2016 ARBOVIRUS SURVEILLANCE SUMMARY

Marin/Sonoma Mosquito and Vector Control District **December 2016**

Executive Summary

As of December 1, 2016, West Nile virus (WNV) has been detected in 13 dead birds and 2 mosquito samples in the counties of Sonoma and Marin in 2016. There have been no human cases of West Nile virus reported from Marin or Sonoma County in 2016.

As of December 9, 2016, the California Department of Public Health (CDPH) has reported a total of 8 Marin County and 11 Sonoma County travel-associated cases of Zika virus in 2015 and 2016. No mosquitoes trapped from the vicinity of these human cases tested positive for Zika or any other mosquito-borne viruses.

Year	Humans	Dead Birds	Mosquito Pools	Sentinel Chickens
2004	0	72	1	0
2005	1	92	0	0
2006	1	29	5	3
2007	1	23	1	0
2008	0	12	2	0
2009	0	Not Tested	0	0
2010	0	Not Tested	0	0
2011	0	Not Tested	2	0
2012	0	28	3	1
2013	2	46	5	3
2014	0	43	12	3
2015	1	14	12	0
2016	0	13	2	Not Tested

Marin/Sonoma WNV Detections, 2004-2016

Program Objectives

The Marin/Sonoma Mosquito and Vector Control District (the District) maintains an active surveillance program for endemic arboviruses, including WNV. The District takes a multifaceted approach, utilizing both active (mosquito trapping) and passive (dead bird and human case reports) monitoring techniques to detect and quantify the intensity of virus transmission in local areas. This information is then used to predict areas of elevated disease risk, allowing the District to direct critical vector control interventions to effectively protect human health.

In 2016, the District enhanced invasive mosquito surveillance efforts to meet the dual threats of increasing detections of travel-related Zika virus cases and growing regions of invasive *Aedes* mosquito species infestations statewide. In addition to conducting routine larval and adult surveillance for invasive mosquito species, the District also investigates local areas that may be affected by travel-related Zika cases and tests any potential vector species present in these areas for Zika, dengue, and chikungunya viruses.

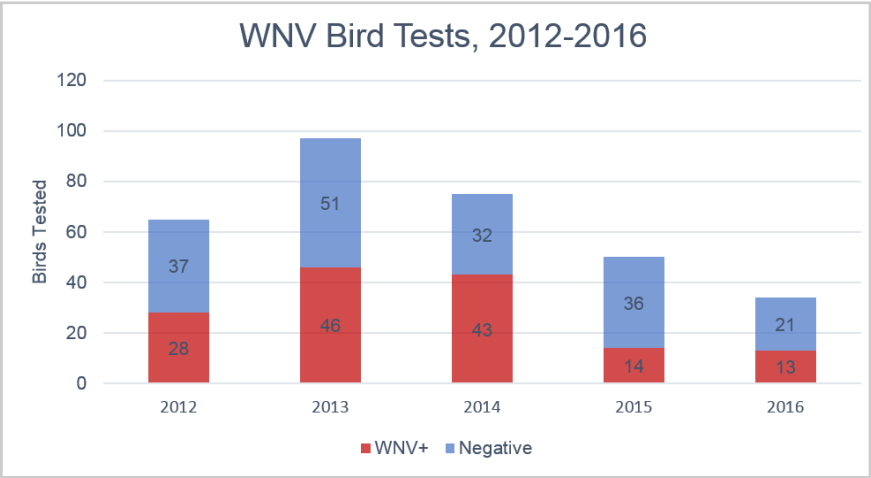
2016 WNV Surveillance

13 WNV+ Dead Birds

2 WNV+ Mosquito Pools

- WNV detected in birds from 6 cities (pg. 2)
- WNV detections in two local mosquito species (pg. 3)
- No human cases in Marin or Sonoma Counties in 2016

WNV Detections in Dead Birds and Mosquitoes, 2016

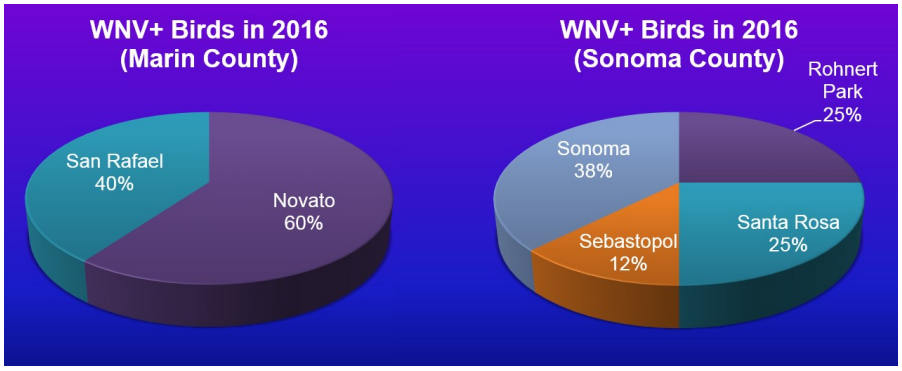


WNV test results of birds from Marin and Sonoma Counties (combined), 2012-2015

Dead Bird Surveillance

In 2016, 45 dead birds were collected from Marin and Sonoma Counties. Of these, 34 were suitable for testing, with 13 testing positive for WNV. The number of dead birds processed was lower than in the prior year, but a higher percentage of those tested were found to be positive for WNV in 2016. Notably, there were no WNV+ birds collected from Cloverdale this year; in 2015 there were two.

County	Processed Birds	Tested Birds	WNV+ Birds	% Tests Positive
Marin	16	10	5	50%
Sonoma	29	24	8	33%
Total	45	34	13	38%



City	Processed	Tested	WNV+
Corte Madera	1	1	
Greenbrae	1		
Larkspur	1		
Novato	6	4	3
San Rafael	6	4	2
Tiburon	1	1	
Marin Total:	16	10	5

Marin County Birds in 2016

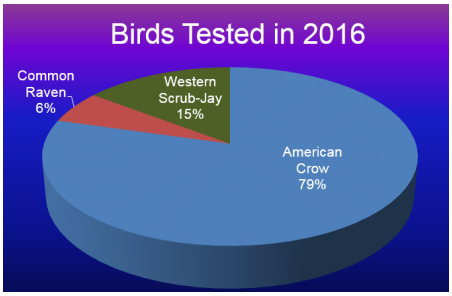
City	Processed	Tested	WNV+
Cotati	1		
Glen Ellen	1	1	
Petaluma	1	1	
Rohnert Park	7	6	2
Santa Rosa	11	10	2
Sebastopol	2	1	1
Sonoma	5	4	3
Windsor	1	1	
Sonoma Total:	29	24	8

Sonoma County Birds in 2016

WNV Testing:

Dead Birds

The District looks for WNV in birds from the family Corvidae, which includes American crows, common ravens, Western scrub-jays, and Steller's jays. Corvids are an important surveillance tool because they are more susceptible to WNV than other bird species.



While scrub jays are relatively easy for residents to identify due to their distinctive coloration, many black non-corvid birds are mistaken for crows or ravens. When in doubt, the District encourages anyone finding a dead bird to report it to the dead bird hotline (**877-WNV-BIRD**) or website (**http://westnile.ca.gov**). Both offer assistance with bird identification.

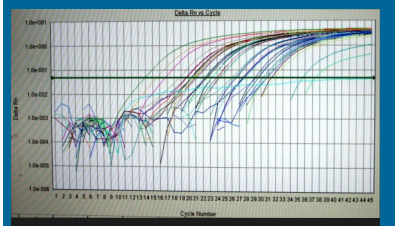
Top photo: A European Starling, which is NOT a corvid; Bottom: Common Raven (photo by Tiziano Lombardi)

WNV Testing:

Using PCR to detect viruses

District biologists identify and separate vector species of mosquitoes into testing samples, or "pools," of up to 50 mosquitoes each. These pools are sent to the Davis Arbovirus Research and Training (DART) laboratory to be tested for multiple viruses using a molecular technique called PCR, or polymerase chain reaction.

PCR testing can detect and quantify even a tiny amount of viral RNA in a mosquito, bird, or other specimen.



District PCR test result screen

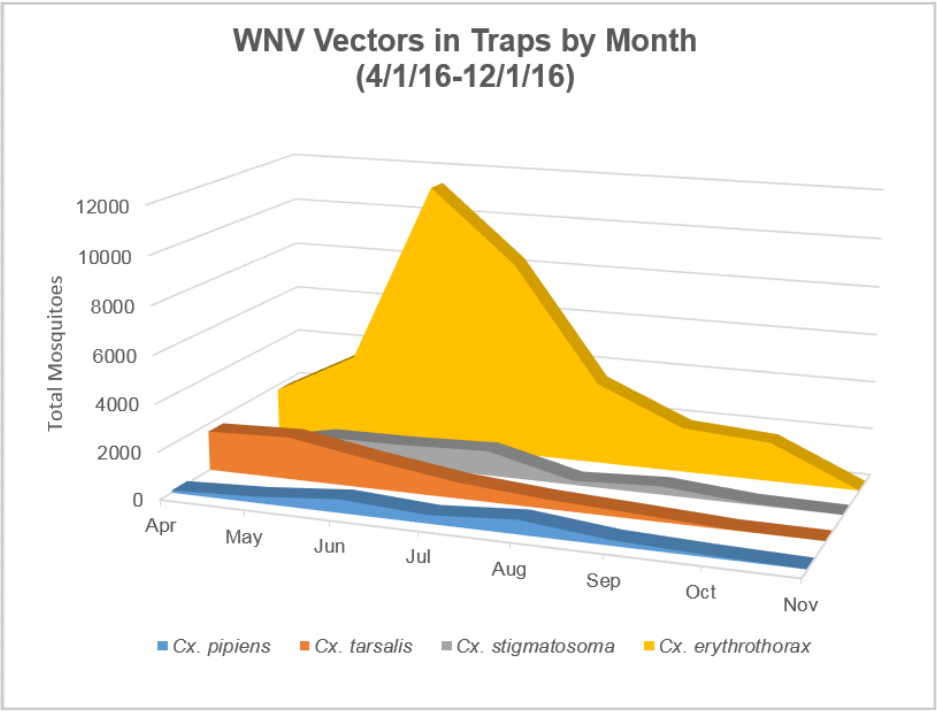
In 2015 & 2016, mosquitoes and chickens in some parts of Southern California tested positive for St. Louis encephalitis virus (SLEV). SLEV has historically caused periodic epidemics in the U.S, but had not been detected in California since 2003, when it seemingly was displaced by WNV. Prospective disease surveillance using techniques such as PCR testing can detect the resurgence of such viruses in the environment and may provide an early warning for future outbreaks.

Pools of *Culex erythothorax* (left) and *Cx. stigmatosoma* (right) tested positive for WNV in 2016. These mosquitoes feed primarily on birds and can amplify virus in the environment.

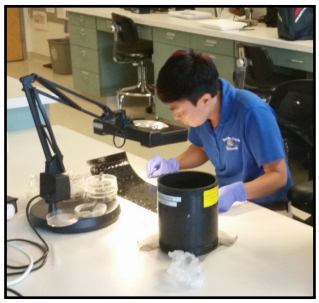
Mosquito Surveillance

In 2016, District biologists identified and counted adult mosquitoes collected from more than 1,800 traps set by laboratory and field staff. Over 16,700 mosquitoes were sent to DART for virus testing. Two mosquito samples tested positive from Petaluma, in Sonoma County. No WNV detections were made in Marin County mosquitoes in 2016.

To monitor for West Nile virus, St. Louis encephalitis virus, and Western Equine Encephalitis virus (WEEV), the district tests adult *Culex pipiens, Cx. tarsalis, Cx. erythrothorax,* and *Cx. stigmatosoma* mosquitoes. While *Cx. pipiens* and *Cx. tarsalis* are the main vectors for transmission of these viruses to humans, *Cx.* erythrothorax and *Cx. stigmatosoma* play important roles in amplifying these viruses in animal host populations in the environment. *Culex erythrothorax* is of particular concern to the District due to the extremely high populations found in bird-rich habitats during the warm summer months.



Monitoring for invasive *Aedes* mosquitoes in Marin and Sonoma Counties



In addition to seasonally monitoring for diseases with a history of local transmission in California such as WNV, the District conducts targeted invasive mosquito species detection efforts within Marin and Sonoma counties. This surveillance effort uses the kinds of traps that have been proven to be the most effective in detecting *Aedes aegypti* and *Ae. albopictus,* which typically fly close to the ground. One of these traps contains lures that attract female mosquitoes searching for a host, while the other attracts females looking for a place to lay their eggs.

Traps are set in areas similar to locations where these invasive mosquitoes have been detected in other parts of the state. Some examples of sites where we conduct our surveillance are cemeteries, construction equipment storage areas and importers of Asian pottery, where these container-breeding mosquitoes typically thrive. Our goal is to expand our surveillance to include more locations that attract tourists, who may accidentally introduce these people-loving mosquitoes to our area.

A total of 455 invasive *Aedes*-targeted trap collections were made from 24 sites in Marin and Sonoma counties in 2016. Although several species of local mosquitos were found in these traps, not a single *Ae. aegypti* or *Ae. albopictus* mosquito was collected.

Seasonal lab technicians bring in daily collections from a variety of mosquito traps (left); These are sorted and identified by District biologists (above).

Zika and other imported diseases in Marin and Sonoma

In 2016 to date there have been 8 confirmed cases of Zika in Marin County and 11 cases in Sonoma County. All cases are related to international travel, and there is currently no indication of local Zika virus risk. However, in an abundance of caution, the District works with county health departments to minimize the threat of local transmission.

Upon being notified of a local resident with a confirmed or probable Zika virus diagnosis by a county public health agency, the District conducts enhanced mosquito surveillance in the area around the case. This is to ascertain that there are no vector mosquito species (invasive *Aedes*) or potential breeding sites present, and to assess whether there are high levels of other mosquito species in the area. Although *Ae. aegypti* and *Ae. albopictus* are the only currently known mosquito vectors, research is still ongoing to determine whether any of our local mosquito species can carry the Zika virus. Any candidate mosquitoes trapped from the area are identified and sent to DART to be tested for Zika virus, as well as for Chikungunya and Dengue (CDZ test). In 2016, 36 *Culex* mosquitoes trapped from three cities were tested for CDZ; all were found negative.

When reported, the District will also conduct targeted surveillance around travel-related Dengue virus and Chikungunya cases in Marin and Sonoma Counties, as these diseases are vectored by the same species of invasive *Aedes* mosquitoes.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016 (to date)
Marin	0	0	0	0	1	0	0	4	1	1	4
Sonoma	0	1	0	1	2	0	3	3	5	0	5

Travel-related Cases of Dengue in Marin and Sonoma Counties, 2006-2016 (year-to-date)

Contact Us

For more information about our services and programs:

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Visit us on the web at www.msmosquito.com