

SHASTA MOSQUITO AND VECTOR CONTROL DISTRICT

2002 ANNUAL REPORT

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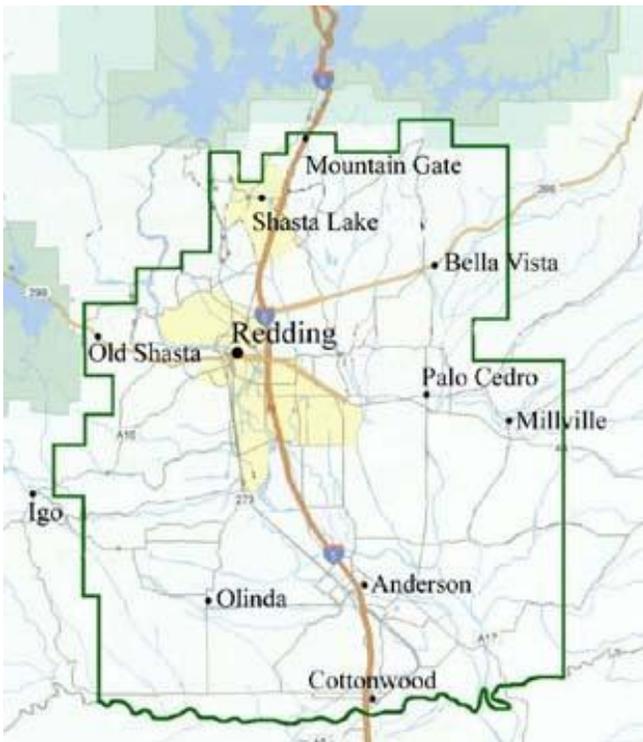
HISTORY

The first local mosquito control district was formed in 1919 in the Redding area and formation of other districts in the Anderson and Cottonwood areas followed in the 1920's. These districts were formed to combat the terrible mosquito problems that plagued the area at that time. Malaria (a disease transmitted by mosquitoes) was widespread when the districts were formed. The Anderson, Cottonwood, and Redding areas had some of the highest malaria rates in the continental United States. Malaria and other mosquito-borne diseases are uncommon in the District today,



Early Mosquito Control

however the mosquitoes that transmit these diseases are still abundant in this area and the potential for serious human health diseases transmitted by mosquitoes still exists. In the mid 1950's the districts consolidated into one district and annexations to the district occurred over the years as more and more people moved into areas that previously were sparsely populated.



DISTRICT ORGANIZATION

The Shasta Mosquito and Vector Control District is a special district type of government agency operating within the boundaries of Shasta County. The District encompasses approximately three hundred eighty-seven (387) square miles and includes the incorporated cities of Anderson, Redding and Shasta Lake. The District boundaries extend from Mountain Gate on the north to Cottonwood Creek on the south and extend from the town of Shasta on the west to Millville on the east. A five member Board of Trustees governs the District. The Board establishes District policy and is responsible for expenditures of the District. The District is financed by a share of property taxes and from mosquito and vector surveillance and control benefit assessment charges. The benefit assessment amounts, which vary for different

parcels, are determined by land use and size, and are collected on Shasta County property tax

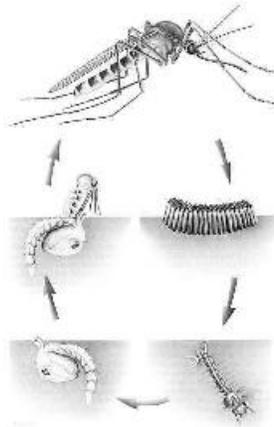
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bills. Only the people within the District pay the benefit assessment charges.

The District does not receive any share of sales tax, cigarette tax, motel occupancy tax, gasoline tax, state grants, or other allocations. In the 2001-2002 fiscal year, the District's income was approximately \$1.23 million; approximately 60% derived from property taxes and 40% from the benefit assessment charge. In the 2002 year, the District employed thirteen full-time people, one part-time person, and three seasonal people.

DISTRICT ACTIVITY

The District performs mosquito control activities and vector information services to protect the public's health from diseases. Vectors are defined as small animals or arthropods that spread disease causing organisms or cause discomfort to the humans and domestic animals. Examples of vectors are mosquitoes, flies, fleas, ticks, spiders and stinging insects, such as yellowjackets.



Mosquito Life Cycle

Examples of some diseases transmitted by vectors other than mosquitoes are Lyme Disease transmitted by ticks and plague transmitted by fleas.

Adult mosquitoes are flying insects that, after taking a blood meal, lay their eggs in water. The mosquito eggs need water to develop into larvae and then into adult mosquitoes. The life cycle of mosquito development repeats itself and, unabated, staggering numbers of mosquitoes are produced and transmission of diseases occurs. Examples of water sources where mosquitoes lay their eggs and develop are: ornamental ponds, industrial and agricultural water, lakes, river isolations, wetlands, sewer ponds, buckets, cans, and holes in trees. Anything that holds water can and often does produce or breed adult mosquitoes. Mosquitoes that

transmit the human diseases Malaria, Western Equine Encephalitis, St. Louis Encephalitis and West Nile Virus are common within the District.

Dog Heartworm is a disease transmitted by mosquitoes that are also abundant within the District. In addition to these diseases, there are new, emerging diseases transmitted by mosquitoes, which can become a serious human health problem within the District. The West Nile Encephalitis Virus, which first appeared in the United States in New York in 1999, and has killed hundreds of people, countless wild birds, and thousands of horses in the U.S. since its arrival, is a disease transmitted by mosquitoes. Migrating birds and blood-feeding mosquitoes have spread West Nile virus throughout the eastern U.S. in the three years since its introduction.

Experts predict that this serious mosquito-borne disease may reach California as early as 2003.

West Nile Virus is an example of the ever-present human health risks from new, emerging human diseases transmitted by mosquitoes. The type of mosquito that transmits the West Nile Encephalitis Virus disease is the most abundant species of mosquito found in the District.

The District's mosquito control program is a comprehensive control program, which uses state of the art equipment, techniques and products to control mosquitoes and protect the public's health and well being. District employees are licensed in mosquito control and receive on-going training and continuing education to keep licenses current. Aerial photographs of the District are utilized and all known mosquito-breeding sources within the District are mapped. District personnel survey these sources for mosquito breeding on a regular basis and perform control activities when necessary. Control activities to kill mosquito larvae in water sources include the use of mosquito-eating fish, drainage, reduction, or elimination of mosquito breeding sources and/or chemical control.

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The District's chemical control program focuses on killing mosquito larvae in the water before they become adult mosquitoes. The District's larviciding chemical control program includes the use of relatively new types of chemicals that are effective in killing mosquito larvae but are safe for non-target organisms. These chemicals are by-products of bacteria and chemicals that are mosquito growth regulators. These chemicals are often very specific to mosquito larvae. To be effective they often must be applied to specific species of mosquitoes and at specific developmental stages of the mosquito's life cycle. District technicians must be well-trained and knowledgeable in order for these types of chemicals to be effective in killing mosquito larvae. These products are considerably more expensive than more conventional pesticides.

The District performs adult mosquito (adulticide) control when large numbers of adult mosquitoes create severe pest problems or when an increased risk to human health from diseases carried by mosquitoes is present. Adulticide chemicals are applied in ultra low volume amounts and the pesticides used in these applications are not harmful to non-target organisms at the rates used for adult mosquito control. The adulticide applications are performed in the early morning or late evening.

Chemicals are also used for weedicide work around the margins of certain water sources. Weeds may protect mosquito larvae from natural predators like mosquitofish and prevent mosquito larvicides from reaching sources. Weedicides are also used to maintain access to mosquito breeding sources.

All pesticide work is done through cooperative agreements with the California Department of Health Services in cooperation with the California Department of Pesticide Regulation. All pesticide use is reported to these agencies on a monthly basis.

The District monitors the effectiveness of its mosquito control program by placing insect traps throughout the District. Contents of these traps are collected weekly and mosquitoes are identified and tabulated as to species and numbers of mosquitoes. (See New Jersey light trap program in this report). This information is also added to a statewide surveillance database of mosquito population statistics.

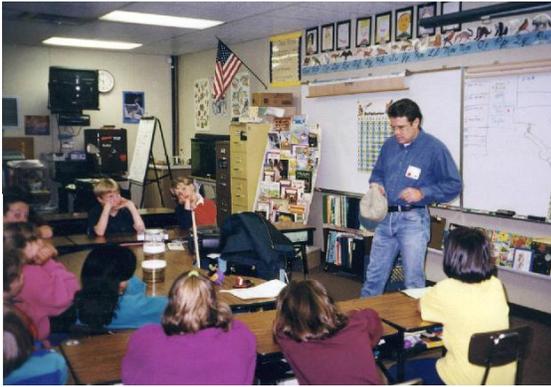
The District performs physical control to reduce or eliminate mosquito-breeding areas. A District-owned backhoe is used to maintain and clean certain drainages to reduce mosquito breeding areas, as well as doing trail access work for mosquito breeding sources. The District utilizes the California Department of Forestry Conservation Crews from Sugar Pine Conservation Camp to perform hand brush cutting activities to maintain access trails to mosquito breeding sources.

The District gives input to the planning departments of Shasta County and the cities of Anderson, Redding and Shasta Lake on proposed developments, etc. to reduce or prevent the creation of new mosquito breeding sources, assure adequate drainage, and access to mosquito breeding sources.

Public information and education is an important part of the control process. The District provides information on its activities by talking to schools and organizations and distributing literature. The District also plans and staffs an exhibit at the Shasta District Fair annually. Educational materials relating to District activities are provided to the public in static displays at the Turtle Bay museums. In addition, the District provided a biologist on a once-a-week basis to talk to visitors at Turtle Bay about mosquito and vector control issues. The District provides

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information to various media to inform residents about District activities and to promote help in minimizing or eliminating mosquito breeding sources, particularly sources around the home, such as standing water in buckets, tires, birdbaths, etc.



Classroom Presentation By District Biologist

The District responds to calls for service by having a technician visit, survey and discuss the mosquito problem with the caller. When possible and necessary, additional mosquito control is performed to respond to mosquito problems.

In addition to the District's mosquito control program, the District has a vector control program, which involves answering calls and providing information regarding vectors. Information on diseases caused by non-mosquito vectors such as Lyme Disease transmitted by ticks and plague transmitted by fleas, is also disseminated. The District provides literature, advises people on what they can do and/or recommends help from a non-specific private pest control agency.

The District also conducts an encephalitis surveillance program to monitor the human health risk from mosquito-transmitted diseases (See Encephalitis Surveillance Program in this report). This program uses sentinel chicken flocks placed throughout the District. District personnel take blood samples from these chickens throughout the mosquito season. The California Department of Health Services Viral and Rickettsial Disease Lab tests these blood samples for the presence of encephalitis antibodies. Live adult mosquitoes are also collected by the use of special traps. These mosquitoes are collected, sorted, grouped by species, sent to the University of California at Davis and tested for the presence of encephalitis virus. The results of the chicken blood tests and live adult mosquito tests are used by the District to determine the risk for transmission of Western Equine Encephalitis, St. Louis Encephalitis, and West Nile Virus to humans. Should the program indicate an increased risk for mosquito-transmitted disease, the District's adult mosquito control program could be increased to protect the public's health.

RESULTS OF DISTRICT ACTIVITY

An on-going challenge for the District is to provide information to the public on the District's activities and resulting public benefit. Shasta Mosquito & Vector Control District provides a high level of mosquito control, which protects the public's health and comfort from diseases and nuisance caused by mosquitoes through the use of environmentally compatible, state of the art products and techniques. Adult mosquito control programs are conducted early in the morning or late in the evening when public outdoor activity level is lowest. Much of the District's other control activities take place in remote inaccessible areas. Despite the fact that much of the District's control activities do not take place in plain view, the level of mosquito control within the District is very high. Therefore many citizens may not realize that the lack of mosquito problems and diseases caused by mosquitoes in this area is the result of efficient, effective on-going mosquito control. Potential human health problems from diseases caused by mosquitoes such as Malaria, Western Encephalitis and St. Louis Encephalitis as well as Dog Heartworm in pets are an ever-present risk. New emerging diseases, such as West Nile Encephalitis Virus and

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other mosquito-borne diseases present on-going challenges for mosquito control.

NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT ISSUE

Shasta Mosquito and Vector Control District faces many challenges in performing its duty to protect public health while protecting the environment and meeting legal requirements imposed by a wide variety of government agencies. Occasionally, the conflict between these different responsibilities can be so severe that in-depth legal interpretation may be required in order for the District to decide what it may or may not do. In 2001 a legal issue arose that, in the opinion of the District manager and Board of Trustees, threatened the District's ability to protect public health through environmentally responsible control of mosquitoes that may transmit disease. The issues involved are too complex to be explained thoroughly in this report; but a more complete explanation of the situation can be obtained by contacting the District for more information. What follows is a very general overview of the agencies and issues involved in this situation:

Shasta Mosquito and Vector Control District uses public health pesticides to kill mosquito larvae in water following joint recommendations of the National Centers for Disease Control and the United States Environmental Protection Agency (USEPA). USEPA is the federal agency that establishes regulations for the safe and effective use of pesticides in the United States under the Federal Insecticide Fungicide and Rodenticide Act (FIFRA). USEPA is also the agency that protects the quality of waters of the United States through the Federal Clean Water Act (CWA). The California State Water Resources Control Board (SWRCB) is the state agency in charge of protecting water quality in California through enforcement of the same Federal Clean Water Act (CWA). A recent decision by the Federal Ninth Circuit Court of Appeals (the Court) has led the SWRCB to the opinion that all public agencies that apply any pesticides to waters of the U.S. must possess an NPDES permit in order to comply with the Clean Water Act.

Shasta Mosquito and Vector Control District has carefully considered this issue and concluded that the SWRCB has misinterpreted the Court's ruling and overstepped its authority by issuing the new NPDES permit. The District is continuing to work with agencies and organizations at the state and federal level to obtain official exemption from the requirements of these types of permits.

PROFESSIONAL AFFILIATIONS

The Vector Control Joint Powers Agency provides for various insurance needs of the District while providing a substantial cost savings to the District. The District also belongs to the Mosquito and Vector Control Association of California for benefits such as the continuing education of mosquito control technicians, legislative representation, and the gaining and sharing of information on the effective operation and management of mosquito and vector control districts. These affiliations have been useful in developing a unified statewide approach to dealing with issues of mutual concern, such as the NPDES permit and the anticipated arrival of West Nile Virus in California. As part of a larger unified body we can help to assure that support of mosquito and vector control will be a component of regulations affecting public health pest control chemicals and other issues that affect the health of the public.

The District is a supporting member of the Turtle Bay Museums and Arboretum. This has given

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district personnel a new venue for the distribution of information on the methods and importance of mosquito and vector control in northern California. Additionally, it has given District personnel access and input with key officials involved in making land use decisions involving mosquito-breeding wetlands within the city limits of Redding affecting a large segment of the public served by the District.

YELLOWJACKET PROGRAM



Yellowjacket Bait Station

This was the fifth year of an experimental program to test whether early season trapping of queens or late baiting of workers can be effective in reducing yellowjacket nuisance in public parks. Thirty-two traps were placed in three parks and at one residence within the Redding city limits. The traps used are commonly available yellowjacket traps baited with turkey ham and a chemical attractant. Trapping of yellowjackets took place from April through October. The trapped yellowjackets were counted throughout the season to assess the effectiveness of the control techniques



Yellowjacket Trap

that were tested. At selected areas toxic bait was used from June through August. Foraging workers theoretically deliver the bait to active nests where it is fed to the queen and larvae, hopefully causing the demise of the whole colony. In previous years we baited later in the season once the yellowjackets became a nuisance. Since this approach had not had much success in the past four years, baiting was conducted earlier with the idea that nest sizes would be smaller and therefore easier to kill.

The emergence of queens was consistent with previous years as was the duration of capture. The average number of queens per trap was consistent with previous years. Yellowjacket worker numbers in 2002 were comparable to numbers in previous years. The number of complaints related to yellowjackets was very low.

Areas that were treated with pesticide-laced baits did not show a significant difference in yellowjacket numbers than untreated sites. This has been the trend in previous years excepting 2000 when there was a decrease in yellowjacket numbers at treated sites when compared to untreated sites. As in years past, the feedback from park visitors and employees regarding our yellowjacket work has been very favorable.

This year the bait that has been used for the last five years was taken off the market. This combined with the fact that there was no statistical evidence that baiting was an effective way to control the yellowjacket population in the District led to the decision to discontinue the yellowjacket program in 2003.

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PUBLIC INFORMATION ACTIVITIES

Effective public health protection through mosquito and vector control depends largely on the efforts of informed citizens to prevent and control these pests around their homes and properties. Everyone needs to know how to avoid exposure to vector-borne disease in environments where pests of public health importance may be found. Since the beginning of mosquito control efforts in California in the early 1900s major emphasis has been put on educating the public about protecting themselves against health threats posed by mosquitoes and other vectors.

Shasta Mosquito and Vector Control District's comprehensive pest management strategy includes an active program of public health education. The District provides over twenty-five



Class Field Trip at SMVCD Education Center

brochures on a wide variety of topics related to mosquitoes as well as other vectors and the diseases they spread. In the course of their work, all District personnel answer questions from the public based upon years of training and experience in all phases of disease and vector issues. Biologists on-staff provide answers to questions by phone, email or in person on any topic related to vectors, diseases, insects in general and pest management that may require additional special expertise. The District Biologist and Associate Biologist also give talks to classrooms, civic groups or any club, organization or agency with an interest in the type of work we do, as well as interviews with the press and broadcast media. Topics covered range from mosquito biology and personal protection against vectors to careers in biology and vector control.

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The District Biologist and Associate Biologist gave classroom presentations at four local elementary schools and one high school on mosquito and vector control and other issues related to biology. The District manager and biologist also gave informational talks on District activities to the Redding City Council, Shasta Lake City Council and the Shasta County Board of Supervisors. The District Biologist also gave joint talks with an epidemiologist from Shasta County Public Health to the Rotary Club and Exchange Club on the subject of West Nile Virus. Additionally, interviews were given with KNVN Channel 24, KHSL Channel 12, KRCR Channel 7, KIXE Channel 9, and KQMS Radio as well as the Valley Post and Record Searchlight newspapers.

The District's field trip program was in its second year and attendance was 300% of the 2001 total with nine classes visiting the District's Educational Demonstration Area. Classes attending the field trips were shown such things as mosquitofish rearing, weather observation, sentinel chickens and a light trap together in a relatively small and aesthetically pleasing location. The field trips lasted about two hours and the participants generally brought sack lunches to eat under the gazebo and on the lawn. We received excellent feedback and plan to host many more field trips in 2003.

A booth that deals with the public health importance of vector-borne disease and the nature of the work done by the District is provided every year at the Shasta District Fair in June. The fair booth this year was twenty-feet (two booth spaces) wide. Topics in the display included District activities such as biological, physical and chemical control of mosquitoes as well as information on other vectors such as fleas, ticks, yellowjackets, and Africanized honeybees. Live specimens included mosquito eggs, larvae, pupae and adults as well as mosquitofish and large exotic insects to grab the attention of passers-by. The booth also had a contest to guess how many yellowjackets were in a jar of alcohol. People submitting the closest guesses won family passes to Turtle Bay. Other display items included views of mosquitoes through a microscope and preserved specimens of vectors and other pests important in disease transmission. All of the District's brochures, bookmarks, stickers, hand-stamps and activity books were available free-of-charge and District personnel were at the booth to answer questions from the public directly from 11:00 A.M. until the Fair closed at 10:00 or 11:00 P.M. The District finds the fair booth to be an effective way to get our message out to thousands of people who live within the District that allows one-on-one contact between District personnel and a large segment of the public.

The Associate Biologist manned a booth at Turtle Bay Twice a week from the end of April through the beginning of September providing brochures and verbal information about mosquitoes, other vectors and District programs. The Associate Biologist also updated many of the brochures produced at the District, and catalogued and organized virtually all of the District's available public information materials.

Major changes were made to the Shasta Mosquito and Vector Control District web site www.snowcrest.net/mosquito in 2002 with more planned to take place in 2003. The site still has

a wealth of information and links related to mosquito and vector control and District activities but is organized in a more user friendly way. Forms on the website allow the public to ask biologist questions via email or submit service requests online.

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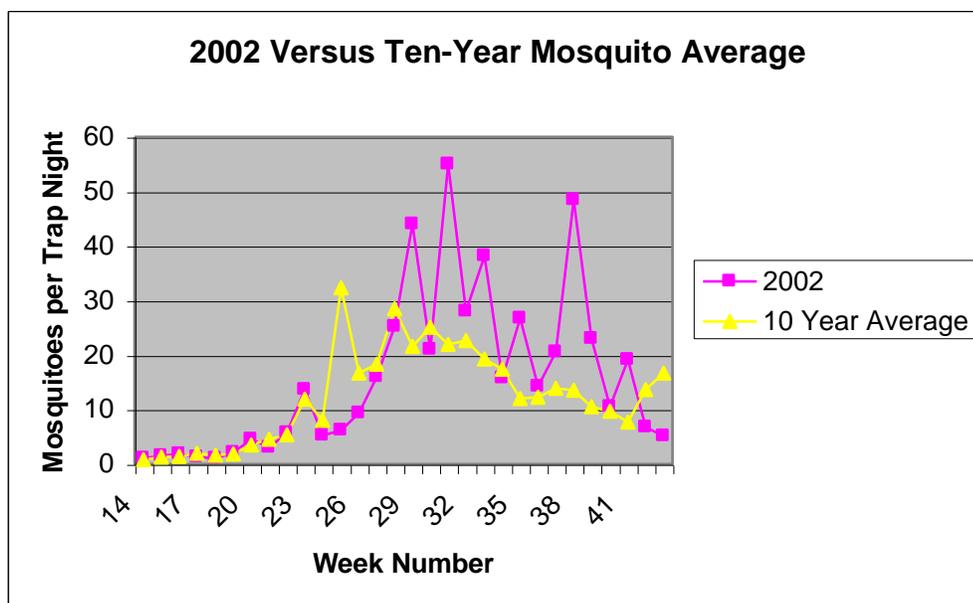
ADULT MOSQUITO LIGHT TRAP PROGRAM

Adult mosquito traps are used by the District to monitor adult mosquito population trends. Traps are placed strategically throughout the entire district to attract and capture mosquitoes over long periods of time. Mosquitoes from the traps are sorted and counted weekly to provide statistics used by the District to set mosquito control priorities.

A total of eighteen traps comprised the adult mosquito surveillance program, which was operated from January through October 2003. Per night tallies of mosquito numbers from all operational traps were reported to the California Department of Health Services as part of an integrated statewide surveillance program



Adult Mosquito Trap



Mosquitoes achieved peak populations of 54.91 mosquitoes per trap night on August 1. The common species observed in the traps throughout the season was *Culex pipiens*, a species that has been implicated in the spread of West Nile virus in the eastern U.S. since 1999. Mosquito numbers throughout the District were higher

in the 2002 season as a whole compared to the previous ten years. Yearly mosquito totals showed a decline from 1997 through 1999 but began rising again in 2000 and 2001. The average number of mosquitoes per trap night in 2002 was up 127% and 194% compared to the years 2001 and 2000 respectively. There were difficulties in controlling mosquitoes at a lumber mill that influences mosquito numbers at two of the traps. There were concerns that some mosquitoes may be showing signs of resistance to some of our mosquito control products but research this year seemed to disprove that notion (see section on research).

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SERVICE REQUESTS

Total Service Requests:	693
Mosquito Complaints	484
Requests for Fish	200
Other	6
Outside District	18
Vector	3

WEST NILE VIRUS

West Nile Virus is a type of encephalitis closely related to St. Louis encephalitis. Prior to 1999 the disease was limited to Africa, West Asia, and the Middle East. In 1999 an outbreak of West Nile Virus was reported in New York City. Since that time it has spread to all states except Nevada, Utah, Arizona, Oregon, Alaska, and Hawaii. 4,008 people were diagnosed with and 263 people died from West Nile Virus in 2002. This disease is particularly devastating to horses and birds where obvious neurological symptoms and death are common. The District has not detected the virus in any sentinel chickens, mosquitoes, or dead birds but anticipate the arrival of the disease within the next couple of years.

Like most Western Equine encephalitis and St. Louis encephalitis West Nile Virus is transmitted by mosquitoes and the reservoir hosts are usually birds. Unlike these other encephalitises West Nile Virus often makes the birds sick and is especially fatal to birds in the Corvid family (crows, jays, ravens and magpies). West Nile Virus has also been found in many other species that other encephalitises do not affect such as dogs, seals, and alligators.

Most people infected with the disease do not show symptoms. Some people develop mild symptoms that include fever, headache, body aches, skin rash and swollen lymph glands. More severe symptoms include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. It is estimated that 1 in 150 persons infected with the West Nile virus will develop a more severe form of disease.

No West Nile Virus was detected in nature in California in 2002, though one human case was reported near Los Angeles International Airport.

ENCEPHALITIS SURVEILLANCE PROGRAM

Mosquito-borne encephalitis is a viral disease transmitted to humans and horses by mosquitoes. The virus is found naturally in birds where it causes no obvious physical symptoms (except for West Nile Virus). No evidence of encephalitis was found in the Shasta Mosquito and Vector Control District in sentinel chickens, pools of mosquitoes, or dead birds. All encephalitis activity

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within California was restricted to a small area in the far southeastern corner of the state. The only encephalitis case that occurred in 2002 in California was a woman with West Nile Virus from Southern California.

Sentinel Chicken Flocks: The Shasta Mosquito and Vector Control District maintained chicken flocks to check for the presence of mosquito-borne diseases in the bird population that are transmissible to humans and horses. There were five sites with ten to eleven chickens per flock. Chickens were bled every two weeks from April 10 through October 23, for a total of 795 blood samples, which were submitted to the California Department of Health Services (DHS) for analysis in 2002 all of which were negative.



Taking Chicken Blood Sample

Mosquito Pools: In seventeen areas of high mosquito occurrence, samples of live mosquitoes were collected, sorted, grouped by species, placed into vials, sent to the California Viral and Rickettsial Disease Lab (VRDL) and tested for the presence of encephalitis viruses. Because of the possibility of West Nile Virus, the number of pools was increased from twenty-three pools in 2001 to seventy-seven pools of approximately fifty mosquitoes each in 2002. Fifty-eight pools of *Culex tarsalis*, the most common encephalitis-transmitting mosquito in California, were tested. Nineteen pools of *Culex pipiens* mosquitoes were tested. Since *Culex pipiens* is a vector of West Nile Virus the District targeted this species for mosquito pools for the first time. All mosquitoes tested in 2002 were negative for any kind of encephalitis virus.

Dead Bird Surveillance: The spread of West Nile Virus on the east coast has been characterized by conspicuous die-offs of birds – particularly in the crow family. The California Department of Health Services has instituted a program to receive and test dead birds submitted by mosquito districts for the detection of West Nile Virus. When someone finds a dead bird they are encouraged to call the state West Nile Virus Hotline, 1-877-WNV-BIRD. The state then determines if the bird is appropriate for testing and notifies the mosquito control agency that covers the area in which the bird was found and requests the district to pick up the bird and mail it for testing. This is an important new early-warning tool to protect public health from this new emerging disease threat. Shasta Mosquito and Vector Control District responded to 17 calls relating to dead birds in 2002. The District submitted 14 birds to the state for virus testing. No West Nile Virus was detected in the birds submitted by Shasta MVCD or any other agency in California in 2002.

RESEARCH

University of California researchers have continued to study *Culex pipiens* mosquito larvae from Shasta Mosquito and Vector Control District, which were found in 2000 to be somewhat resistant to mosquito control products that the District has been using in some persistent mosquito larval sources. University personnel have had difficulty in raising these mosquitoes in laboratory conditions, so the District has been trapping live samples and sending them to researchers for

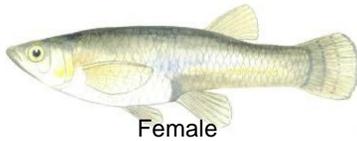
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use in various projects. These mosquitoes have also been found to transmit West Nile Virus in a laboratory setting.

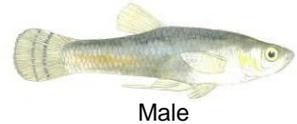
An independent researcher under contract with a mosquito control products company, conducted tests using *Culex pipiens* mosquitoes from the area mills to determine their susceptibility to commonly used mosquito control products. Mosquito larvae were collected in egg laying traps. Known concentrations of Vectobac and Vectolex were added to containers with twenty-five larvae and results were recorded at 24 and 48 hours. The mosquitoes tested did not show any resistance to these products.

All of the above research has been reported to professional pest control and health protection associations and some of it is slated for publication in peer-reviewed journals.

BIOLOGICAL CONTROL



The Shasta Mosquito and Vector Control District uses the mosquito-eating fish (*Gambusia affinis*) to control mosquito larvae in permanent water sources within the



district. Mosquito-eating fish are maintained in holding ponds, and transferred to holding tanks at the district office. In addition to stocking natural areas throughout the District by mosquito control technicians, mosquito-eating fish are distributed free-of-charge to residents within the district for use on their properties.

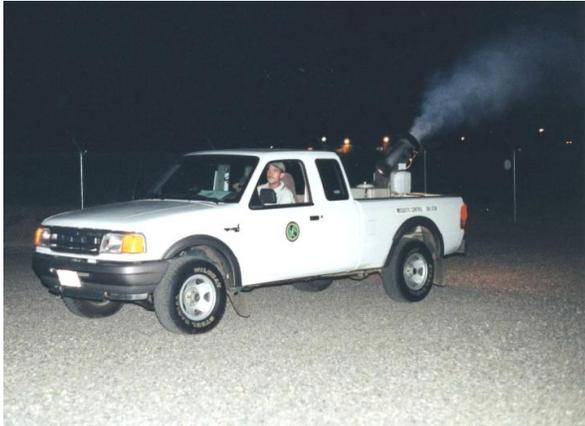
Fish Retrieving:	56.75 Hours Retrieving
Fish Transferring:	11.00 Hours Transferring
Fish Stocking:	61.17 Hours Stocking
Fisheries Maintenance	<u>178.50 Hours</u>
Total Biological Control	307.42 Hours

CHEMICAL CONTROL

The Shasta Mosquito and Vector Control District uses a variety of chemical control techniques in circumstances where other methods are ineffective or impractical. Larvicides are applied to standing water to control mosquito larvae in areas that cannot be controlled by mosquito-eating fish due to their inaccessibility, transient nature, or other factors. Very sophisticated chemicals are used for larvicide work that do not adversely affect the environment due to their highly specific nature and the very low doses which can be used for mosquito control work. These products provide a high level of control, but are more expensive and require more training and continuing education for the mosquito control technicians.

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The presence of large numbers of adult mosquitoes, or the detection of mosquito-borne diseases



Adult Mosquito Control

within the District triggers application of adulticides in areas of concern. Adulticides are applied at ultra-low volumes (ULV) as aerosols over large areas. Pesticides used in these applications are not harmful to non-target organisms at the rates used for adult mosquito control. The applications are generally made before dawn under very stringent weather guidelines to provide maximum effectiveness while minimizing human exposure.

Weedicides are used by the District to eliminate cover around the edges of water sources that may provide protection to developing mosquito larvae and/or prevent mosquito sprays from getting to the

water surface. Weedicides are also used to help keep trails open and maintain access to mosquito sources. All pesticide work is done through cooperative agreements with the California Department of Health and the California Department of Pesticide Regulation. All pesticide use is reported to these agencies on a monthly basis.

<u>Adulticiding:</u>	194.57 Hours	
Total Acres	62495.10 Acres Treated	
<u>Larviciding:</u>		
Agricultural Sources	256.83 Hours	19.91%
Industrial Sources	146.25 Hours	11.34%
Natural Sources	749.00 Hours	58.06%
Residential Sources	<u>137.83 Hours</u>	<u>10.69%</u>
Total Larviciding	1,289.92 Hours	100.00%
Oil-based:	170.47 Acres Treated	
Biorational:	<u>2,272.83</u> Acres Treated	
Total Acres:	2,443.30 Acres Treated	
<u>Weediciding:</u>	361.75 Hours	
Total Acres	220.44 Acres Treated	

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PHYSICAL CONTROL:

The Shasta Mosquito and Vector Control District has a program to reduce or eliminate mosquito breeding areas by managing the water sources where mosquitoes breed. Such physical control includes clearing vegetation around pond or stream banks, improving drainage, and providing access for other types of control work. The District works in cooperation with the local California Department of Fish and Game.

By Equipment:

Total Backhoe Time	349.33 Hrs,
	48.67 Hrs Helper Time



Physical Control By Hand

Beaver Dam Removal	7.75 Hours
Brushing	472.00 Hours
Brushing by Sugar Pine	129.25 SMVCD Hours
Burning	274.33 Hours
Empty Containers	2.58 Hours

SOURCE PREVENTION INPUT

With the cooperation of the planning departments of Shasta County and the cities of Anderson, Redding and Shasta Lake, the District reviews proposed development, such as subdivisions and lot splits, in an attempt to reduce the creation of new mosquito breeding sources, to ensure adequate drainage, and District access to mosquito breeding sources.

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A detailed black and white line drawing of a mosquito, shown from a side profile, facing left. It has long, thin legs, a segmented body, and two large, patterned wings. The drawing is positioned to the left of the main title text.

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William C. Hazeleur, District Manager
John Albright, District Biologist

District Board of Trustees
President Marvin Bennett, City of Anderson
Vice President C. Bruce Wade, Shasta County
Secretary Winifred Woods, City of Redding
Ernest Lusk, Shasta County
Glenn Shaw, City of Shasta Lake

Board of Trustees Meetings are held the third Tuesday of each month at 1:30 p.m. at the District Office:

19200 Latona Road
Anderson, CA

Agendas are available online at www.snowcrest.net/mosquito/Agendas/current_agenda.