Vector Control Report 2021

A Changing Environment Creates New Challenges for Mosquito Control.

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COUNTY of VENTURA

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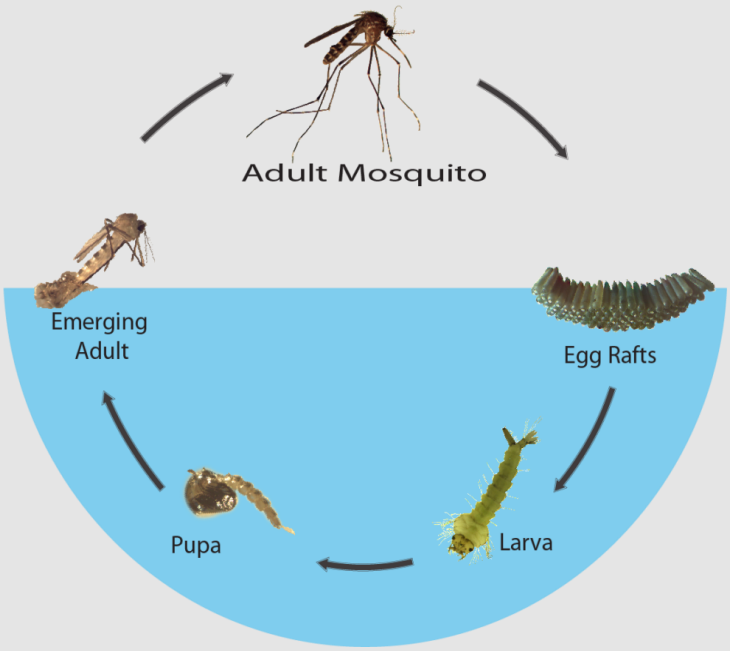
Mosquito Life Cycle

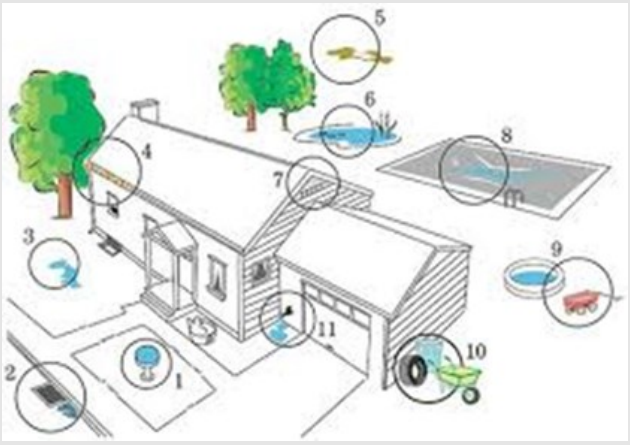
Mosquitoes require water in which to pass their early life stages (eggs, larvae and pupal stages): this usually takes from 7 to 10 days. Most mosquitoes lay their eggs in standing water, where they hatch in a day or two. This may be along creek margins, in containers, gutters, tires, or ponds. Any location where water stands for over two weeks may become suitable for mosquito breeding. Other types of mosquitoes lay their eggs in dry containers, dirt along creek edges, or dry ponds where they remain until covered by water, then hatching occurs. The mosquito eggs hatch into the larval stage (also called wigglers) where the larvae wiggle through the water feeding on minute particles. This stage lasts for about one week. The larva changes into the pupal stage called tumblers. This stage is where the larva changes into the adult mosquito. When the adult mosquito is ready to emerge, the skin of the pupa splits open and the adult mosquito climbs out. Adult mosquitoes typically emerge during the summer months and usually live for approximately two weeks. Mosquitoes that emerge in late summer may survive through the winter months if conditions and habitats are ideal. They frequently rest in grasses, shrubbery, or other foliage, and in shaded, secluded, or protected areas, including: doghouses, chicken coops, under eaves, etc.



Most adult mosquitoes generally feed on flower nectar. However, female mosquitoes also bite humans and animals to obtain a blood meal needed to develop their eggs. Many species of mosquitoes can transmit diseases such as West Nile virus, St. Louis Encephalitis and Malaria when they bite.

Where can I find mosquito larvae?

Larva may be found any place around your home where water collects, such as old tires, wading pools, clogged gutters, wheelbarrows, etc.



Here are some places to check:

1. Birdbaths
2. Street gutters and drains
3. Low-lying depressions in lawn areas
4. Roof gutters and eave troughs
5. Compost piles
6. Ornamental ponds and pools
7. Missing or damaged screens for windows and attic vents
8. Pool covers
9. Toys, wading pools, and other objects around the yard that can hold water
10. Wheelbarrows or tires that are left outside
11. Leaky faucets

You may be raising mosquitoes!

Homeowners can help reduce mosquito transmitted diseases and nuisance conditions caused by mosquito breeding around their homes by eliminating standing water. Start with a thorough inspection of your property to determine sources of standing water.

If mosquitoes are still bothering you: If mosquitoes continue to bother you and you have eliminated mosquito breeding sources around your house, the mosquitoes are most likely coming from a source off your property. This problem should be reported to the Mosquito Complaint Hotline: 805/658-4310.

2021 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 2021.

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. Following the principles of Integrated Vector Management, control measures may consist of source mediation, biological control, or application of pesticide.

Source Inspection

We maintain a dynamic inventory of known mosquito sources (breeding sites).

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

NEW CHALLENGES IN A CHANGING ENVIRONMENT

Although trending hotter and drier weather conditions are eliminating some mosquito breeding sources, there is still persistent urban and agricultural runoff and treated wastewater discharges that can create significant breeding sites in waterways and estuaries. If accumulated water is not flushed out, an area can become choked with vegetation and stagnant, creating breeding sources that can potentially remain active throughout the mosquito season until late fall.

Larvicide is still applied by hand but some conditions call for special equipment such as backpack blowers, boats and even helicopters.

2021 saw unprecedented conditions that necessitated aerial applications to treat mosquito populations thriving in areas that were inaccessible by conventional means.

Summary of 2021 mosquito source inspections and treatments by jurisdiction

City	# of inventoried sources	# of mosquito source inspections	# of mosquito source treatments
Camarillo	**287**	**1,719**	**514**
Fillmore	**82**	**447**	**183**
Ojai	**217**	**755**	**370**
Oxnard	**272**	**1,674**	**991**
Port Hueneme	**23**	**157**	**120**
San Buenaventura	**307**	**1,542**	**854**
Santa Paula	**99**	**312**	**93**
Simi Valley	**743**	**5,032**	**2,003**
Thousand Oaks	**668**	**3,738**	**1,800**
Unincorporated	**137**	**494**	**203**
TOTAL:	**2,835**	**15,870**	**7,131**

SEASONAL VECTOR CONTROL TECHNICIANS

Each year, the Division hires up to 8 seasonal Vector Control Technicians, between spring and fall, who perform thousands of source inspections and control activities, and respond to hundreds of requests for services. We have been very fortunate to have had many of them return for multiple seasons and to have frequently found new recruits that bring energy, a willingness to learn, and a desire to serve by protecting public health and enhancing the quality of life we enjoy in Ventura County.

All seasonal Vector Technicians bring relevant education and experience and many continue on to pursue a career in environmental health or related fields. In fact, some of the leaders and key staff in the County of Ventura Environmental Health Division "got their feet wet" starting as Vector Control Technicians.

2021 seasonal staff prepare to inspect the Santa Clara River mouth. From left: Noah Moral, Benson Fong, Colin Gallagher, and Jeremy Licea.

Mosquito control is largely achieved by affecting physical changes in the environment and using biorational larvicides to control mosquitoes in the larval stage.

- 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 1,333 complaint responses and requests for service within cities and the unincorporated area concerning mosquitoes, rodents, and other vectors/nuisance pests. During the second season since the establishment of Invasive Aedes mosquitoes in the county, calls concerning them generated a large percentage of our complaint response activities.

City	# of vector-related complaint responses or requests for	# of West Nile Virus surveillance requests	# of Invasive Aedes complaint responses or requests for services
Camarillo	42	0	6
Fillmore	41	0	27
Ojai	52	0	18
Oxnard	20	1	2
Port Hueneme	4	0	0
San Buenaventura	48	2	6
Santa Paula	16	1	0
Simi Valley	771	3	469
Thousand Oaks	240	2	26
Unincorporated	99	0	9
TOTAL:	**1,333**	**9**	**563**

INVASIVE MOSQUITO SPECIES

IMPORTANT PUBLIC SERVICE REQUEST TO ALL COUNTY RESIDENTS AND MUNICIPALITIES - WE NEED YOUR ASSISTANCE

Two invasive (non-native) mosquito species have been found in several areas of California. The *Aedes aegypti* and *Aedes albopictus* mosquitoes are different from most of our native species in that they bite during the day as well as the night, are highly adapted to developing and feeding in and around homes, and they have the potential to transmit several viruses, including dengue, chikungunya, Zika, and yellow fever. None of these viruses are currently known to be transmitted within California however these mosquitoes could pick them up from infected travelers returning from other parts of the world, including Mexico, Central and South America, the Caribbean, and Asia, and local transmission could occur.

These are small, black mosquitoes with stripes on their back and on their legs. They lay their eggs in any small artificial or natural container that can hold a teaspoon of water or more.

Since the invasive *Aedes aegypti* mosquito was detected in Ventura County for the first time in September 2020, Vector Control Program Staff has used lessons learned from neighboring districts that have been dealing with Invasive Aedes for some time. The most effective way to decrease their numbers has been shown to be public outreach: If awareness is raised and residents reduce the amount of breeding places and cut down on water usage to limit runoff from collecting in gutters and drains, there will be fewer mosquitoes. Vector Control developed notices to hang on doors, brochures to distribute, inserts for water bills, and postcards to be sent to targeted mail routes in infested areas. The County of Ventura's social media accounts celebrated "California Mosquito Awareness Week" in April.

Vector Control Technicians were also very active in the field. Services specific to Invasive Aedes mosquitoes in 2021 included:

- Performing 563 complaint responses.
- Conducting 57 surveillance trappings.
- Deploying 49 In2Care mosquito traps that attract and kill mosquitoes, both larvae and adults.
- Adding dozens of new Vector sites that are sources of Invasive Aedes mosquitoes to our inventory to be inspected/treated on a recurring basis.

Clearing blockage from a yard drain outlet where small amounts of water often hold large amounts of *Aedes aegypti larvae*.

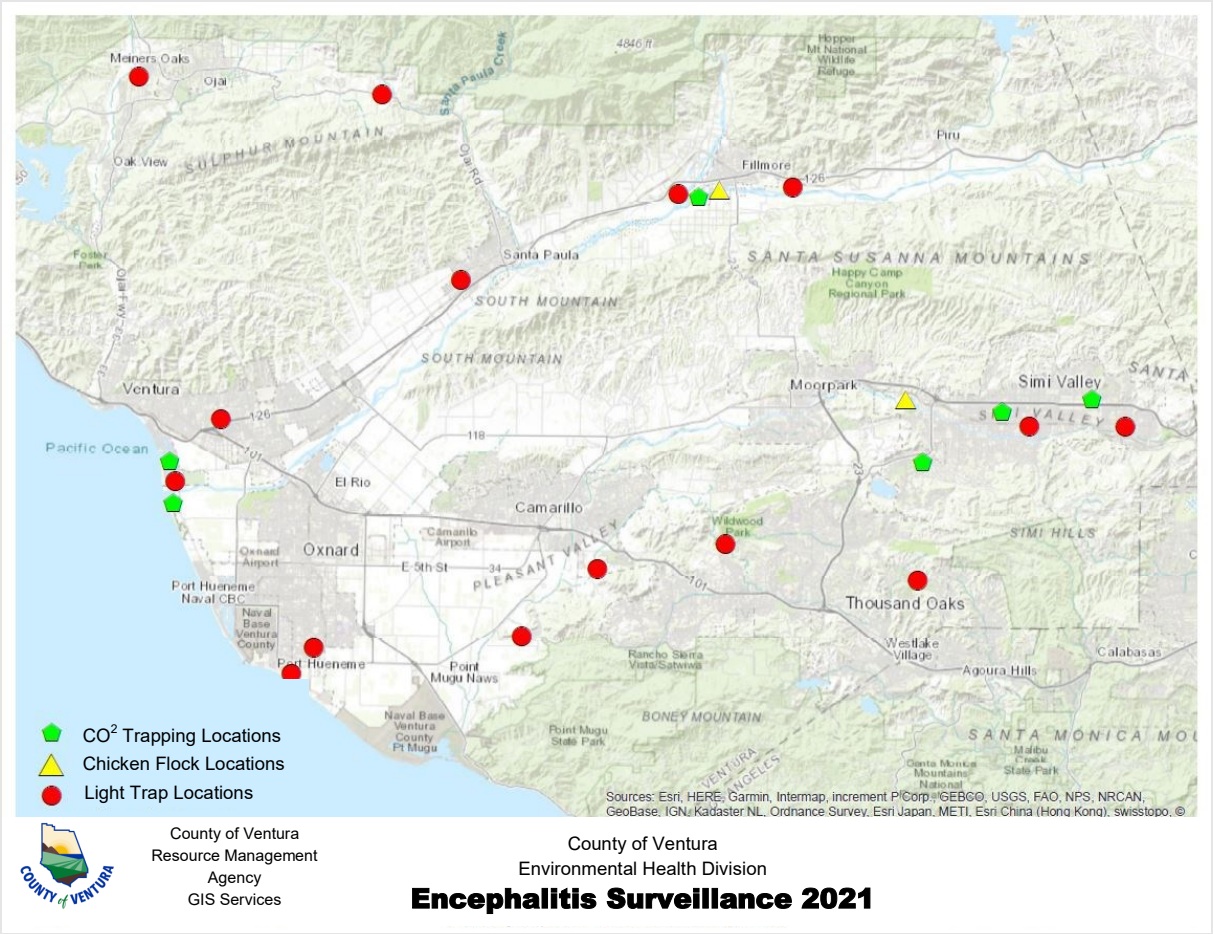
Help protect yourself and your neighbors by eliminating standing water in and around your home or business:

- 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, use 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.

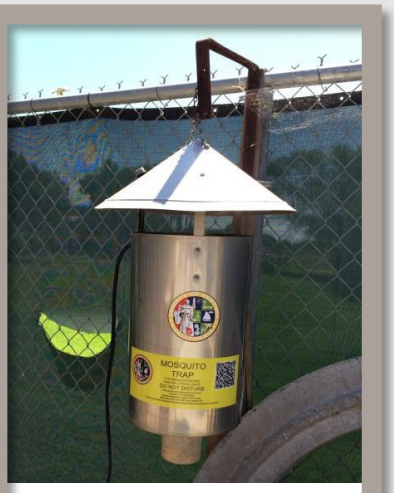
If you are being bitten by small black mosquitoes with white stripes in or around your home, especially during daylight hours, please call the Vector Control Program's **Mosquito Complaint Hotline** at **805/658-4310**. To request free mosquito fish to control mosquito breeding in ponds, fountains, and 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.



CO2 Trap



Light Trap

MOSQUITO MONITORING AND TESTING

During 2021, 15 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 virus surveillance traps, used to collect live adult mosquitoes, were deployed throughout the County. These traps were placed on 15 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 2021 tested positive. Within the State in 2021, 2,263 of 38,024 mosquito pools tested were positive for West Nile Virus. 45 of 31,379 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 2021, 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.

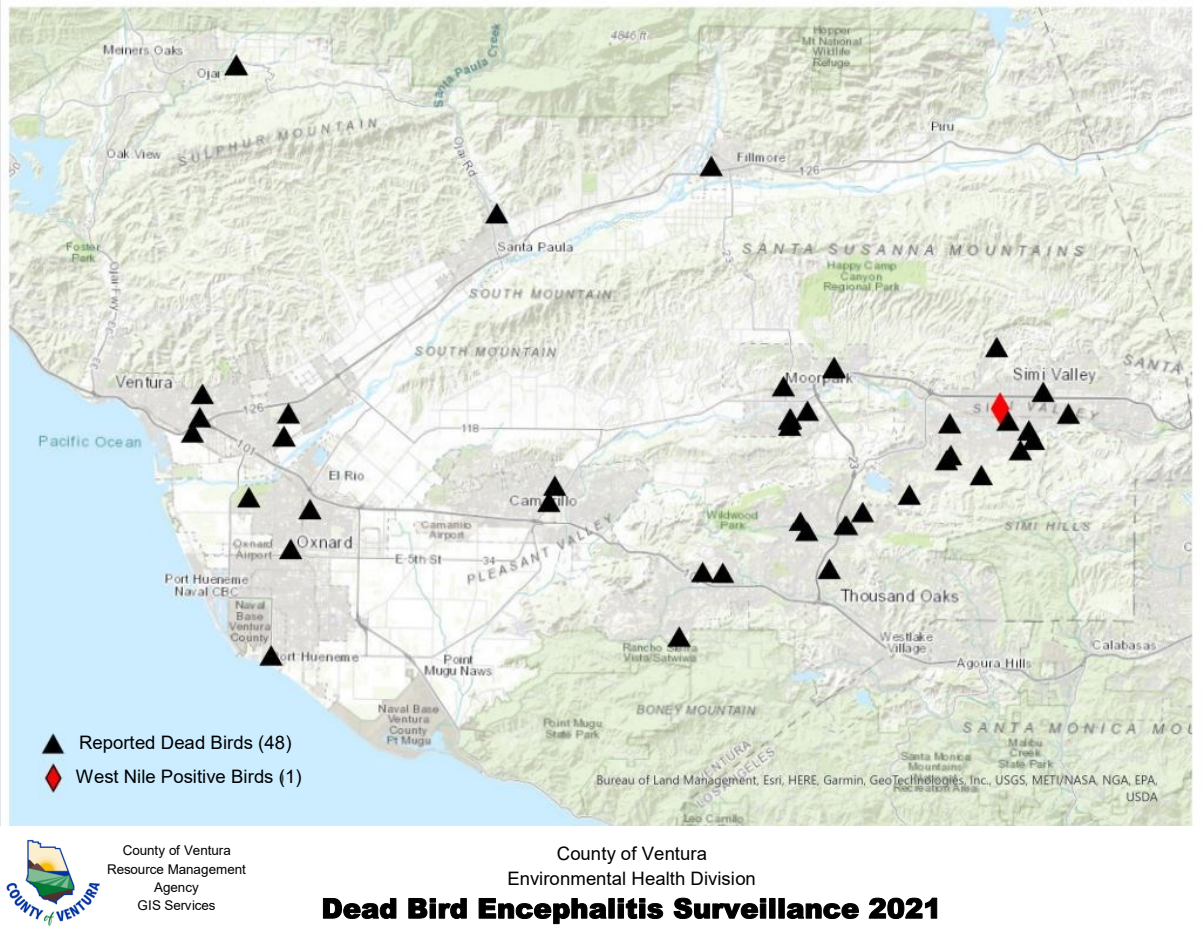
Flocks consisting of 10 chickens each were placed at these locations in April and regularly tested every other week through mid-November. A total of 270 serological (blood) samples were submitted to CDPH for Saint Louis Encephalitis, Western Equine Encephalitis, and West Nile Virus testing.

No chicken blood samples collected within Ventura County tested positive during the 2021 season. Throughout the State, 90 of 5,823 chicken blood sera samples tested positive for West Nile Virus, and 2 tested positive for Saint Louis Encephalitis.

WILD BIRD COLLECTION AND TESTING

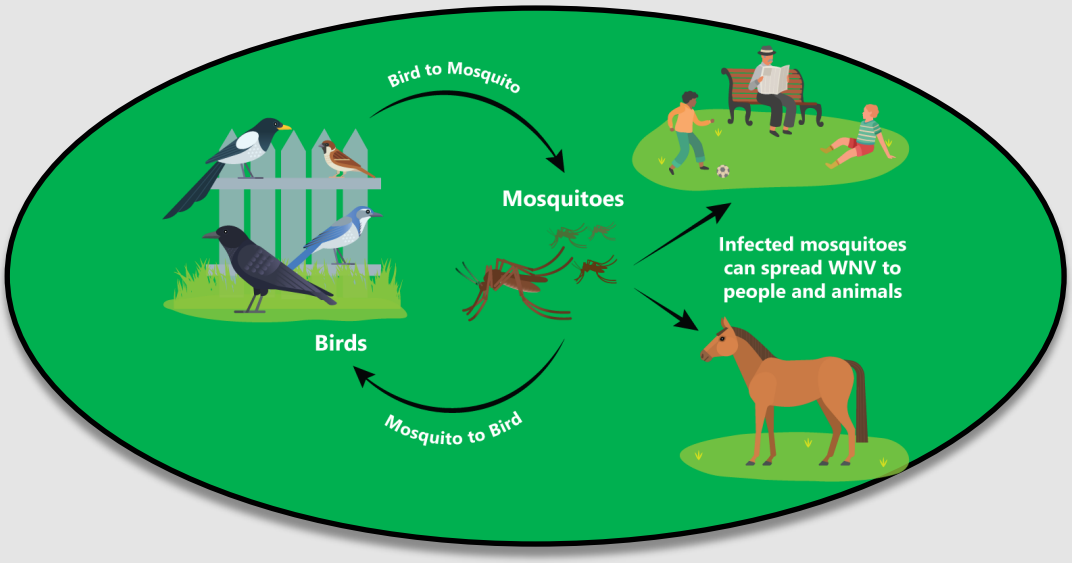
In Ventura County during 2021, a total of 48 dead birds were reported to the West Nile Virus dead bird hot line; 14 were collected and submitted for testing; 1 (7%) tested positive for West Nile Virus.

Throughout the state, a total of 5,224 dead birds were reported to CDPH; 1,755 were tested, and 210 (12%) were positive for West Nile Virus.



Help Monitor for West Nile Virus

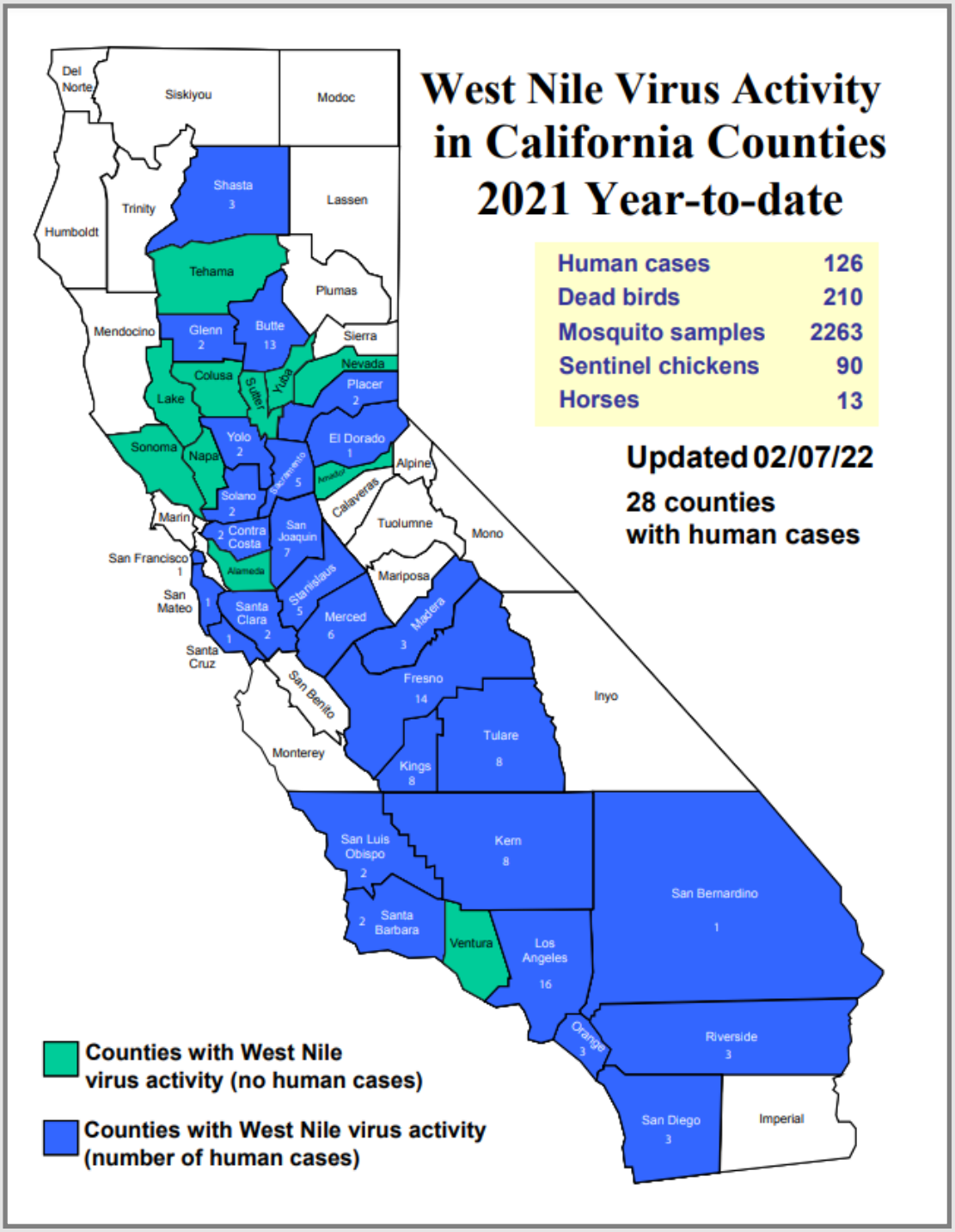
Report recently deceased birds to **877-WNV-BIRD** or submit a report online at westnile.ca.gov .



INCIDENCE OF WEST NILE VIRUS AND ENCEPHALITIS

In 2021, there were no confirmed human cases of West Nile Virus in Ventura County. Statewide, there were 126 human cases reported during the year, resulting in 13 fatalities. In the State, there were 13 West Nile Virus equine cases. There were no West Nile Virus equine cases reported in Ventura County.

During 2021, there were 4 human cases of Saint Louis Encephalitis statewide.



PLAGUE SURVEILLANCE

Plague is a highly infections 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.

Some of the rodent species found in California that are sampled to evaluate plague activity.

Top row, from left to right:

- **Yellow-pine chipmunk (*Tamias amoenus)***
- **California ground squirrels (*Otospermophilus beecheyi)***
- **Douglas squirrel (*Tamiasciurus douglasii)***

Bottom row, from left to right:

- **Golden-mantled ground squirrel (*Callospermophilus lateralis)***
- **Dusky-footed woodrat (*Neotoma fuscipes)***
- **Belding's ground squirrel (*Urocitellus beldingi)***

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, these areas 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 2021 there were no human cases of Hantavirus infection reported within Ventura County. At the time this report was posted statewide numbers were preliminary and there was 1 confirmed case of Hantavirus being reported statewide in 2021.

Deer mice, *Peromyscus maniculatus*, are the primary reservoir of *Sin Nombre* virus.

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 doubled 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 was reporting 69 confirmed, 23 probable, and 4 suspect cases of Lyme disease in California in 2021, and 3 confirmed and 2 probable cases in Ventura County.

Tick flagging.

Tick Collections	Potrero John Trail 2/10/2021	Rose Valley Falls 2/10/2021	Cozy Dell Trail 2/24/2021	Arnold Rd Wetland 12/20/2021	Sycamore Canyon 12/20/2021
Ixodes pacificus	58	6	2	0	0
Dermacentor occidentals	36	0	158	0	9
Total	94	6	160	0	9

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 2021, Ventura County EHD, along with CDPH, performed 5 tick collection surveys ("flaggings") 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 2021.

Here are some things you can do to avoid ticks!

- Avoid trail margins, brush, and grassy areas when in tick country.
- Wear light-colored clothing so ticks can easily be seen.
- Tuck pants into boots or socks, and shirt into pants.
- Apply insect repellent registered for use against ticks on pants, socks, and shoes.
- Check yourself, your children, and pets frequently.
- Mow grass along buildings and footpaths.
- Remove brush in areas of high human activity.

PUBLIC INFORMATION

The Division also provides the following fact sheets concerning vector control topics. These are downloadable and made available for reproduction, they can also be accessed at the Division website: https://vcrma.org/vector-control-program

- West Nile Virus
- Rodents and Hantavirus Brochure (English version)
- Rodents and Hantavirus Brochure (Spanish version)
- Lyme Disease in California (English version)
- Lyme Disease in California (Spanish version)
- Facts About Plague

Prevent and Control Rats webpage:
https://vcrma.org/prevent-and-control-rats

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/

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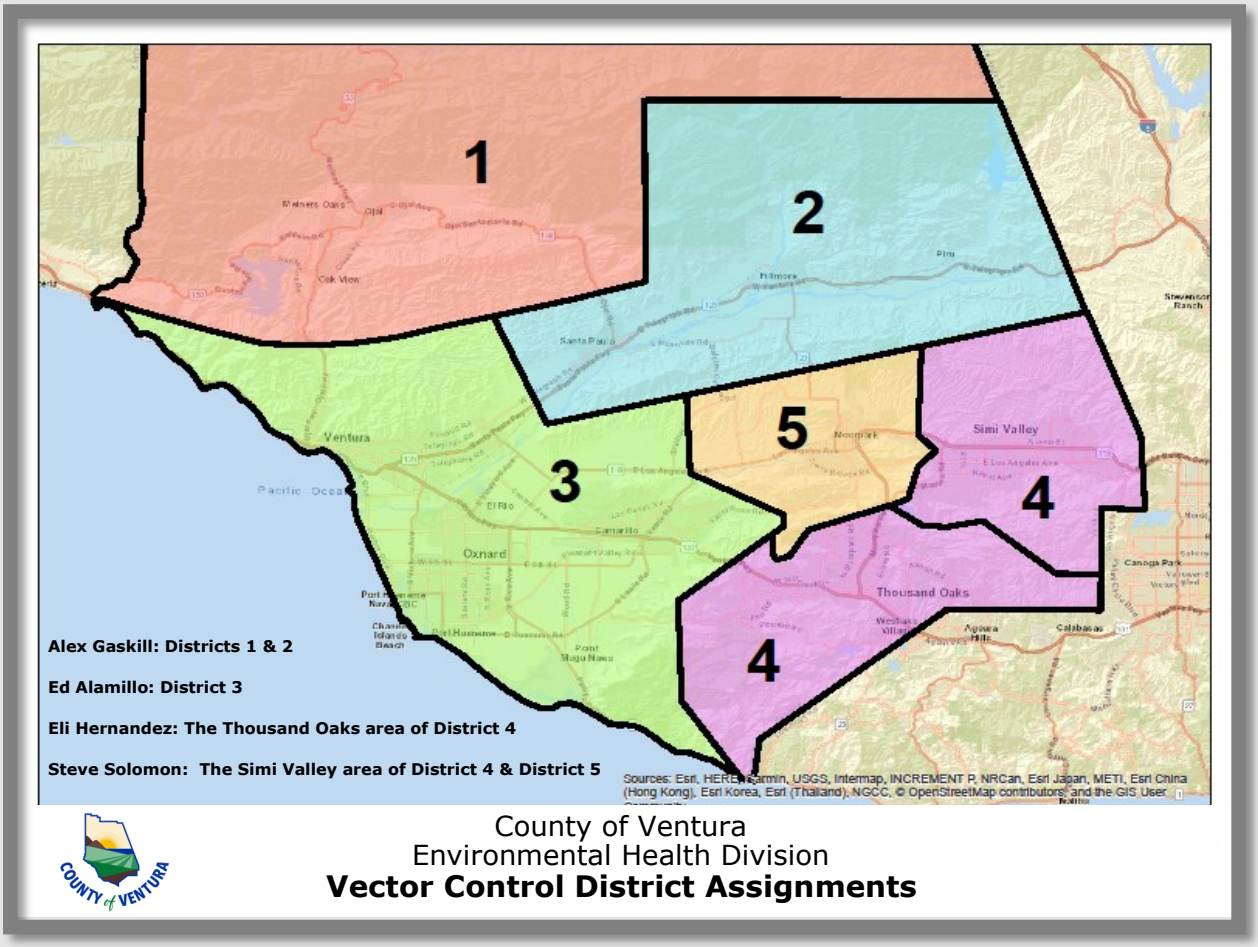

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