269
2011	1261	262	154	197

* Includes mosquito sources treated with two different larvicides simultaneously, counted as two applications.
** In 2008 MVC discontinued the practice of public pick-up of fish, in cooperation with CA Department of Fish and Game. Instead we have adopted the policy of delivering the fish in order to prevent the introduction of mosquitofish into sensitive habitats.

The reduction of pesticide applications beginning in 2008 corresponded with the increased use of extended residual methoprene briquettes, which reduced the need for repeated applications in street drain catch basins. The reduction of treatments in 2011 may also be due to an unusually cool year, reduced staffing while replacing a technician, and a county wide 5% labor furlough.

Residential properties produce mosquitoes in small ponds, neglected swimming pools, septic systems, animal troughs, tires, and plant containers, to name a few sources. The MAVC consults with residents in order to manage or eliminate breeding habitats. Notices are sometimes sent to residents to ask for help in locating hidden mosquito sources. Residents can assist us greatly by reporting biting activity, green pools and other standing water sources. The day-biting Asian Tiger mosquito, *Aedes albopictus*, has been found in Southern California, can transmit many diseases including Dengue fever and is able to breed in a potted plant saucer.

Mosquitofish provide excellent control of mosquitoes in many situations. Mosquitofish use in Santa Cruz County pre-dates our program having been introduced statewide for several decades. The MAVC cooperates with wildlife management agencies by not introducing mosquitofish into natural water bodies where they may compete with native fish and amphibians. They are typically stocked in yard containers such as large fountains, animal water troughs and fishponds.

The battle to control mosquitoes can be difficult for staff. Machetes, brush-cutters, and chainsaws are wielded to access breeding sites that may contain poison oak, stinging nettle and blackberry; and stinging insects may add to the challenge. Treatments often involve wading through deep mud and dense aquatic vegetation while carrying a backpack blower that can weigh up to 50 lbs.

Mosquito Life Cycle

Eggs *Larvae* *Pupae* *Adult Male*

Mosquito Source Reduction

Source reduction is the preferred approach over pesticide application. The MAVC strives to find non-pesticide solutions to mosquito breeding situations whenever possible, which may include: removal or thinning of dense aquatic vegetation that harbor mosquito larvae, removal and/or emptying of yard containers including tires that hold water, stocking mosquitofish in fish ponds and unused pools or spas, and educating the public in ways to prevent mosquito breeding situations. In addition, trail clearing is necessary to create access to various natural mosquito-breeding sources so that source reduction and mosquito control may be possible.

In 2011 the MAVC took part in the following mosquito source reduction projects:

- Worked with the California Conservation Corps at Pinto Lake County Park to manually remove approximately ¼ acre of dense aquatic vegetation.
- Worked with the Santa Cruz County Parks department to manually remove nearly one acre of mosquito fern (*Azola sp.)* from the pond at Quail Hollow Park in Felton.
- Consulted with organic farm owners about their pond on Pioneer Lane in Watsonville for the removal of dense vegetation and levee improvement to reduce breeding and provide us access.
- Coordinated the removal of dense aquatic vegetation in a small agricultural pond next to Alianza Elementary School in Watsonville.
- Found over 30 green pools using an aerial photography service. Provided mosquito control and consulted with home owners to eliminate the mosquito breeding potential of the unused pools, often by stocking them with mosquitofish.
- Requested removal of a large unused septic structure in Felton and provided mosquito control until it was removed by the Public Works department.
- Requested municipalities clean out street drains that consistently breed mosquitoes.
- Stocked mosquitofish in 154 residential fish ponds, pools, and animal troughs.
- Removed several tires from roadsides, and consulted on the removal of tires and containers on private properties.
- Consulted on a large trail clearing project at the UCSC Arboretum pond for the purpose of accessing mosquito breeding habitats.
- Cleared trails and removed brush in order to access mosquito breeding habitats throughout the county.

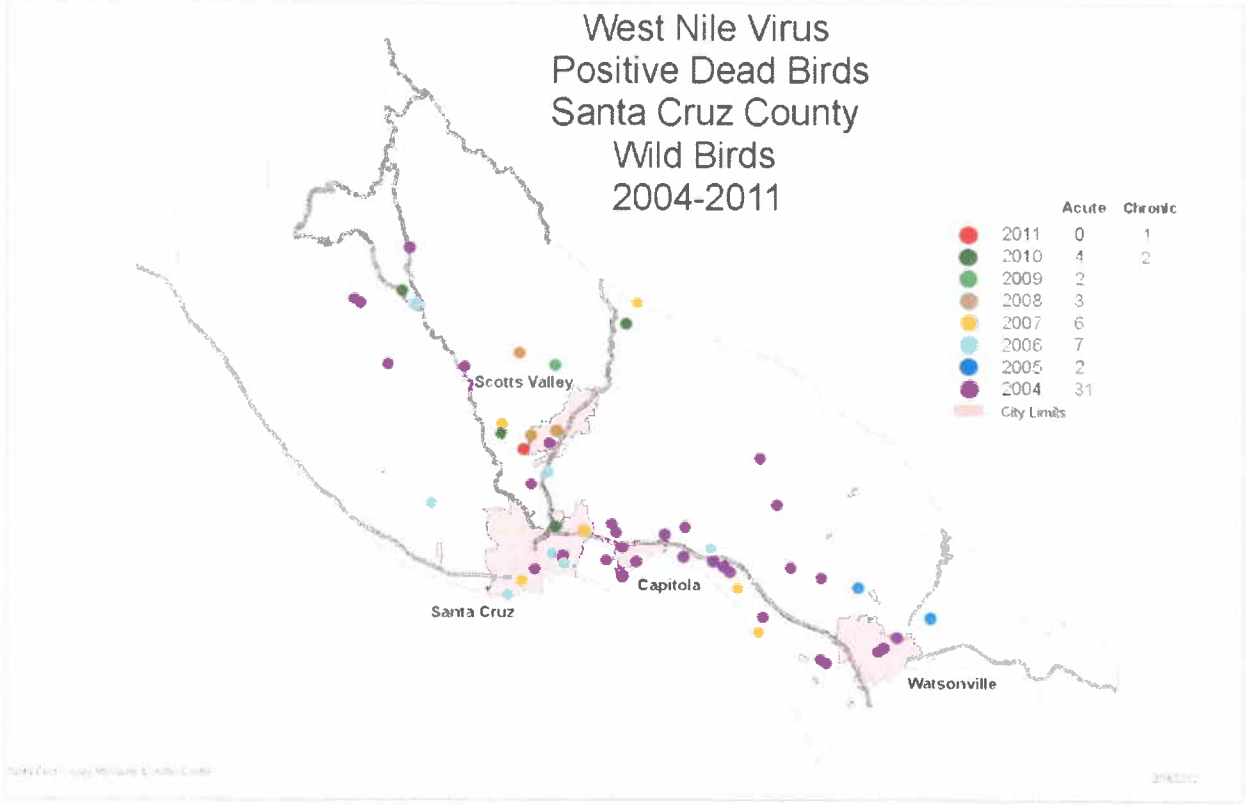
Vectorborne Diseases in Santa Cruz County

Mosquitoes and West Nile Virus

One fatal human case of mosquito-borne West Nile virus (WNV) was reported in the County, contracted by an infected organ donated from Southern California. Statewide there were 155 confirmed human cases of WNV with 9 fatalities in 2011, an increase from 2010 which had 111 human cases with 6 fatalities.

Twenty one dead wild birds were reported by County residents to the State Dead Bird Hotline and collected and submitted by MAVC for WNV testing in 2011, with one positive for chronic infection which was likely infected prior to 2011. Statewide 688 birds from 26 counties tested positive for WNV. Blood samples from 'sentinel' chicken flocks located at Watsonville High School and our Capitola Road office were also submitted, with no positive WNV detections.

The most significant vector of WNV in Santa Cruz County is the common house mosquito, *Culex pipiens*. This species is especially difficult to control because breeding sources can be difficult to locate. The larvae are often hidden within backyard sites in un-maintained pools, buckets, tires, animal troughs, roof gutters, and in underground sources of stagnant water, including utility vaults, street catch basins, sewer, and septic systems. Accordingly, treatments of street catch basins are prioritized and coordinated with the aid of GIS mapping programs. Chronically breeding storm water systems are reported to City and County Public Works. The MVC contracts with aerial photography services to find unmaintained "green" pools. Residents are instrumental in reporting hard to find mosquito sources in their neighborhoods.



Ticks and Lyme Disease

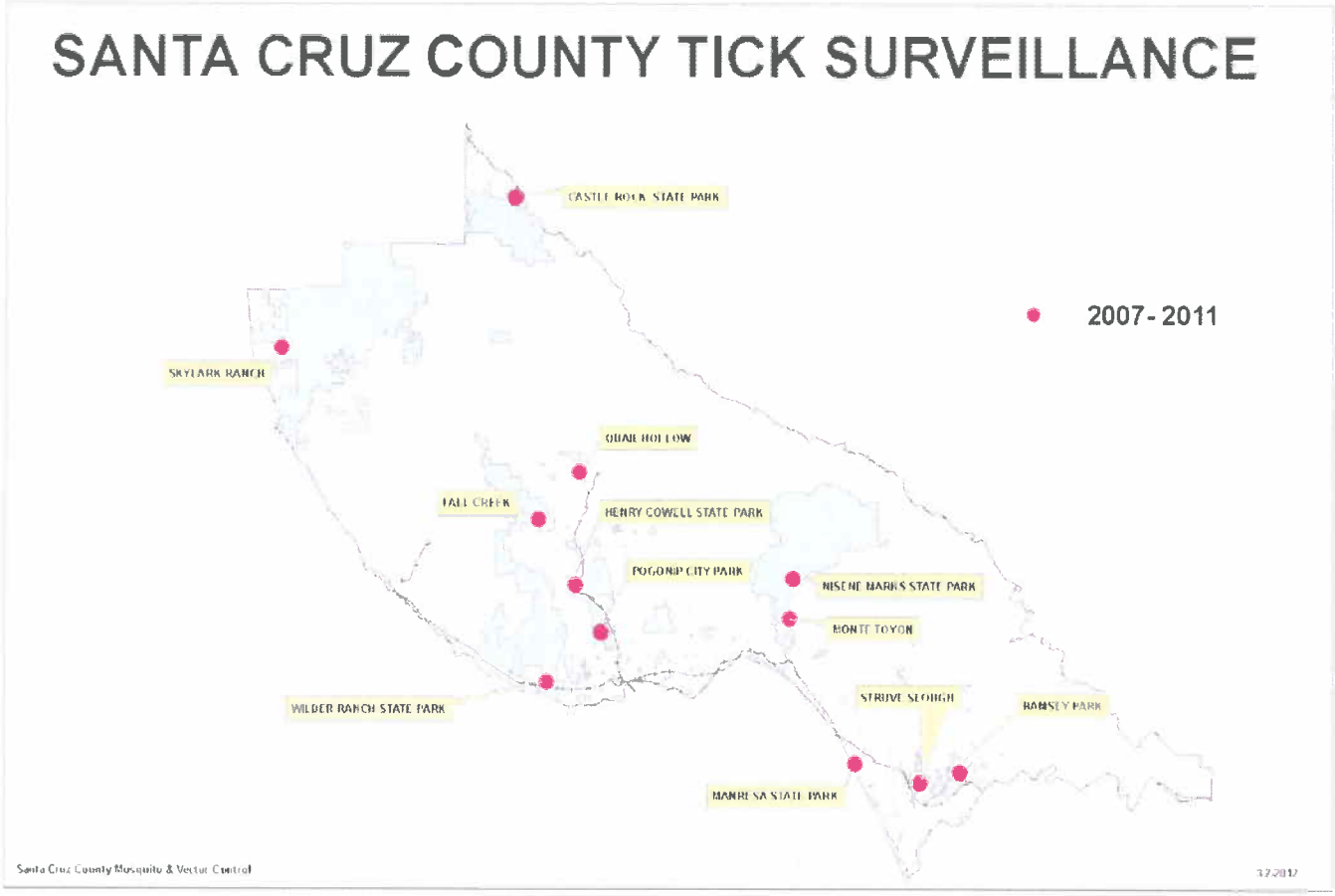
Santa Cruz County had eight reported cases of Lyme disease in 2011. The average is five cases per year, making Lyme our most important vector-borne disease. We collected 313 Western black-legged ticks (*Ixodes pacificus)* from primarily high use recreational areas in State Parks including Wilder Ranch and Nisene Marks, which were tested by the California Department of Public Health (CDPH) for the bacteria (*Borrelia burgdorferi)* that causes Lyme disease. The 220 adult and 93 nymphal ticks yielded an infection rate of 2% and 9.5% respectively (Table 2).

Table 2. Santa Cruz County 2011 Tick and Lyme Disease Surveillance

Site	Collected	Males Tested	Fem Tested	Total adults	# Borrelia Positive Adults	Nymphs	# Borrelia Positive Nymphs
Nisene Marks	2/28/2011	26	24	50	0	0	na
Nisene Marks	3/17/2011	2	4	6	0	0	na
Nisene Marks	4/5/2011	1	6	7	0	11	0
Monte Toyon	2/7/2011	4	15	19	0	0	na
Wilder Ranch	2/4/2011	63	54	116	5	0	0
Wilder Ranch	5/12/2011	0	0	0	na	93	14
Wilder Ranch	4/19/2011	13	8	22	0	1	0
Wilder Ranch	6/14/2011	0	0	0	na	95	5

The tiny nymphal ticks present a greater risk of spreading Lyme disease than adult ticks as they carry a much higher infection rate and they and their bites are more likely to go unnoticed. Nymphs are found in cool moist environments, typically in leaf litter or on logs and tree trunks. Adult ticks of three common species are found on the tips of grasses and shrubs, often along trails, and readily attach to animals and people that pass by. Questing ticks are much more abundant on the uphill side of a trail.

According to the CDPH, the chance of getting Lyme disease is very low if ticks are removed within 24 hours of becoming attached. MVC identifies removed ticks for persons who have been bitten, and provides tick bite prevention and symptom recognition information to the public. We find awareness to be the most effective means of preventing tick-borne disease. Antibiotics are effective in treating Lyme disease in its early stages. For more information on Lyme disease please refer to the CDPH website at www.cdph.ca.gov . Currently there is no efficient means to control ticks other than a deer fence and clearing brush and leaf litter in yards adjacent to natural areas.



Rodents and Hauntavirus

MVC assisted the California Department of Public Health (CDPH) in rodent surveillance and a Hantavirus study at Wilder Ranch. Hantavirus Pulmonary Syndrome is a rare yet frequently fatal virus transmitted through feces and urine of small wild rodents such as the deer mouse. Six trapped mice were blood-sampled and released in 2011. Samples tested negative, and further study is planned.

Yellow Jackets and Bees

Five percent of callers inquired about yellow jackets and bees. The MVC abates yellow jacket nests when found in public areas and present a danger to residents. MVC generally does not eliminate honey bees, but refers residents reporting wild hives and swarms to beekeepers, who often remove them for no charge.

The spread of the Africanized honey bee (AHB) presents a threat to public health and beekeeping. Stinging incidents in some situations may result in life-threatening injury and death. Africanized bees respond in greater numbers than our European honeybee, and pursue their victims over greater distances. A disturbed colony may remain agitated for as long as 24 hours, attacking perceived threats up to a quarter mile from the hive. The bees may respond aggressively to everyday occurrences such as vibrations generated by passing vehicles, power equipment, and even foot traffic.

Counties shaded in brown are considered to have potential for colonization of Africanized Honey Bees. (Map courtesy of Sting Shield Insect Veil)

The AHB has colonized more than half of California and has been found as far north as Monterey County. The advance of the AHB throughout the central coast is anticipated, but has slowed significantly at its present position in recent years. Mosquito and vector control agencies where the AHB is established have dedicated significant resources to AHB abatement programs. The Santa Cruz County AHB Task Force developed an Action and Response Plan. The MVC will continue to monitor the movement of the bee.

In the Laboratory

- Thousands of mosquito larvae and tens of thousands of adult mosquitoes were collected and identified to species.
- 21 dead birds were submitted for WNV testing, with one positive result.
- 4 samples of mosquitoes were submitted for encephalitis and West Nile virus testing with no viral activity detected.
- 640 sentinel chicken blood samples were submitted for encephalitis and WNV testing with no viral activity detected.
- 313 Western black-legged ticks were collected and submitted to DHS for Lyme disease testing, resulting in a total infection rate of 6%.

Community Education

The MVC strives to educate and inform the public about vectors in our community and the services we offer, with special emphasis on mosquitoes, their breeding habitats, and how to eliminate and report mosquito sources. In 2011 our program provided:

- Educational exhibits on mosquito and vector control reached several hundred people at the County Fair and Earth Day events in Watsonville.
- Classroom and other presentations on vector biology and control to various adult groups and over 235 students.
- Radio, newspaper, and television interviews on vector issues.
- Distribution of mosquito-borne West Nile virus, tick-borne Lyme disease and many other public health pest informational pamphlets.
- Annual open house inviting public to visit our facility, learn about and comment on our services.

Earth Day / Day of the Child - Watsonville

Environmental Care

The MVC prioritizes care for the environment, and utilizes Integrated Mosquito Management techniques, which involves:

- Emphasis on mosquito habitat reduction and water management techniques.
- Prioritization of least toxic means of pest reduction.
- Selective and sustainable treatments when mosquitoes exceed threshold levels with consideration of resident proximity, ecosystem balance, disease risk and other environmental factors.
- Focus on more efficient mosquito control in the larval stage, as opposed to the adult stage that requires less selective pesticides.
- Bio-control with fish where appropriate. Mosquito fish are delivered along with a written notice not to re-release them into natural bodies of water.
- Cooperation with wildlife regulatory agencies in refuges and preserves, and assessment of mosquito abatement activities with respect to sensitive species.
- Compliance with Water Quality Control Board permit requirements for water resource protection.

Pesticide Use and the Environment

The MVC limits pesticide use to EPA registered materials that are biorational or least-toxic. Mosquitoes are controlled in the aquatic larval (juvenile) stage rather than the adult stage, as larval control treatments are environmentally sound and more effective in reducing mosquitoes before they emerge as adults and disperse. The MVC cooperates with the County's Integrated Pest Management (IPM) Departmental Advisory Group and the County and City of Santa Cruz's IPM policies.

The MVC applies aquatic larvicides under a National Pollution Discharge Elimination System permit as required in waters of the United States, and reports use to the Central Coast Regional Water Quality Control Board (RWQCB) and the County Agricultural Commissioner. The MVC has a Mosquito Management Plan on file with RWQCB and the U.S. Fish and Wildlife Service.

Bacillus thuringensis israelensis* (*Bti*)** is a highly selective microbial larvicide (pesticide that targets mosquito larvae). Bti has an extremely low toxicity to humans, animals and other non-target pond life, and biodegrades in a matter of hours. ***Bacillus sphaericus* (*Bs*)** is a related larvicide that is particularly effective in polluted sources such as dairy and septic ponds. ***Spinosad was recently introduced in 2011 and like *Bti* and *Bs,* it is derived from bacteria that occur naturally in soil, and likewise has low toxicity to non-target organisims. The California Department of Food and Agriculture and the Organic Materials Review Institute (OMRI) have certified some formulations of *Bti, Bs* and *Spinosad* as organic. *Bti* and *Bs* accounted for 84% of the total acreage treated in 2011 (page 10).

Methoprene is another biorational larvicide, known as an insect growth regulator. It mimics the juvenile hormone and disrupts mosquito metamorphosis into the adult stage. Methoprene is very selective, having little impact on non-target organisms. It is biodegradable and breaks down rapidly in the environment. Methoprene is non-toxic to humans and other animals at labeled dosage rates, is labeled for fish habitat, and approved by the World Health Organization for controlling mosquitoes in drinking water. Methoprene accounted for 14% of the total acreage treated in 2011.

Larviciding oils are of monomolecular film type or refined mineral oil that forms a thin film that suffocates mosquito larvae. The mineral oil biodegrades within a day, and the monomolecular film biodegrades within one to three weeks and is labeled for use in potable water. Larviciding oils are the only available larvicides that can control mosquitoes in their pupal (non-feeding) stage. Larviciding oils accounted for less than 2% of the total acreage treated in 2011.

Herbicide spot treatments are made using Aquamaster, a glyphosate product, to control poison oak along access trails to mosquito-breeding sources. The material safety data sheet for Aquamaster labels it "practically non-toxic" to non-target organisms.

Mosquito fish are a favorite biological control method and may eliminate the need for pesticide treatments. The MVC has mosquito-eating fish available for backyard ponds, animal water troughs and un-maintained pools. Mosquito fish are not stocked where they may compete with native fish or amphibians.

Table 3.

PESTICIDE USE BY SANTA CRUZ COUNTY MOSQUITO AND VECTOR CONTROL 2007-2011

Pesticide/Units	Units/Acre	2007	2008	2009	2010	2011
Mosquito Larvicides						
Methoprene – Altosid						
Briquets - (lbs) Label MSDS	7.0	15.3	19.4	20.3	13.0	7.6
Briquets - XR (lbs) Label MSDS	41.8	93.4	124.0	83.1	68.1	62.7
Packets – WSP (lbs) Label MSDS	5 - 20	33.8	1.9	41.2	25.9	27.3
Pellets (lbs) Label MSDS	5 - 10	6.8	11.9	7.9	5.3	13.2
Single Brood Granule (lbs) Label MSDS	5 - 20	541.3	193.9	226.4	890.3	92.4
Liquid (gal) Label MSDS	0.03	0.1	0.1	0.1	0.04	0
Tossits (lbs) Label MSDS	5 - 10	-	45	0.2	0	0.2
Biological Agents						
Bacillus thuringiensis israelensis (Bti)						
Aquabac 200G (lbs) Label MSDS	5 - 20					1563.5
Vectobac 12AS (gal) Label MSDS	0.06 - 0.13	0.6	0.8	1.7	0.5	1.4
Vectobac G granules (lbs) Label MSDS	5 - 20	3231.0	3847.6	5526.6	4464.4	2157.7
Vectobac CG granules (lbs) Label	5 - 20	0	0	0	0	583.2
Bacillus sphaericus (Bs)						
Vectolex (lbs) Label MSDS	5 - 20	3408.5	3229.8	3151.6	2006.1	1168.8
Vectolex WDG (lbs) Label MSDS	0.75 - 1.3	4.7	1.9	0.02	0	2.53
Vectolex WSP (lbs) Label MSDS	24	8.9	1.9	1.9	4.4	0.6
Bti with Bs						
Vectomax (lbs) Label MSDS	5 - 20	0	0	966.3	222.0	1040.4
Spinosad						
Natular (lbs) Label MSDS	5 - 20	0	0	0	0	4.2
Water Surface Films						
Agnique MMF (gal) Label MSDS	0.5 - 1.0	0.2	0.2	0.3	0.3	0.4
Agnique Granule (lbs) Label MSDS	10 - 20	-	-	-	11	0.4
Golden Bear 1111 (gal) Label MSDS	3 - 5	54.4	48.5	11.4	2.5	23.4
Wasp Insecticide						
Hornet & Wasp Killer (15 oz can) Label MSDS		23	21	8	11	3
Drione (lbs) Label MSDS	-	0.3	1.3	1.0	2.5	0.2
Herbicide						
Monsanto Rodeo (gal)	0.6 - 0.9	0.3	0	0	0.1	0
Monsanto Aquamaster (gal) MSDS	0.6 - 0.9	6.7	6.2	1.1	0.9	0.7
ProSpreader Surfactant (gal)	0.06 - 0.1	1.1	1.2	0.2	0.2	0.1

Summary of Mosquito Larvicide Types Used In 2010

Larvicide Type	Acres treated	% of total treatments
Spinosad	0.3	negligible
Surface Films	6.7	2%
Methoprene	41.1	11%
Bacillus (Bti and Bs)	330.3	87%
Total Acres Treated	378.4	

Financial Statement

Revenues	2009-10	2010-11	%Change
South County Assessment (Original)	$284,277	$284,533	+0.01
South County Disease Control Assessment (est. June 2004)	210,849	215,974	+2.4
North County Mosquito Control Assessment (est. August 2005)	746,964	764,986	+2.4
Interest	13,318	11,535	-16
Total	**$1,265,863**	**$1,277,028**	**+1**
Expenditures			
Salary and Benefits	$688,497	$700,993	+1.8
Services and Supplies	201,451	217,938	+8.2
Fixed Assets (vehicle and computer)	0	0	
Total	**$889,948**	**$918,931**	**+3.2**
Fund Balance			
Unreserved / Undesignated	301,495	319,747	+6

2011-2012 Assessment Rates

Based on Assessor's use code, number of units, acreage and location

Single Family Residential / Institutional	$13.52 – 20.77
Multi-Family 2-4 units, duplex, triplex, fourplex	5.41 – 19.10
Condominium / Vacant	6.76 – 10.39
Mobilehome / Mobilehome Parks	2.11 – 46.38
Industrial / Commercial	6.76 – 18.74+
Office	19.19 – 27.20+
Auto Storage / Parking	0.27 – 14.15+
Apartments, 5+ Units	5.41 – 46.38+
Agricultural Property	0.027 – 11.61+

HOMEGROWN MOSQUITOES

MOST IMPORTANT MOSQUITO SPECIES IN SANTA CRUZ COUNTY

	***Aedes sierrensis* (Tree hole mosquito)** This species breeds in tree holes (rot cavities or depressions in trees which hold water). If near trees and partially filled with organic debris, containers such as tires and buckets may produce these mosquitoes. The eggs hatch when the tree hole or container fills with water. The adults hatch in March and remain in the area until early summer. This mosquito has a short flight range, is an aggressive biter, and is the primary vector of canine heartworm in Santa Cruz County. It is found in any area where suitable tree holes are found.
	***Anopheles freeborni* (Western Malaria mosquito)** This species breeds in clear, seepage water in sunlit algal-laden pools. The adult females overwinter, and lay eggs in the spring through fall, with summer being the peak season of activity. Females are active at dusk, flying great distances to feed on most mammals. They readily enter houses to attack humans. This species is the primary vector of human malaria in the Sacramento Valley. This mosquito is common throughout Santa Cruz County in sloughs, ponds, channels, and flooded fields. Most of the control effort on this species is by use of biorational larvicides and mosquitofish.
	***Aedes washinoi* (Woodland pond mosquito)** This mosquito is produced in woodland depressions that fill with water and in the Watsonville Slough System. Most aerial applications are undertaken to control this mosquito during the winter months. Eggs are laid on the mud and organic material along the edges of receding water in these areas. Adults are generally present in the early spring, are very aggressive, and may be found in large numbers. Most of control effort on this species is by use of biorational materials and mosquitofish.
	***Culex erythrothorax* (Tule mosquito)** This species breeds in tule marshes throughout MVC, but especially in the Watsonville Slough system. Larvae over winter and emerge as adults during the spring and summer months. This species is capable of reaching extremely high numbers, but does not cause considerable nuisance to the public as it is not an aggressive biter and does not venture far from the marsh. Control is undertaken using biorational materials in granular or pellet form when numbers are relatively high in sources close to populated areas.
	***Culex pipiens* (Northern house mosquito)** This species causes the largest number of service requests and is generally an urban problem. The adult can be found all year and breeds in storm drains, catch basins, utility vaults, septic tanks, flooded basements, sumps, and in just about any water container found near humans. The adult readily enters homes and bites at night. Because of the type and variety of breeding sources, it can take many hours to locate the cause of a problem. Continual treatment and monitoring of sources is required to maintain control of these mosquitoes. Calls from the public are vital in locating sources. A West Nile virus vector.
	***Culex tarsalis* (Encephalitis mosquito)** This mosquito is produced in rain pools, marshes, swimming pools, ponds, and other fresh water sources. Although this species does not produce a large number of MVC's service requests, it requires a large part of the control effort to prevent the spread of encephalitis in Santa Cruz County. This species feeds primarily on birds and is only moderately aggressive towards man. *Culex tarsalis* is capable of reaching very high numbers. Control is by application of biorational materials and mosquito fish stocking. A West Nile virus vector.
	***Culiseta incidens* (Cool weather mosquito)** This mosquito is produced in fishponds, creeks, and containers. Small sources can produce sufficient numbers to cause discomfort in a neighborhood. This mosquito is moderately aggressive, bites in the evening or shade, and is very noticeable because of its large size. It is primarily a problem of urban and suburban areas. Control is by use of biorational larvicides and mosquito fish.
	***Culiseta inornata* (Winter marsh mosquito)** Females of this species rest during the summer and become active in the fall after the first rains. Eggs are laid on the surface of rain filled ponds in the fall. Many generations can be produced in one season. This mosquito bites at dusk in the fall and spring and is moderately aggressive, quite large, and may reach very high numbers. It is very noticeable to the public because of its size and activity. This species is generally found close to temporary fresh water sources. Most of the control effort is by using biorational materials.
	***Culiseta particeps*** Larvae of this mosquito occur in shaded clear pools containing algae, leaves, and other debris. Over wintering as adult females, this species becomes active during the early spring through fall. Females prefer large mammals and may feed on man in shaded places. This species occurs in shaded drainages from Freedom to the north coast section of Santa Cruz County. Adults can reach high numbers in localized areas and cause problems in some suburban neighborhoods. Like the other members of this genus occurring in this area, it is a large species. Control is through the use of biorational materials and source modification.

IN FOND MEMORY OF

KENNETH HARVEY CORBISHLEY

August 22, 1961 – May 16, 2012

AGRICULTURAL COMMISSIONER / SEALER OF WEIGHTS AND MEASURES / DIRECTOR – MOSQUITO & VECTOR CONTROL

November, 2006 – September, 2011

http://www.altavistamortuary.com/sitemaker/sites/altavi1/obit.cgi?user=635053Corbishley