

Vector Control Report 2023



COUNTY of VENTURA

**Resource Management Agency
Environmental Health Division**
800 S. Victoria Ave, Ventura, CA 93009-1730
TEL: 805/654-2813 • FAX: 805/654-2480
www.vcrma.org/divisions/environmental-health

Looking Back

Rain, rain, and more rain. Much of Ventura County received twice the normal amount of rainfall during the 2022-2023 rainy season and it's safe to say that many areas had more than twice the amount of mosquitoes as a result. As Spring began and temperatures rose, standing water was ubiquitous and the Environmental Health Division saw a dramatic spike in mosquito populations.

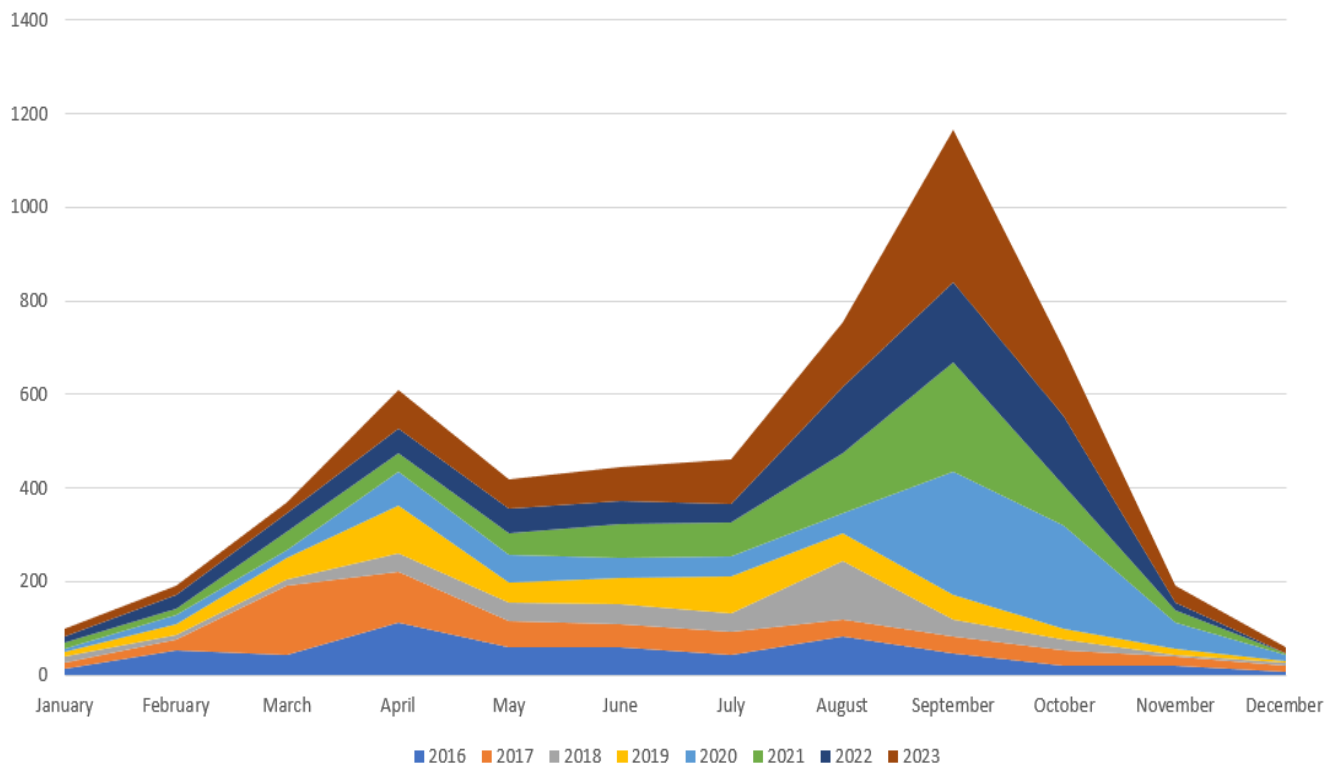
State wide, West Nile Virus (WNV) surveillance was yielding early positive mosquito and dead bird samples in remarkable numbers. Ventura County collected wild birds in Simi Valley, Thousand Oaks, and Ventura in the third week of June that tested positive for WNV.

Residents from all areas of the County reported early season mosquito bites, and then the complaints exploded. Tropical Storm Hillary came in late August and delivered highly unusual amounts of summer rain, followed by hot and humid weather. Conditions could not have been better for mosquito breeding. In particular, the *Aedes aegypti* mosquito has plagued residents of affected cities in Ventura County since 2020. Desiccation resistant eggs adhering to the sides of containers and objects prior to the storm began rapidly developing into adult mosquitoes. A fuse was lit. In the weeks to follow, the already high reports of aggressive day-biting mosquitoes accelerated to record levels.

Ventura County Vector Control Program staff rose to the challenges in 2023, responding to nearly double the number of public complaints/service requests compared to 2022. In addition, staff inspected and treated 1,875 active inventoried mosquito sources, controlled breeding in many new temporary sources created by the rains, and conducted surveillance and public outreach.

Looking forward, we will continue to adapt to this dynamic field in public health and work hard to reduce the nuisances and risks mosquitoes and other vectors bring to our communities.

Vector Complaints per Month



2023 REPORT OF VECTOR CONTROL ACTIVITIES

The Ventura County Environmental Health Division (Division) provides the following summary of Vector Control activities conducted during the calendar year 2023.



Mosquito Control

Mosquito Control activities consist of Division staff inspecting potential mosquito sources and applying control measures when mosquito eggs, larvae, and/or pupae are observed. Staff follows the principles of Integrated Vector Management. Control measures may consist of source remediation, biological control, or application of pesticide.

Source Inspection

The program maintains a dynamic inventory of known mosquito sources (breeding sites).

Sources can vary from intermittent flooding, to manmade sources, to large natural areas with well developed biological systems such as riverbeds and wetland areas.

Inspections vary from weekly up to annual, and each source is evaluated based on historical breeding and other factors. Each site is assigned an inspection frequency to control mosquitoes and use program resources efficiently.



SUMMARY OF 2023 MOSQUITO SOURCE INSPECTIONS AND TREATMENTS BY JURISDICTION

City	# of inventoried sources	# of mosquito source inspections	# of mosquito source treatments
Camarillo	274	1,219	441
Fillmore	86	412	195
Ojai	230	998	435
Oxnard	288	1,614	1,073
Port Hueneme	21	142	103
San Buenaventura	310	1,040	582
Santa Paula	104	402	104
Simi Valley	788	5,028	2,579
Thousand Oaks	696	4,400	1,729
Unincorporated	164	660	439
TOTAL:	2,961	15,915	7,683



Ventura County Vector Control uses mosquito control methods that achieve the optimal long term results while causing the least harmful impacts on the environment.

- The Division maintains the capability of using pesticide that targets adult mosquitoes in the event of a public health emergency, however our program adheres to the principles of Integrated Vector Management to achieve mosquito control with the most effective and least negatively impactful means.
- The Division primarily depends on control strategies such as:
 - physical alteration, prevention, or removal of the breeding source
 - introducing mosquito fish (*Gambusia affinis*) into isolated artificial water bodies such as decorative ponds or inoperable swimming pools
 - larvicides containing naturally occurring bacteria like *Bacillus thuringiensis israelensis*
- The Division makes mosquito fish available to the public for use in confined non-natural waters at no charge. Just call the **Mosquito Fish Hotline at 805/662-6582.**



PUBLIC COMPLAINT RESPONSES

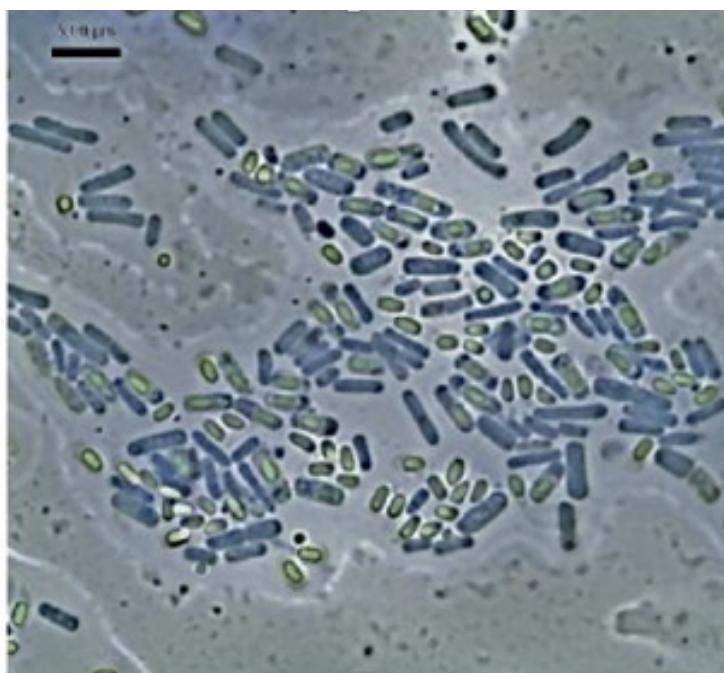
Division staff performed 1,939 complaint responses within cities and the unincorporated area concerning mosquitoes, rodents, and other vectors/nuisance pests. During the fourth season since the establishment of Invasive Aedes mosquitoes in the county, calls concerning these mosquitoes rose to 637 compared to 266 in 2022. Due to their continued spread and conditions such as tropical storm Hillary and associated weather patterns, these mosquitoes have many places to propagate rapidly.

City	# of vector-related complaint responses	# of West Nile Virus Complaint responses	# of Invasive Aedes complaint responses
Camarillo	122	4	7
Fillmore	61	0	12
Ojai	128	0	57
Oxnard	59	2	2
Port Hueneme	3	0	0
San Buenaventura	127	7	20
Santa Paula	32	0	3
Simi Valley	806	6	335
Thousand Oaks	405	6	168
Unincorporated	196	0	33
TOTAL:	1,086	25	637

FUN PESTICIDE FACT...

The bacterium *Bacillus thuringiensis* was first discovered in 1901 by a Japanese biologist, Shigetane Ishiwatari, while investigating the cause of sotto disease (sudden-collapse disease) that was killing a large population of silkworms. Ishiwatari was the first to isolate the bacterium *Bacillus thuringiensis* (Bt) as the cause of the disease. A decade later, Ernst Berliner also isolated the bacterium Bt and re-discovered it. The bacterium was killing a Mediterranean flour moth in the German town of Thuringia and because of where it was found, Berliner named the bacterium *Bacillus thuringiensis*. Ishiwatari originally named the bacterium *Bacillus sotto* which was later determined to be invalid because of the existence of a crystal within Bt which contained activity that would not be discovered until Berliner reported the existence of this crystal in 1915.

In 1977, subspecies *israelensis* was first discovered and isolated from mosquito larvae in an isolated stagnant pond in the Negev Desert of Israel (Goldberg and Margalit 1977). *Bacillus thuringiensis* subsp. *israelensis* (Bti), would then become a very effective bacterium for the control of specific insects in the suborder Nematocera of the Diptera family, including mosquitoes and black flies.



Mosquito larvae are killed after they ingest Bti which produces toxins in the gut. Bti is manufactured in different formulations such as tablets, pellets, liquid, or granules. When proper label instructions are followed, Bti can be applied to various stagnant water sources such as rain barrels, fountains, ornamental ponds, green swimming pools, and most natural settings such as wetlands or creeks. Bti is very host specific and has not shown to be toxic to humans, animals, and the environment. Bti is an active ingredient in several Environmental Protection Agency (EPA) registered insecticides that can be used in residential, commercial, and agricultural settings. Some of these insecticides such as the one most commonly used by Ventura County Vector Control are OMRI listed, or approved for use in certified organic operations under the USDA National Organic Program. Bti can be purchased over the counter for home use, applied by a private pest control company, or applied by a Ventura County Vector Control Technician. The use of Bti is very important for the safe and effective control of mosquitoes throughout Ventura County.

Eli Hernandez, Staff Specialist

Steve's *Aedes aegypti* Blog 2023



Why are the 'invasive Aedes' mosquitoes so difficult to get rid of?

The Vector Control Program had been preparing for 'invasive Aedes' mosquitoes to appear in Ventura County since their 2011 arrival in Southern California. When staff received a call in 2020 that *Aedes aegypti* mosquitoes may have been discovered in Simi Valley, I went to the house and did an extensive inspection of the yard. I looked everywhere I could think of, **and I missed it!**

There was a small bucket filled with leaves. It looked dry, so I left it alone since mosquitoes cannot develop without water. The next day while setting a mosquito trap, another technician scooped under the leaves and found a small amount of water that was not visible to the eye and the invasive mosquitoes were there.

Known as 'day biters', 'ankle biters', and 'yellow fever mosquitoes', the invasive *Aedes aegypti* mosquito has now spread through Ventura County the same way they've spread through California.

After 4 years of dealing with this invasive species, we have learned a lot about their behavior and how they are different than our native mosquitoes

-They like to hide. Hidden places like underground drains and underneath potted plants are very common in most neighborhoods and often provide the teaspoon of water that they need to develop.

-They are aggressive biters. These invasive mosquitoes appear to bite people more often than our native mosquitoes. Every time they bite, they are getting the nutrients they need to lay more eggs. The increase in biting leads to an increase in their population. In addition many people have reported allergic reactions or have had secondary infections at the bite.

-They can spread disease. Local transmission of dengue occurred in 2 Southern California locations in 2023. When travelers carry a mosquito-borne virus into an area where the invasive Aedes mosquitoes are present, the risk for transmission is real as evidenced by the cases in Pasadena and Long Beach.

-They can find water, rain or shine. Tropical Storm Hillary gave us heavy rainfall in August 2023 (at the peak of *Aedes aegypti* season) and it led to a large increase in the numbers of invasive Aedes mosquitoes. But in 2020, 2021, and 2022 we also had large numbers of these mosquitoes while in a severe drought. We learned that the invasive Aedes mosquitoes can thrive just by laying eggs and developing in sources created by sprinklers and hose runoff in yards and neighborhoods.

-They do have a season. While it's possible to experience these mosquitoes any time of year in our mild climate, it has been clear that invasive Aedes populations boom between July and October.

-They like to beat the heat. We usually associate mosquitoes with Summer heat, but the invasive Aedes are active in the daytime and are always looking to get out of the Sun. They will look for shady, cool, and preferably wet locations to hang out during peak heat on those hot Summer/Fall days. There are many reports of them going indoors and into garages. Underground drains and leafy plants can also provide the shade they need.

-They are coming from many places!! When dealing with complaints about *Aedes aegypti* mosquitoes, we often find dozens of locations nearby where these mosquitoes can breed. Many are located on private property and obtaining access to each yard is both difficult and time consuming. While it can be easy to blame one fountain or pond, neighborhoods that have Aedes mosquitoes usually have multiple sources on multiple properties.

The ability of these invasive mosquitoes to hide in cryptic locations and to lay eggs and proliferate in multiple locations makes eradication with pesticides very difficult and inefficient. It is much easier and more effective to prevent these mosquitoes by eliminating standing water wherever possible and to modify containers that do hold water, such as screening yard drains to prevent mosquitoes from entering the drainpipes or filling plant saucers with sand to prevent the collection of water. Now that we have this invasive species, it is time reduce overwatering and to pay attention to where our runoff is collecting. It is especially important to do these things in Spring *before* their season begins.

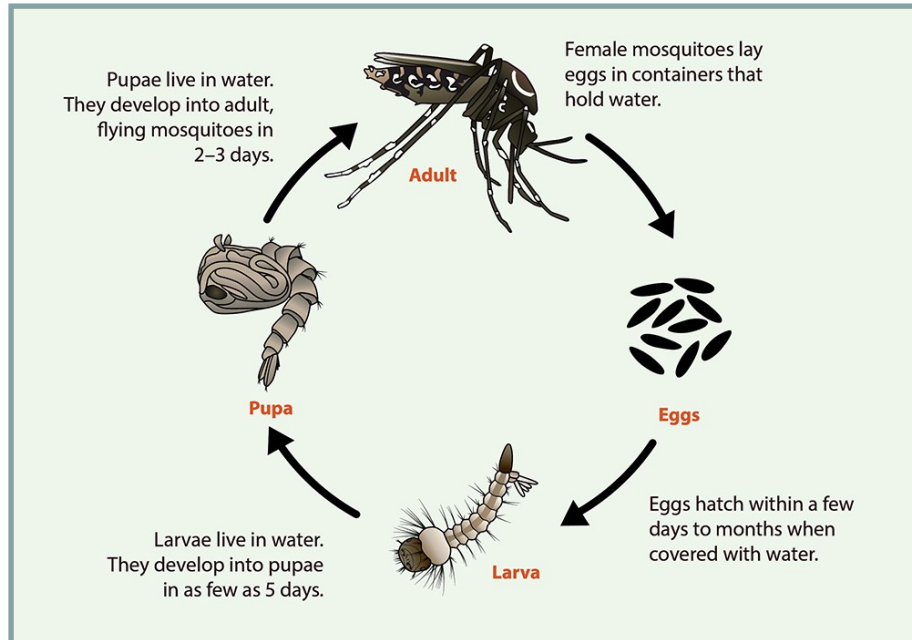
"an ounce of prevention is worth a pound of cure"

Steve Solomon, Staff Specialist

-Benjamin Franklin

Services specific to Invasive *Aedes* mosquitoes in 2023 included:

- Performing **637** complaint responses.
- Conducting **40** surveillance trappings.
- Deploying **46** In2Care mosquito traps that attract and kill mosquitoes, both larvae and adults.
- Direct mailing **36,222** Invasive *Aedes* educational outreach postcards.
- Hand delivered Invasive *Aedes* materials in **44** neighborhoods.



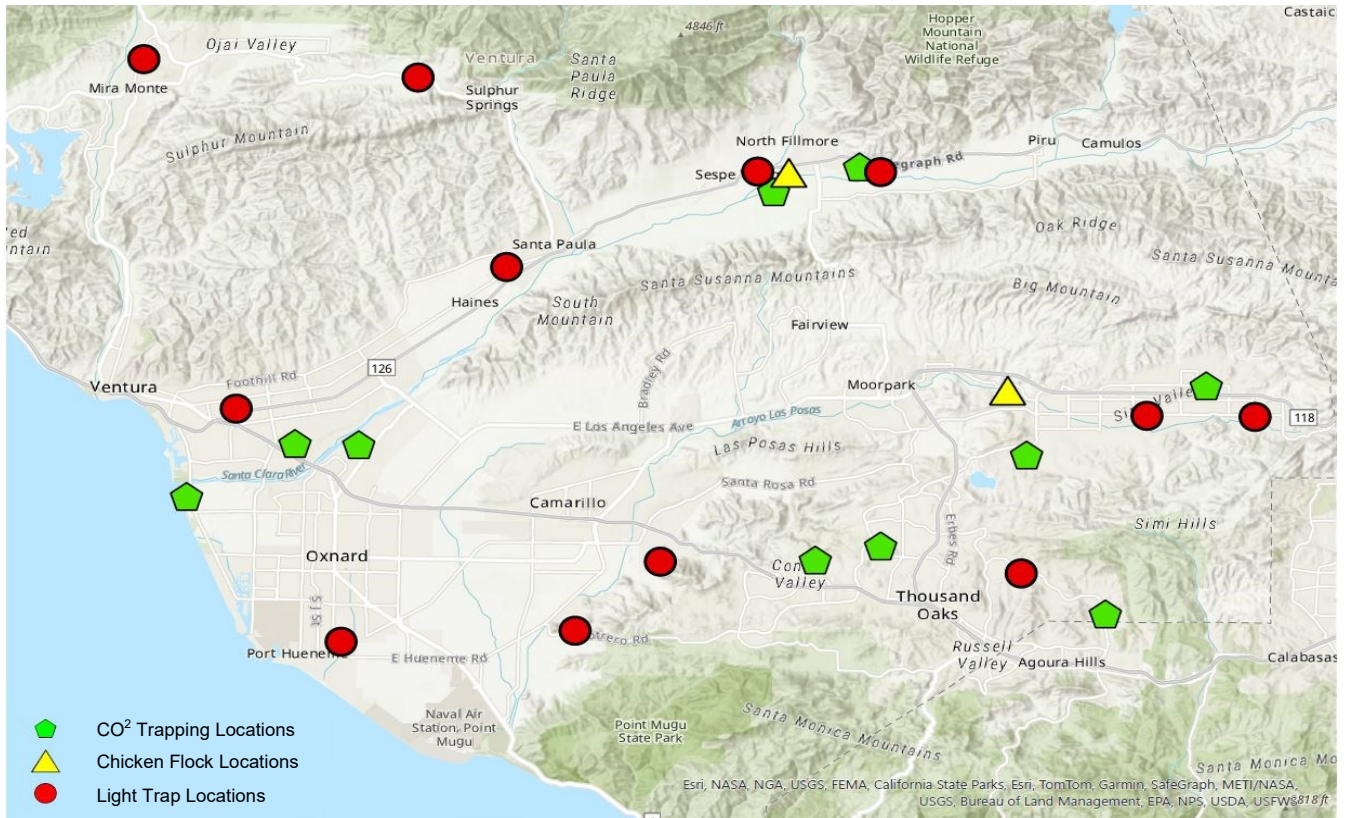
Help protect yourself and your neighbors by eliminating standing water in and around your home or business:

- Once a week, empty and scrub, turn over, cover, or throw out items that hold water inside and outside your home.
- Tightly cover water storage containers (buckets, cisterns, rain barrels) so that mosquitoes cannot get inside to lay eggs.
- For containers without lids, cover tightly with 1/16th inch wire mesh.
- Keep rain gutters free of debris.
- Fill saucers under potted plants with sand/aquarium gravel or remove them.
- Cover yard drains with highly permeable landscape cloth or 1/16th inch wire mesh under the inlet grates and check the outlets for blockage weekly.

If you are being bitten by small black mosquitoes with white stripes in or around your home, especially during daylight hours, please call the Vector Control Program's **Mosquito Complaint Hotline** at **805/658-4310**. To request free mosquito fish to control mosquito breeding in ponds, fountains, and water gardens, call **805/662-6582**. For more information on *Aedes aegypti* and *Aedes albopictus* mosquitoes, visit: <https://vcrma.org/invasive-aedes-mosquitoes>

ENCEPHALITIS AND WEST NILE VIRUS SURVEILLANCE

St. Louis Encephalitis virus, Western Equine Encephalitis virus, and West Nile virus are mosquito-borne viruses which can be transmitted to humans. These viruses can cause mild to very serious illness in humans. The purpose of the encephalitis and West Nile Virus surveillance program is to prevent transmission of encephalitis and West Nile viruses by mosquitoes to humans. Mosquito species commonly found in Ventura County can transmit Saint Louis Encephalitis, Western Equine Encephalitis, and West Nile Virus. The surveillance program has many facets, which include mosquito population and species monitoring, virus testing of adult mosquitoes, serological analysis of sentinel chickens, and dead bird surveillance for West Nile Virus.



County of Ventura
Resource Management
Agency
GIS Services

County of Ventura
Environmental Health Division

Encephalitis Surveillance 2023



CO2 Trap



Light Trap

MOSQUITO MONITORING AND TESTING

During 2023, 12 mosquito light traps were located in representative areas of the County to monitor mosquito population densities. One or more traps are located in each city, and adult mosquito specimens are collected once per week throughout the year.

Trap results are used to evaluate the effectiveness of mosquito control measures and the potential for disease transmission. Additionally, 6 encephalitis vector survey traps, used to collect live adult mosquitoes, were deployed throughout the County. These traps were placed on 12 different occasions. Mosquitoes from these traps were collected and submitted to the California Department of Public Health, Vector-Borne Disease Section (CDPH) for Saint Louis Encephalitis, Western Equine Encephalitis, and West Nile Virus testing.

None of the samples of mosquitoes collected in Ventura County during 2023 tested positive. Within the State in 2023, 4,512 of 52,375 mosquito pools tested were positive for West Nile Virus and 728 of 47,205 mosquito pools tested were positive for Saint Louis Encephalitis. There were no positive mosquito pools for Western Equine Encephalitis, Chikungunya, Dengue, or Zika.



SENTINEL FLOCK MONITORING AND TESTING

In 2023, two sentinel chicken flocks were deployed for serological monitoring of Saint Louis Encephalitis, Western Equine Encephalitis and West Nile Virus. These flocks were located in the areas of Simi Valley and Fillmore.

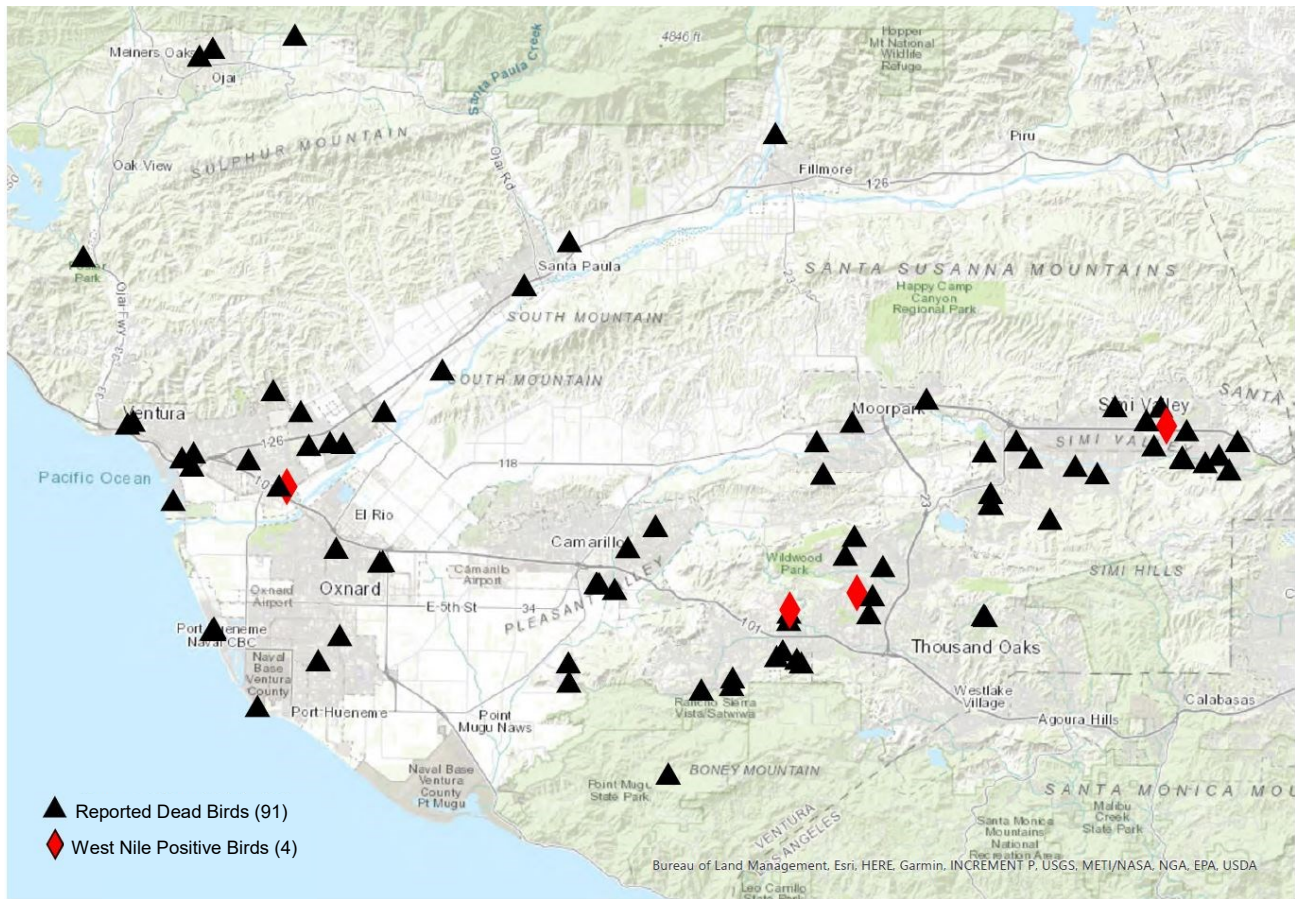
Flocks consisting of 11 chickens each were placed at these locations in April and regularly tested every other week through mid-November. A total of 221 serological (blood) samples were submitted to CDPH for Saint Louis Encephalitis, Western Equine Encephalitis, and West Nile Virus testing.

No chicken blood samples collected within Ventura County tested positive during the 2023 season. Throughout the State, 187 of 3,704 chicken blood sera samples tested positive for West Nile Virus.

WILD BIRD COLLECTION AND TESTING

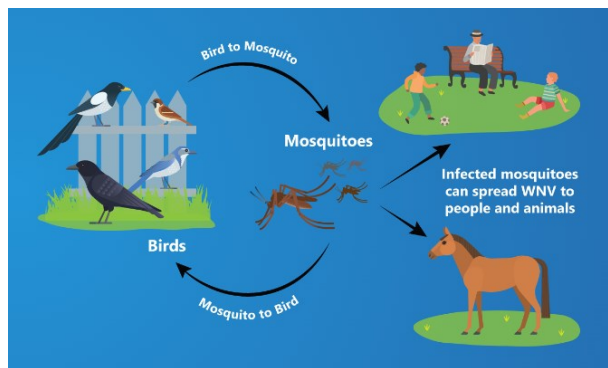
In Ventura County during 2023, a total of 91 dead birds were reported to the West Nile Virus dead bird hot line; 25 were collected and submitted for testing; 4 birds (16%) tested positive for West Nile Virus.

Throughout the state, a total of 6,793 dead birds were reported to CDPH; 2,046 were tested, and 855 (42%) were positive for West Nile Virus.



County of Ventura
Environmental Health Division

Dead Bird Encephalitis Surveillance 2023



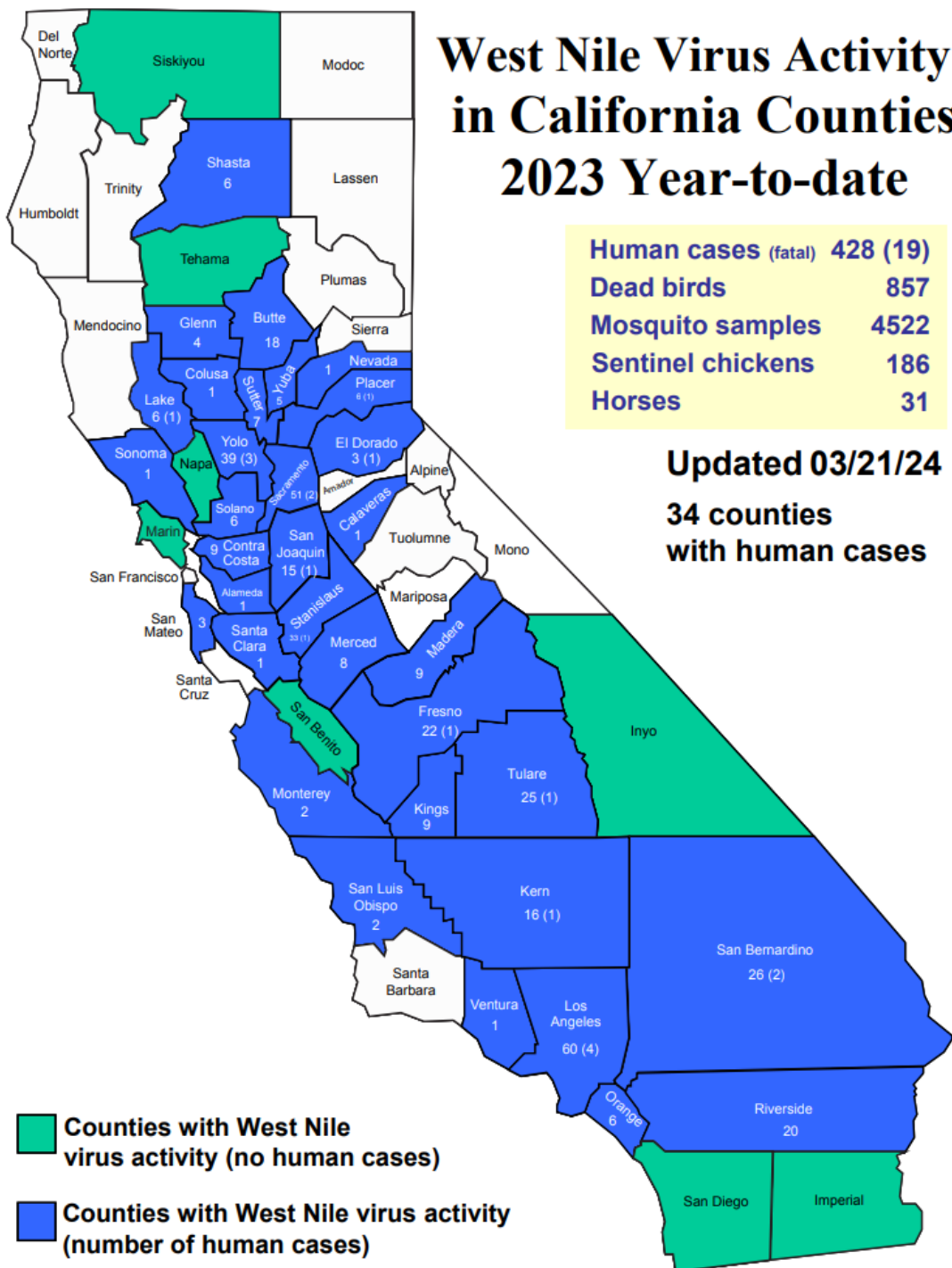
Help Monitor for West Nile Virus

Dead bird reporting helps public health agencies track where West Nile Virus could be spreading. Mosquitoes often acquire WNV from birds. A WNV positive dead bird is an indication that the virus is circulating in that area and the potential for human infection may increase. Ventura County Vector Control Program uses this information to focus surveillance and control efforts in the area of a positive dead bird in order to use our resources efficiently and reduce the risk of human illness from WNV. Report recently deceased birds to **877-WNV-BIRD** or submit a report online at westnile.ca.gov.

INCIDENCE OF WEST NILE VIRUS AND ENCEPHALITIS

In 2023, there was one confirmed human case of West Nile Virus in Ventura County. Statewide, there were 428 symptomatic human cases reported, resulting in 19 fatalities. In the State, there were 31 West Nile Virus equine cases. There were no West Nile Virus equine cases reported in Ventura County.

During 2023, there were 18 human cases of Saint Louis Encephalitis statewide.



PLAGUE SURVEILLANCE

Plague is a highly infectious disease, caused by the bacteria *Yersinia pestis*, which primarily affects rodents. Humans and their pets (dogs, and especially cats) can get plague if they visit or live in areas where wild rodents are naturally infected. The purpose of the plague surveillance program is to protect the public through early detection and subsequent suppression of plague in the wild rodent population. Although the hazard to the public is generally low, the potential for disease transmission increases significantly when large outbreaks (epizootics) occur among susceptible rodent populations.

Plague positive animals have consistently been found within the north half of Ventura County. Passive plague surveillance, which involves inspection of an area to determine rodent population density, rodent health, and risk to the public, was performed in several areas of Ventura County. These areas included trails within the Los Padres National Forest. At the time of inspection, most locations were not considered to have a high enough risk of plague to warrant active surveillance.



HANTAVIRUS

Hantavirus Pulmonary Syndrome is a rare but often fatal illness caused by *Sin Nombre* virus which is carried by wild mice. Most cases occur when airborne particles of dried rodent urine, droppings, or saliva contaminated with the virus are inhaled. In 1997, the Division conducted a survey of the deer mouse population for the presence of Hantavirus in Ventura County. Results indicated an infection rate of 10% to 15%. This rate is consistent with the most recent Hantavirus infection rate found throughout California and reported by CDPH. In 2023 there were no human cases of Hantavirus infection reported within Ventura County.

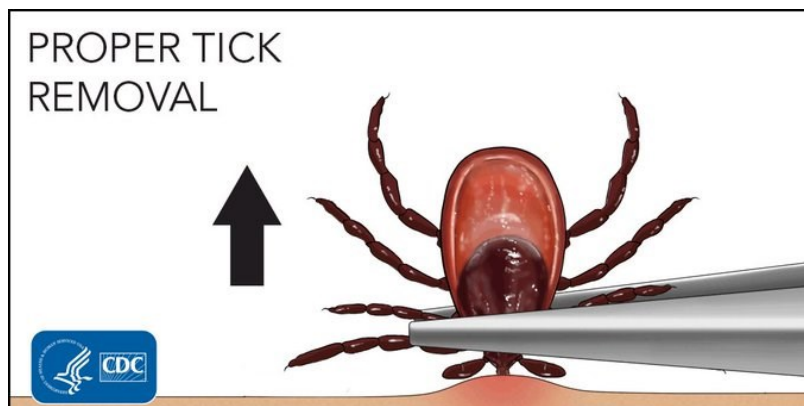
LYME DISEASE

Lyme disease is an infectious disease transmitted by the bite of a specific species of tick. It is caused by a spirochete (a spiral shaped bacterium) that may persist in the human body for several years if not treated with antibiotics. The Western Black Legged Tick, *Ixodes pacificus*, is the primary vector of Lyme Disease in California. This tick is found throughout Ventura County especially in the more humid areas of the coastal canyons, inland creeks, and heavily irrigated grass areas.

According to the Centers for Disease Control and Prevention, since 1991, the incidence of Lyme Disease cases has almost tripled in the United States. Just over 9,000 cases were reported in 1991, compared with nearly 26,203 cases in 2016. The majority of these cases were from northern states. The number of cases in Ventura County and California has remained relatively constant. The rising number of cases elsewhere is likely a result of both increased awareness and exposure. At the time this report was posted, CDPH’s provisional numbers for 2023 were 61 confirmed and 30 probable cases of Lyme disease in California and 1 confirmed case in Ventura County.

<u>Tick Collections</u>	Las Virgenes Open Space Preserve 2/7/2023	La Jolla Canyon Ray Miller Trail 2/7/2023	Sycamore Canyon 2/07/2023
<i>Ixodes pacificus</i>	0	1	1
<i>Dermacentor occidentals</i>	0	13	4
Total	0	14	5

Division staff provides information on Lyme Disease, other tick-borne disease transmission, personal protection against ticks, and methods of tick control. The County also provides warning signs about ticks and Lyme Disease to operators of parks and campgrounds. In 2023, Ventura County Vector Control Program, along with CDPH, performed 3 tick collection surveys to determine tick population and species density. This helps to evaluate the potential for Lyme disease transmission in those areas surveyed. No *Ixodes pacificus* ticks collected in Ventura County tested positive for the causative agent of Lyme Disease in 2023.



VECTOR CONTROL PROGRAM STAFF



Alex Gaskill
Vector Control
Technician II

Cary Svoboda
Vector Control
Program Lead

Ed Alamillo
Vector Control
Technician III

Steve Solomon
Vector Control
Technician III

Eli Hernandez
Vector Control
Technician III

The Division also provides consultative services upon request for the Cities of Ventura County, on topics such as nuisance insects, rodents, and bedbug infestations. City representatives may contact us at **805/654-2816**.

IMPORTANT PHONE NUMBERS

Mosquito Complaint Hotline: 805/658-4310

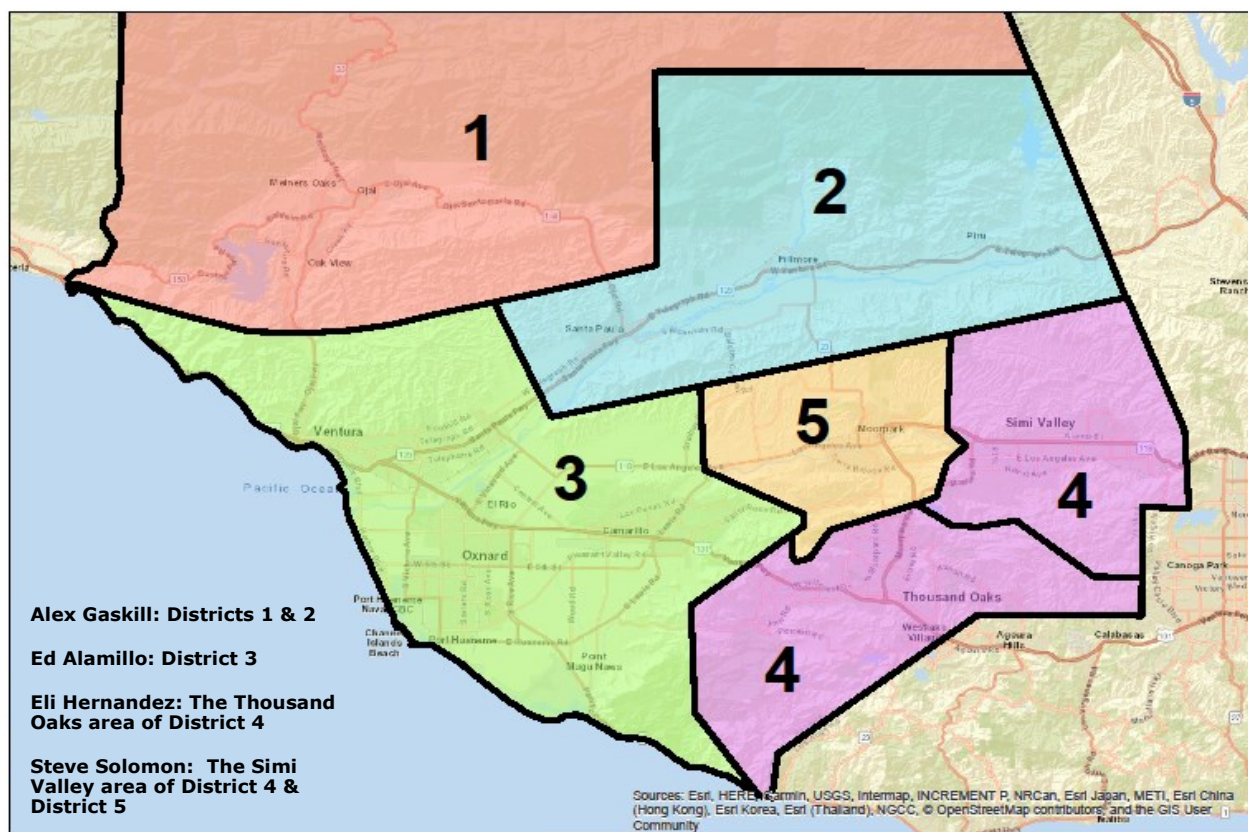
Mosquito Fish Request Hotline: 805/662-6582

You can also submit a complaint online at:

<https://eco.vcrma.org/>

Report a Dead Bird for WNV Testing: 877/WNV-BIRD (968-2473) or

<https://westnile.ca.gov/>



County of Ventura
 Environmental Health Division
Vector Control District Assignments

STAFF	AREA	CONTACT
Alex Gaskill	Ojai, Santa Paula, Piru, Fillmore	Alex.Gaskill@ventura.org (805)654-3985
Ed Alamillo	Malibu, Port Hueneme, Oxnard, Ventura, Camarillo	Ed.Alamillo@ventura.org (805)654-2819
Steve Solomon	Moorpark, Simi Valley, Bell Canyon	Steven-Daniel.Solomon@ventura.org (805)654-3585
Eli Hernandez	Newbury Park, Oak Park, Thousand Oaks, Westlake Village	Eli.Hernandez@ventura.org (805)654-2873



COUNTY of VENTURA

Environmental Health Division

800 S. Victoria Ave, Ventura, CA 93009-1730

TEL: 805/654-2813 • FAX: 805/654-2480

Internet Web Site Address: vcrma.org/divisions/environmental-health