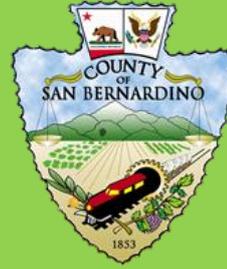


San Bernardino County Mosquito and Vector Control Program



2012 Annual Report



COUNTY OF SAN BERNARDINO
Environmental Health Services
DEPARTMENT OF PUBLIC HEALTH

385 North Arrowhead Avenue, 2nd Floor

San Bernardino, CA 92415

www.sbcounty.gov/dph/dehs

(800) 442-2283

San Bernardino County

Mosquito and Vector Control Program

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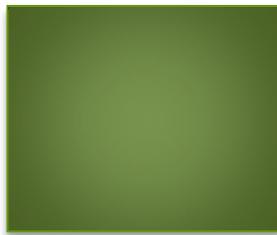
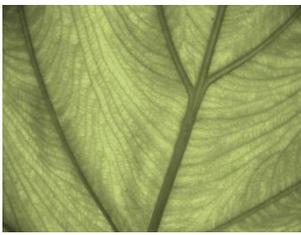
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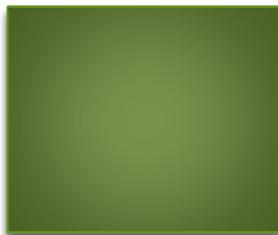
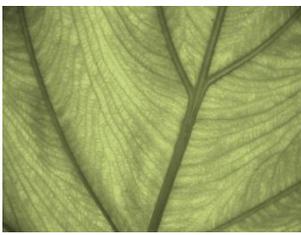
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Mission Statement

Division of Environmental Health Services is dedicated to improving the quality of life by protecting public health, promoting safety and preventing environmental hazards for all residents and visitors.



I. PROGRAM OVERVIEW

The San Bernardino County Vector Control Program (MVCP), under the Division of Environmental Health Services, pursues its mission by providing quality and responsive services to a majority of County residents. Covering an area of 20,105 square miles and serving 2,081,313 residents in the County, MVCP responds to citizen complaint/service requests for community control of vectors and nuisance pests such as mosquitoes, flies, rodents, and Africanized Honeybees. MVCP monitors for the presence of vector borne diseases, and inspects poultry ranches, dairies, and riding academies for flies and other vector related issues. MVCP also provides direct abatement and control services in sanitary sewer systems, flood control channels and basins, public streets and parks.

The California Legislature adopted the "Mosquito Abatement Act" in 1915. The law was later incorporated into the State Health and Safety Code, which authorized the creation, function and governance of Mosquito Abatement Districts in the State of California. This law was amended in 1939 and 1980 and then repealed and replaced by a new comprehensive Mosquito Abatement and Vector Control District Law in 2002.

The 1972 Saint Louis encephalitis outbreak in Los Angeles infected four people in San Bernardino County. This outbreak increased mosquito-borne disease awareness in the County and prompted the establishment of this vector control program in the Department of Public Health.

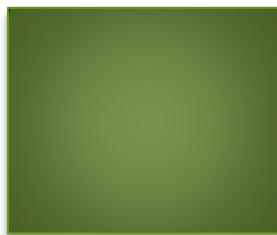
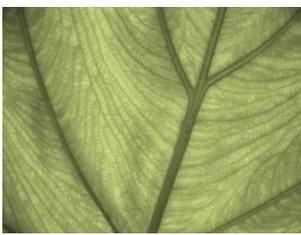
On November 24, 1986 the County Board of Supervisors adopted a County ordinance which granted authority for the creation of a Mosquito and Vector Control Program with the services provided to County residents in a wider area, enhancing the surveillance of vectors and vector-borne diseases.

The detection of Hantavirus in the County in the mid-1990s increased collaboration with local, state, and federal agencies. The arrival of Africanized Honeybees to the County in 1998 increased activities and efforts to mitigate this heightened concern of residents and visitors.

The arrival of West Nile Virus (WNV) in the United States in the summer of 1999 required increased vigilance and an extensive outlay of resources nationwide. Once the disease was detected in the County in 2003, the focus of MVCP shifted to monitoring and controlling mosquito-borne diseases. This increase in services demanded additional resources to reduce the risk of WNV in the County.

A recent challenge is the establishment of the Asian Tiger Mosquito (*Aedes albopictus*) in nearby counties which may, again shift resources and abatement strategies to properly respond to this newly introduced species capable of transmitting disease such as dengue fever.

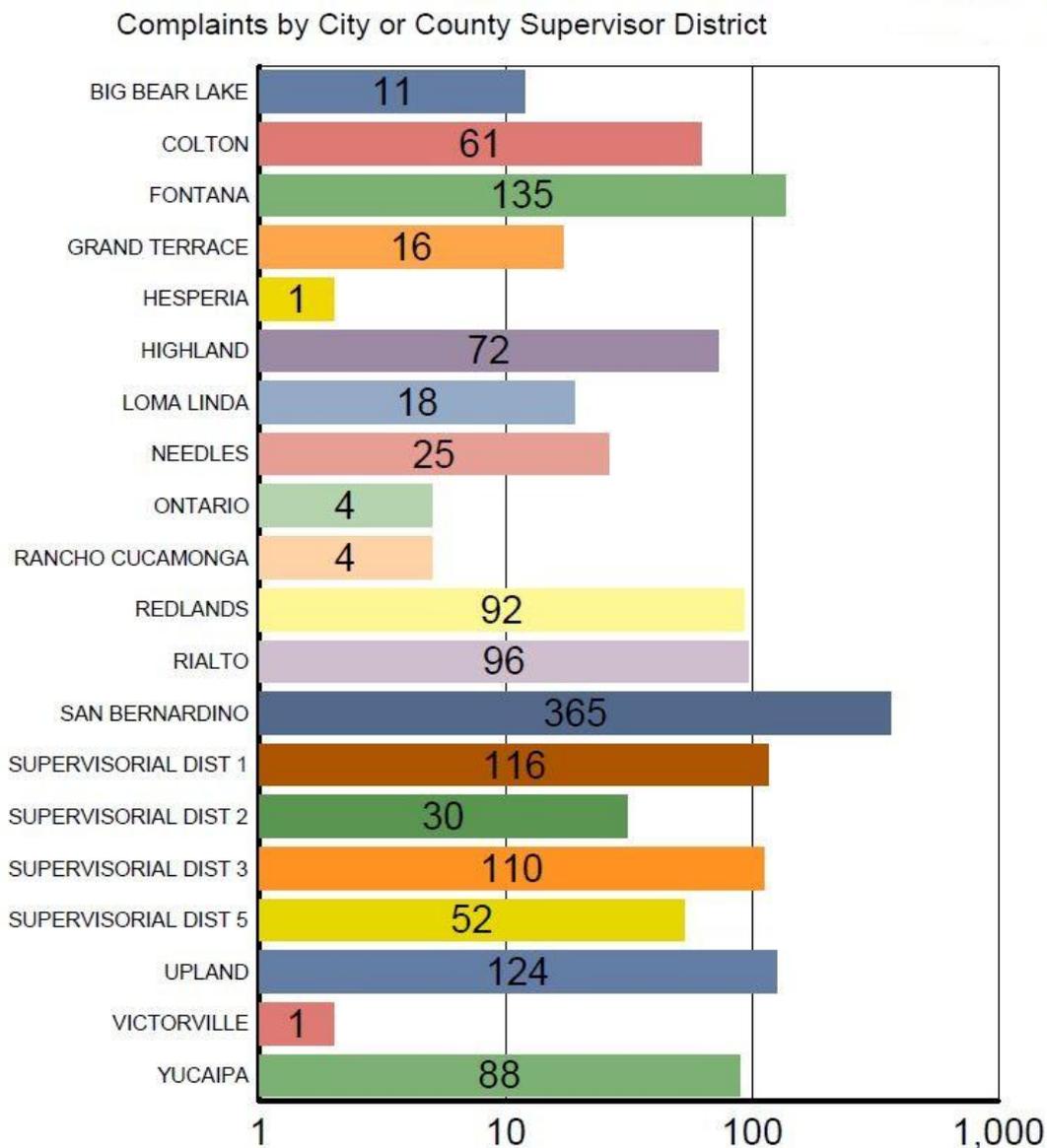
The following pages summarize operations, disease surveillance and health education activities conducted by the San Bernardino County Mosquito and Vector Control Program (MVCP) from January 1, 2012 through December 31, 2012. The report provides an overview of vector control activities and analyzes the level and distribution of MVCP services throughout the County.

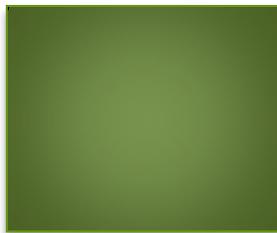
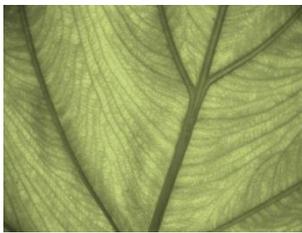


II. OPERATIONS

MVCP is currently staffed by a Supervising Environmental Health Specialist, an Environmental Health Specialist III, a Vector Control Technician II, 7 Vector Control Technician I's, 5 seasonal field staff, an Office Assistant III and other support staff in the County Department of Public Health. Services provided to the community and to residents of San Bernardino County include responding to service requests/complaints relating to vector control issues within 24 to 48 hours, routine mosquito control, surveys that target vector species, and community education. In 2012, MVCP staff responded to over 1,421 service requests and conducted approximately 15,580 water source inspections on 1,461 inventoried water sources to eliminate mosquito breeding. Details of MVCP services are included below.

Table 1: Number of service requests received and responded to by city in 2012.



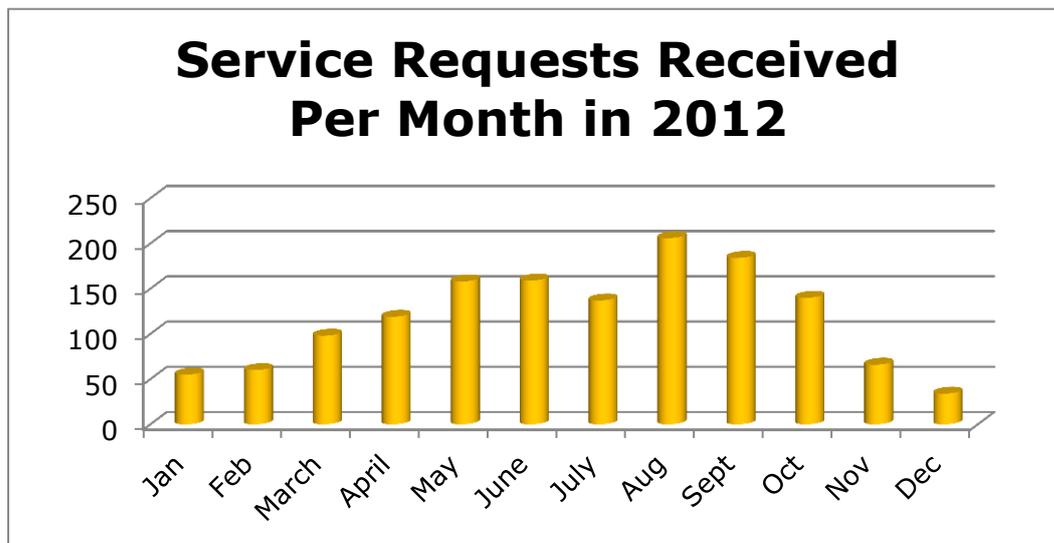


Citizen Request for Service

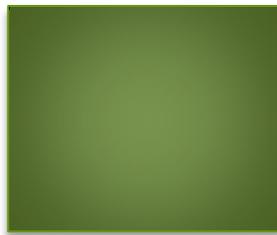
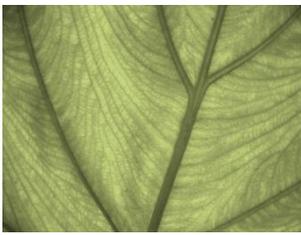
MVCP responses to citizen requests vary from phone consultations, mailing educational and instructional literature, identifying specimens, inspecting premises, abating vector nuisances, and enforcement of County Code. Service requests for the last 5 years include; 2,516 in 2008, 2,378 in 2009, 1,811 in 2010, 1,668 in 2011 and 1,421 in 2012.

Of the service requests addressed by MVCP in 2012, the highest number was for green pools followed by bees, mosquitoes, rats, cockroaches and flies. An ongoing concern has been mosquito breeding in unmaintained swimming pools. Of the 633 mosquito service requests, 440 were at swimming pools which were vacant, foreclosed properties. Each was inspected and treated with larvacide to control breeding. 8 of those pools were drained by Vector Control staff to eliminate mosquito breeding. 1,321 follow-up inspections were conducted on these pools to ensure mosquitoes were controlled until properties were brought into compliance.

Table 2: Service requests received per month in 2012 for specific vectors and pests in each area of the County .

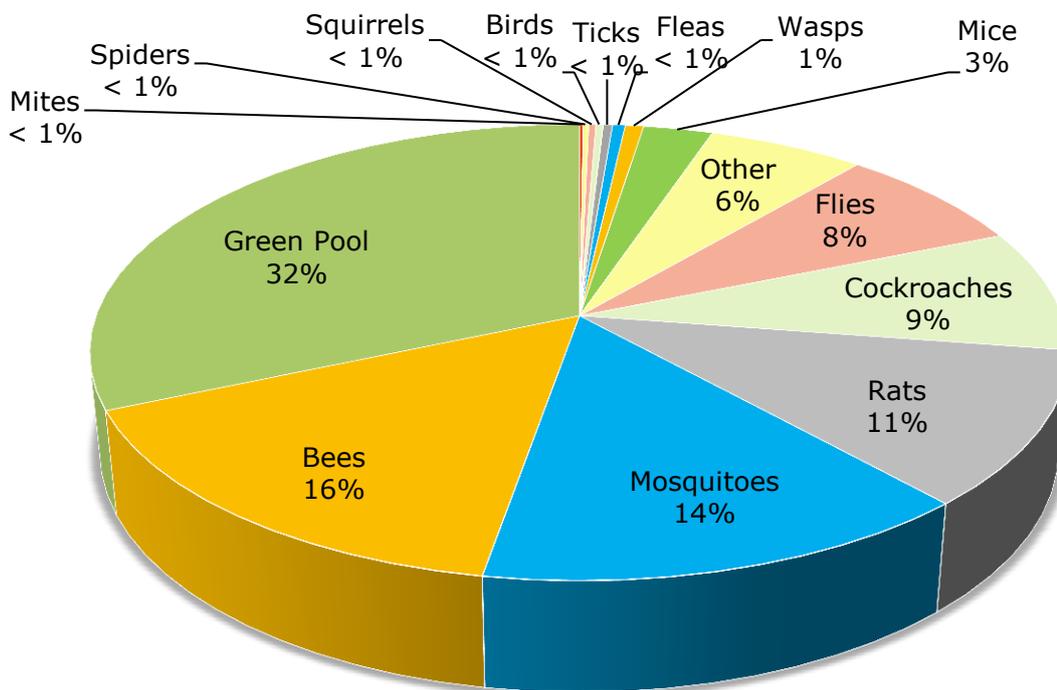


A Vector Control Technician treating a green pool for mosquitoes.



Under the "Other" category in Chart 1, the predominant vector was Bed Bugs. Though not of significant concern for the last several decades, Bed Bugs are increasing in numbers, and are spreading rapidly. Where previous reports were regarding Bed Bug infestations in motels and hotels, MVCP currently receives calls about infestations at summer camps, health care facilities, apartments and single family residences. Though they have not been found to transmit disease in the United States, their bite(s) can cause significant discomfort.

Chart 1: Percentage of service request by vector type received in 2012.

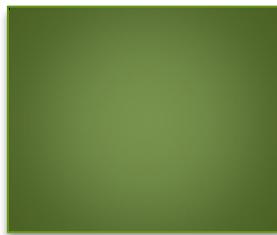
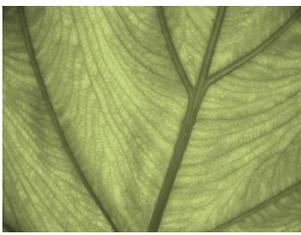


Percentage of Service Request Types Received

In some circumstances enforcement actions were necessary to gain compliance with County Code. Methods of compliance included Courtesy Notices to Abate, Notices of Violation, Office Hearings and Billable Inspections. Table 3 shows the number of actions taken in 2012.

Table 3: Total Notice of Violation and Office Hearings during 2012.

Notice of Violations	Office Hearings
630	7



Animal Establishment Inspections

Confined livestock farming can produce large numbers of nuisance flies, causing annoyance for nearby residents. These animal establishments include commercial poultry ranches, dairies and riding academies. Inspections are routinely conducted to ensure fly, mosquito and rodent breeding are prevented/controlled and manure is managed properly. A total of 197 poultry ranch inspections, 35 dairy inspections and 9 riding academy inspections were conducted during 2012.



BELOW: Common places where mosquitoes can be found breeding in neighborhoods. Maintain areas dry or regularly clean and maintain standing water.

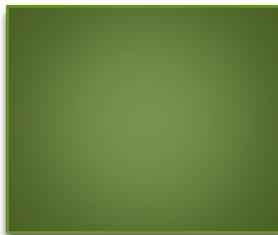
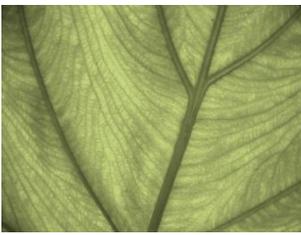


Sanitary Sewer Inspections

The sanitary sewer system is composed of a network of underground ducts that can provide a habitat for rats and cockroaches. 6 surveys were performed in 2012. Each survey may cover a specific local target area, or a broad area of a city. The goal of each survey is to reduce the number of roaches or rodents in a sewer system so that humans are no longer affected.



Vector Control Technicians conducting a sewer survey.



Vector Inspections in County Flood Control System

Under a written contract between the MVCP and the County Department of Public Works Flood Control District, MVCP inspects and treats for mosquito, other vectors and nuisance pests breeding at all flood control channels and basins. MVCP works with the County Flood Control District to identify basins and channels that require debris and vegetation removal to prevent breeding.

MVCP spent 1,269 direct work hours inspecting and conducting surveillance for mosquitoes and breeding sources in flood control facilities. Physical abatement, biological controls and larvicides were used in the flood control channels and catch basins.



Integrated Vector Management Services

In 2012, MVCP used several strategies to control for mosquitoes, other vectors and nuisance pests. These strategies include physical, biological and chemical control, in addition to active surveillance and trapping. Pesticide use is the last option if physical abatement such as using a shovel or biological controls are not effective.

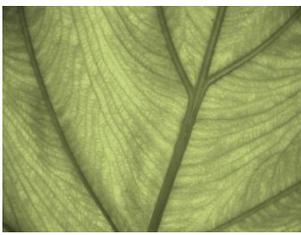


Mosquito fish (*Gambusia affinis*) are the primary biological abatement method for controlling mosquito larvae in decorative ponds and other water sources on private property. MVCP places the fish in breeding sources where other methods of control are not practical.

When physical and biological abatement cannot be used, chemical abatement methods are used. Chemicals that MVCP use typically have less toxicity than table salt or caffeine and are targeted towards specific vectors. MVCP used several types of chemicals for the abatement of vectors and nuisance pests. A total of 87 pounds of rodent poison was used to control infestations of rats and mice. 93 pounds of pesticide was used to treat infestations of Africanized Honeybees and cockroaches. 1.5 gallons of pesticide concentrate was used to control Africanized Honeybees and wasps. 28.5 gallons and 2,328 pounds of pesticide was used to control mosquitoes in neglected (green) residential swimming pools, roadside ditches, flood control channels, golf courses, constructed waterways, and other mosquito breeding habitats. A total of 15,795 routine inspections were performed at these water sources.



A Vector Control Technician prepares to apply a chemical treatment over a large area of a basin.



MVCP introduced a midge (chronomidae) control program in 2008. Midges resemble mosquitoes but do not take blood meals. Although they are not a disease vector, in sufficient numbers they affect quality of life for residents and visitors.



LEFT: midge resting on a wall



RIGHT: mosquito larvae

Nuisance flies are insects that are annoying or can spread diseases to people and domestic animals by biting or physical deposition of pathogens. The immature (larval) stages of flies are found in a range of habitats, including water and semi-aquatic sites. Fly larvae found in decaying organic matter are sometimes called maggots. The close association of many of these insects with dead animals, feces, or garbage and their attraction to humans and animals allows flies to potentially pick up and spread a variety of bacteria and parasites that may cause disease. In order to control adult fly populations, a total of 3.1 gallons of mist sprayer formulation was used in 2012 in close proximity to dairies and poultry ranches and other fly breeding sources.

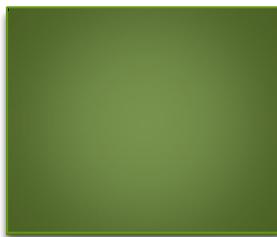
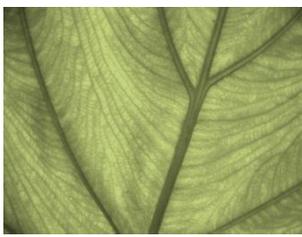
Active surveillance was an additional tool for monitoring and controlling some vectors. Trapping techniques were used to monitor for and/or control mosquitoes, ticks, cockroaches, rats, mice, and other nuisance pests within the County.



A Vector Control Technician prepares a rodent trap.



Various terrains that Vector Control Technicians encounter.



III. DISEASE SURVEILLANCE

MVCP maintains a pro-active surveillance and monitoring program to determine the abundance of vector populations and the prevalence of diseases they transmit, focusing mainly on mosquito-borne viruses, rodent-borne and tick-borne diseases. Surveillance efforts in 2012 are summarized below.

Mosquito Surveillance Program

MVCP disease surveillance program monitors adult mosquito populations throughout the County using New Jersey Light Traps (NJLT), *carbon dioxide* (CO₂) – baited traps, and gravid traps. The NJLT uses a light source to attract both male and female mosquitoes. The CO₂-baited traps use *carbon dioxide* to attract host-seeking female mosquitoes, while gravid traps use a hay infusion as an attractant for ovipositing (egg-laying) females. Combinations of these trapping methods are continually being used across the County to provide an accurate representation of mosquito activity throughout the year. Higher mosquito counts and the presence of WNV in mosquitoes, sentinel chicken flocks and dead birds are factors used to determine the risk of infection to humans and animals.



Senior Vector Control Technician collects and labels mosquito samples from a New Jersey Light Trap.

The abundance of adult mosquito species was monitored weekly using NJLTs throughout the County. 21 NJLTs in 2012 were stationed in rural, suburban, and urban habitats of the valley, mountain, and desert regions of the County. Trap sites in the valley region included the cities or areas of Colton, Fontana, Grand Terrace, Highland, Mentone, Redlands, Rialto, San Bernardino, Yucaipa, and Upland. Traps in the mountain region were located at Barton Flats, Big Bear Lake, Lake Arrowhead and Silverwood Lake. Five sites located in the desert region included two in the City of Needles, one at Park Moabi, one at Parker Dam, and one at Mojave Narrows Regional Park in Victorville. All mosquito counts were reported to the California Department of Public Health on a weekly basis.

In 2012, a total of 3,210 mosquito surveys were performed, from which 25,345 mosquitoes were collected. Of the 652 mosquito pools tested, 20 pools tested positive for West Nile Virus (WNV), indicating a low prevalence of the virus in MVCP mosquito populations. The following table shows the type of trap and the number of mosquitoes caught per trap, and which traps tested positive for WNV.

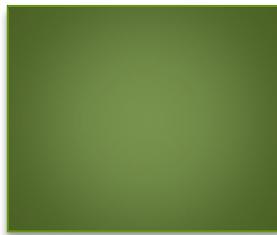
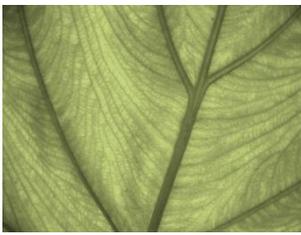


Table 4: Total number of mosquitoes collected, the number of mosquito pools submitted for testing and the total number of pools that tested positive for WNV collected in 2012.

Trap Type	Number of Mosquitoes	Number of Pools	Number Pools Tested Positive for WNV
NJLT	4,103	N/A	N/A
Gravid	609	29	3
CO2	20,633	623	17

Sentinel Chicken Flock Samples



Eight sentinel chicken flocks, each with 10 chickens, are placed in various areas to monitor arbovirus activity within the County. Although chickens can become infected with arbovirus's, they are not negatively affected and do not show symptoms. Samples were taken from all the sentinel flocks once every two weeks and sent to the State laboratory for viral testing. Of the 100 chickens tested in 2012, 35 chickens were infected with WNV throughout the season. Positive chickens with WNV were confirmed in the cities or areas of Colton, Fontana, Needles, Rialto, Upland and Yucaipa.

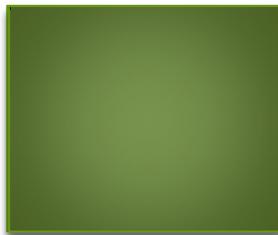
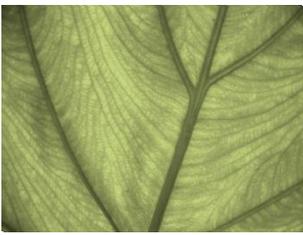


Vector Control Technician prepares to take samples from a sentinel chicken flock.

Dead Bird Surveillance Program

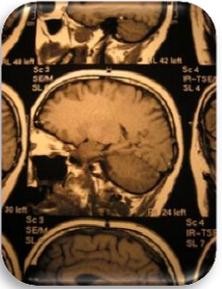
The dead bird surveillance program started in 2000 to enhance WNV detection capabilities. In 2012, MVCP responded to a total of 87 dead bird reports, where 60 tested positive for WNV. Positive dead birds were collected from the cities or areas of Grand Terrace, Highland, Phelan, Rialto, San Bernardino, Upland and Yucaipa. Individuals are encouraged to report dead birds immediately by calling 1 (877) WNV-BIRD. MVCP staff will then retrieve the bird for testing.





Human Cases of West Nile Virus

Most people who become infected with WNV will not show any symptoms but that doesn't mean that an illness won't develop. According to the Center for Disease Control and Prevention (CDC), 1 in 5 people infected with WNV will show signs of West Nile Fever (non-neuroinvasive) and about 1 in 150 people infected with WNV will develop neuroinvasive symptoms, which affects the brain, spinal cord and nervous system. These symptoms include, high fever, muscle weakness, vision loss, paralysis, coma, encephalitis and even death. In 2012, there were a total of 33 WNV human cases, with 21 cases being neuroinvasive (encephalitis) and 12 being non-neuroinvasive (West Nile Fever). Of these 33 human cases, 1 fatality was reported in 2012. Human cases and the prevalence of WNV in the County increased in 2012 from 4 cases reported in 2011.



WNV in Equine (Horse) Population

Infection with WNV does not always lead to signs of illness in people or animals. However, horses are very sensitive to the virus and have a high mortality rate if they are infected. In 2012, WNV was not detected in any horses in the County. This is partially attributed to successful WNV vaccination efforts in the county.



Plague Surveillance

Plague is caused by *Yersinia pestis*, a bacteria that can be transmitted to humans through the bites of infected fleas. Plague is endemic in the mountains and foothills of San Bernardino County, and is commonly transmitted by infected fleas found on ground squirrels and other rodents.

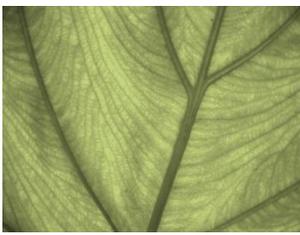


MVCP carried out routine surveys in the mountain and foothill areas of the County to detect and monitor for Plague, and the fleas that carry it. In 2012, 7 Plague surveys, with a total of 64 rodents, were trapped. None of the rodents tested positive for Plague and no human cases were identified in 2012.

Hantavirus Surveillance

Hantavirus cardiopulmonary syndrome, or HCPS, is a rare but often fatal disease of the lungs. Although there are many types of hantavirus, Sin Nombre virus (SNV) is the specific hantavirus that causes HCPS in the western United States. In California, the deer mouse, *Peromyscus maniculatus*, is the most common species known to carry SNV.





Hantavirus surveillance consists of rodent trapping and testing for antibodies against SNV at various sites within the County. 7 surveys were conducted in 2012 to determine the prevalence of the virus. Of the 76 rodents trapped none tested positive for SNV.

Tick Surveillance

The Western black-legged tick, *Ixodes pacificus*, can transmit the spirochete *Borrelia burgdorferi* which is responsible for causing Lyme disease in humans. Wild rodents and other mammals are likely reservoirs of these pathogens. This tick is distributed in the Western Pacific region of the United States. Larvae and nymphs feed on birds, lizards and small rodents, while adult ticks feed on deer and other mammals.



The tick surveillance program primarily involves the collection of host seeking ticks for tick-borne infections, especially Lyme disease. 31 tick surveys were conducted in 2012 that yielded 1,960 ticks. None of the ticks tested positive for Lyme disease.

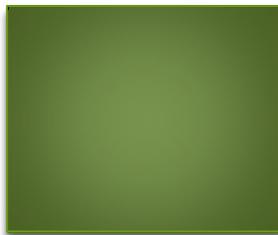
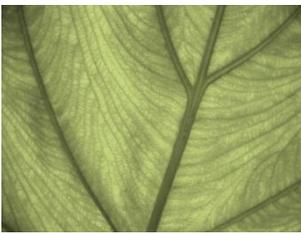
IV. HEALTH EDUCATION

Community outreach and health education benefits the residents and visitors of the County by delivering vector control information and educational material directly to the public. Health education efforts by MVCP included telephone and personal visits, distribution of flyers and brochures, lectures and presentations and participation at local health fairs. Presentations were also provided in public forums, to businesses and community organizations. Radio and television interviews were conducted, and press releases were distributed to the media when incidents of public health significance occurred.

In 2012, MVCP had 65 vector control specific events and 28 general program events which include presentations, health/career fairs and the distribution of written material. Vector control specific events are forums where only MVCP material is presented or distributed. General program events are forums where MVCP and other programs from the Division of Environmental Health Services (DEHS) are presented or distributed. Over 1,400 people attended presentations, which included K-8 school children, students from local colleges and universities, senior centers and city chambers of commerce. Over 600 people at health/career fairs were provided with written material and inquired about the program and its services. Over 3,200 brochures and educational literature was distributed to local libraries, schools, apartment complexes, senior centers and universities.



Vector Control Technicians at a health fair conducting public outreach for the residents of San



For more information about the Health Education Program, to schedule a presentation, for service requests, or how to report complaints please contact MVCP at 1 (800) 44-ABATE or visit the website a www.sbcounty.gov/dph/dehs.

Please call the WNV Dead Bird Hotline at 1 (877) WNV-BIRD to report a dead bird.

V. ACKNOWLEDGEMENTS

- ❖ San Bernardino County Mosquito and Vector Control Program Staff
- ❖ Cities of Big Bear Lake, Colton, Fontana, Grand Terrace, Highland, Loma Linda, Needles, Redlands, Rialto, San Bernardino, Upland, and Yucaipa
- ❖ San Bernardino County Departments of Agriculture, Public Health, and Transportation/Flood Control
- ❖ Mosquito and Vector Control Association of California (MVCAC)
- ❖ California Department of Public Health Vector-Borne Disease Section
- ❖ Viral and Rickettsial Disease Laboratory, California Department of Health Services
- ❖ California Department of Fish and Wildlife
- ❖ California Department of Food and Agriculture
- ❖ California Department of Parks and Recreation
- ❖ School of Veterinary Medicine and Center for Vector-Borne Disease Research, Department of Entomology and the Davis Arbovirus Research Unit at University of California – Davis
- ❖ Bureau of Land Management
- ❖ United States Forest Service