



COVER PHOTO BY CLAUDINE GOSSETT

Learn how the
**Marin/Sonoma Mosquito
and Vector Control District**
is protecting you from mosquitoes
and vector-borne diseases—
and how you can help

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A Century-plus of Mosquito Protection

The District helps **residents control** disease-carrying insects

BY DEBBIE ARRINGTON

Public-minded residents have always been on the front line of local mosquito control. It's a healthy tradition that stretches back more than a century.

"In the early 1900s, the San Rafael area was almost unlivable because of huge black clouds of salt-marsh mosquitoes," explains Phil Smith, the District Manager of the Marin/Sonoma Mosquito and Vector Control District.

Swarms of mosquitoes bred in the swampy marshland that surrounds San Francisco Bay. People wore head nets to ride the ferry or venture outdoors. Businesses used smudge pots outside doorways to try and ward off these biters.

The San Rafael Improvement Club, primarily led by women, was formed to combat mosquitoes and raise awareness of the problems mosquitoes cause. These insects are not just annoying, they can carry deadly disease. The club's efforts eventually led to the passage of California's Mosquito Abatement Act of 1915 and the formation that same year of what's now the Marin/Sonoma Mosquito and Vector Control District, the state's first district of its kind.

Now serving all of Marin and Sonoma counties, the District is "an integral and essential part of maintaining good health and welfare," Smith says. "We work closely with municipalities and state and federal agencies to control mosquito populations and test for mosquito-borne diseases."

Through surveillance, trapping and testing, the District monitors the counties' wetlands and wild areas as well as cities and suburbs, taking action when necessary. In addition to

native mosquitoes, such as the *Culex* species that can spread West Nile virus, the District is on the lookout for invasive mosquitoes, which are spreading rapidly in California. These species, *Aedes aegypti* and *Aedes albopictus*, have the potential to transmit several viruses, including dengue, chikungunya, Zika and yellow fever.

We're neighborhood mosquito detectives. We often find they're not coming from the property where they were first reported, but from elsewhere in the neighborhood. Our technicians are excellent at tracking them down."

Phil Smith, Manager,
Marin/Sonoma Mosquito
and Vector Control District

abandoned swimming pools. District experts are just a phone call away."

"Our technicians are excellent ambassadors for vector control," Smith says. "We're here to help. We do our best. We're very user friendly."



The District traps and tests in cities, suburbs, wetlands and wild areas.
PHOTO BY CLAUDINE GOSSETT

Pennies a day TO FIGHT THE BITE

Since 1915, the Marin/Sonoma Mosquito and Vector Control District has protected residents and visitors to Marin and Sonoma counties from mosquitoes and other vectors that carry disease. It is funded by property taxes and assessments and services are provided at no additional cost to residents. The District serves:

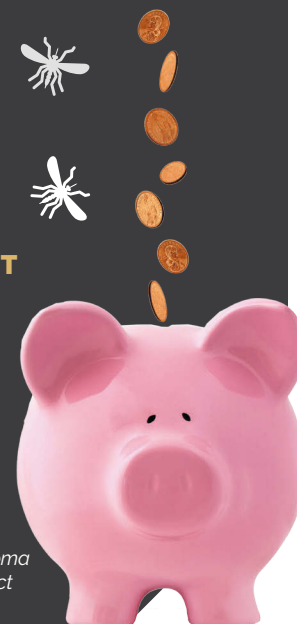
2,300
SQUARE MILES

763,000
RESIDENTS

AVERAGE YEARLY COST PER HOUSEHOLD*:
\$25

THAT'S PROTECTION FOR LESS THAN 7¢ PER DAY

*Single family. Source: Marin/Sonoma Mosquito and Vector Control District



The Science

Learn how the District uses **cutting edge techniques** to monitor our area

BY WHIP VILLARREAL

For the Marin/Sonoma Mosquito and Vector Control District, monitoring 2,300 square miles and thousands of active mosquito breeding grounds, with a relatively small staff, can be challenging, but the work is critical.

“We acquire mosquito samples daily and they are identified each morning down to the species. This provides data which is used to inform our responses and control operations,” says Erik Hawk, Assistant Manager with the Marin/Sonoma Mosquito and Vector Control District. “We currently have 23 mosquito species in our two counties and their life cycles have different attributes and seasonality. Conducting surveillance and understanding what stage of the life cycle they are in is key for our planning and control efforts.”

Each week from April through October, the District sets and retrieves multiple adult mosquito traps around Marin and Sonoma counties. A common trap that is deployed, called an EVS trap, uses dry ice to mimic carbon dioxide exhaled from humans and animals, and light to attract egg-laying female

mosquitoes. Another trap is called a gravid trap, which uses nutrient-rich water to attract females.

These traps are set throughout Marin and Sonoma counties in areas that are known hotspots for adult mosquitoes. Traps can be set on stands, in trees or placed on the ground. Once retrieved, suitable mosquitoes can be tested at UC Davis to determine if they are carrying diseases like West Nile virus. Traps are also set in other strategic areas within the District to look at the distribution and abundance of mosquito populations.

The District forms its strategic mitigation efforts based on what the surveillance results yield. The data also helps the biologists understand what species are thriving and the potential for transmission of diseases they may carry. The District continuously researches and evaluates new equipment to improve its surveillance program.

Once mosquito samples are retrieved, they are sent to UC Davis for virus testing.
PHOTOS BY CLAUDINE GOSSETT



DID YOU KNOW?

The District utilizes a type of snowcat normally used at ski resorts that has been modified to work in warmer and muddy types of terrain. This vehicle, with an attached rotary ditcher, is used for mosquito habitat reduction and wildlife habitat enhancement and restoration in marshes within Marin and Sonoma counties.

Erik Hawk, the District's Assistant Manager, explains that with high tides generally 6 feet and above, these marshes get inundated with water and when it recedes, some water is trapped and becomes prime breeding grounds for mosquitoes. Not only does cleaning water circulation channels control mosquito populations, it also benefits the natural habitat and helps plants and animals rebound in these areas.

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Erik Hawk, Assistant Manager, Marin/Sonoma Mosquito and Vector Control District



Defend Your Home

Be aware of **potential problems** around your house and yard

BY ANNE STOKES

Backyards are the No. 1 source for mosquito production. Anything that can hold water for more than five to seven days has the ability to produce mosquitoes. However, mosquitoes aren't the only things that can be found lurking around your yard. Rats can be, too! Use this checklist to help identify areas that could be producing mosquitoes or attracting rodents to your home.

To help keep mosquito populations at bay, it's important to **keep an eye out for any standing water**, even in small amounts. Be sure to empty, clean, seal or remove common offenders such as:

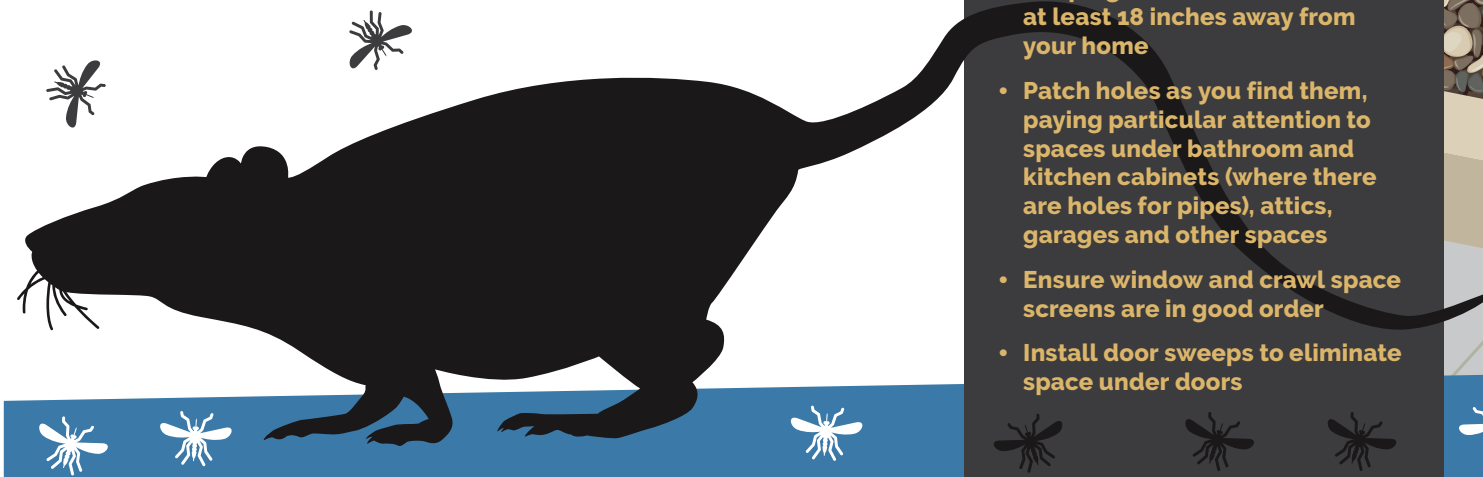
- | | |
|--|---|
| 1 Neglected pools and ponds | 6 Yard clutter such as children's toys, trash or tires |
| 2 Buckets and barrels, including improperly sealed rainwater conservation units | 7 Inadequately sealed septic tanks |
| 3 Flower pot saucers | 8 Bird baths and fountains |
| 4 Clogged roof gutters | 9 Yard drains |
| 5 Tarps | |

Keeping rodent populations under control is also an important consideration when maintaining your yard. Rats are attracted to:

- 10** Bird feeders, including excess feed in chicken coops
- 11** Pet food
- 12** Unsealed compost bins
- 13** Fruit trees
- 14** Dog feces
- 15** Overgrown vegetation, such as ivy, which creates cover and travel corridors

Prevent rats and mice from getting into your home by:

- Cutting tree limbs at least 4 feet away from your house to keep rodents from leaping from trees onto your roof
- Keeping stacked firewood at least 18 inches away from your home
- Patch holes as you find them, paying particular attention to spaces under bathroom and kitchen cabinets (where there are holes for pipes), attics, garages and other spaces
- Ensure window and crawl space screens are in good order
- Install door sweeps to eliminate space under doors





The Rodent Factor



Discover the **nontoxic** ways the District can help you **prevent infestation** on your property

BY KATHLEEN VIVALDI

Let's be honest, talking about rodents is not typically a hot topic—until they become a major problem. By taking steps to prevent this vermin, you can avoid the need for costly repairs, reduce the risk of disease transmission and ensure a comfortable living space. Having knowledge and support is key!

This is where Marin/Sonoma Mosquito and Vector Control District comes in. The District offers rodent inspections to residents of Marin and Sonoma counties. District staff attempt to locate rodent entrance points into structures, identify sources of harborage, determine the rodent species that are present and provide recommendations to residents on how to make their property less attractive to rodents.

The District's Rodent Control Specialist Tony Russo says, "My job is to provide residents with the knowledge necessary to manage rodent infestations and prevent the potential spread of disease associated with rodents."

How is this done? The District encourages a five-step approach to help maintain long-term management and keep rodents away:

1. **Recognizing an infestation—droppings, oily rub marks, gnaw marks and chewing.**
2. **Adopting practices that reduce harborage, food and water sources available to rodents.**
3. **Excluding rodents or rodent-proofing buildings**

(both interior and exterior) by sealing gaps and cutting back tree branches near roof edges.

4. **Trapping when necessary with snap or electronic traps. The District generally recommends utilizing trapping strategies for rats instead of using rodenticides.** Russo says, "Toxic baits, if used and handled improperly, can cause secondary poisoning to other animals and people. If the resident does not want to do exclusion and trapping work themselves, we recommend they call a pest control company."
5. **Cleaning.** "Rodents can spread diseases through their droppings and urine," Russo explains. "That is why once you have excluded them from your home, it is very important to thoroughly clean while taking appropriate precautions." Deep cleaning will help sanitize the area and remove any pheromones left behind by the rodents.

If you are experiencing a rodent issue, know that you are not alone, and the District is here to help! Visit www.msosquito.org/rats for more information.

Learn more about proper cleaning techniques at www.cdc.gov/healthypets/pets/wildlife/clean-up.html

“

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Tony Russo,
Rodent Control Specialist,
Marin/Sonoma Mosquito
and Vector Control District

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DID YOU KNOW

- **The two most common rats found in and around homes in Marin and Sonoma counties are:**
 1. Norway rats, also known as wharf, sewer, or brown rats
 2. Roof rats, also known as black, fruit, or ship rats
- **Male rats reach maturity at 10-12 weeks and females at eight to nine weeks.**
- **Females can get pregnant within 48 hours of giving birth and average five litters per year. A typical female will give birth to 40 babies a year.**



The Future

Find out how the District is **looking ahead**—and how you can help

BY WHIP VILLARREAL

In Sonoma and Marin counties, West Nile virus has been the predominant virus spread by mosquitoes for the last several years. Invasive *Aedes* species mosquitoes that transmit other viruses, such as dengue, yellow fever, and chikungunya, have yet to be found in the counties. However, they have been moving steadily throughout the state for the last several years and the Marin/Sonoma Mosquito and Vector Control District is actively searching for them through a targeted surveillance program.

The District is focused on finding invasive *Aedes* species mosquitoes as soon as they arrive in the counties. Laboratory staff set traps in specific areas where they suspect these new species may be found. Some of these places include garden nurseries, waterway ports, and even cemeteries. In some parts of the state, mosquito control districts have found that cemeteries have produced high populations of these invasive mosquitoes.

Residents can help to find these new invasive *Aedes* mosquitoes. “If you’re being bitten by mosquitoes, let us know,” says Dr. Kelly Liebman, Scientific Programs Manager with the District. “Many of the new detections of these species throughout the state have come from residents reporting day-time mosquito bites. It is also important to discourage mosquito breeding in and around your home.” Liebman recommends that you let the District know if you have any

contained water features that regularly hold water. The District also recommends washing out and scrubbing down the sides of water-holding containers such as bird baths once per week. The eggs of these invasive mosquitoes can survive on the sides of containers for several months, and hatch when the container is refilled. They can reproduce in tiny amounts of water, and have even been found indoors, reproducing in flower vases and other continuous water-holding containers.

Liebman adds it is not a matter of if, but when, invasive species will arrive in Marin and Sonoma counties. It is important for the District to identify them quickly in order to contain them. These species don’t fly far, so if the District knows where they are, there is the potential to contain and eradicate them.



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Kelly Liebman, Scientific Programs Manager,
Marin/Sonoma Mosquito and Vector Control District

DID YOU KNOW?

The main *Culex* species that the District tests for West Nile virus, St. Louis encephalitis virus, and western equine encephalitis virus are:

- *Culex tarsalis*
- *Culex stigmatosoma*
- *Culex pipiens*
- *Culex erythrothorax*



INVASIVE SPECIES

Aedes aegypti

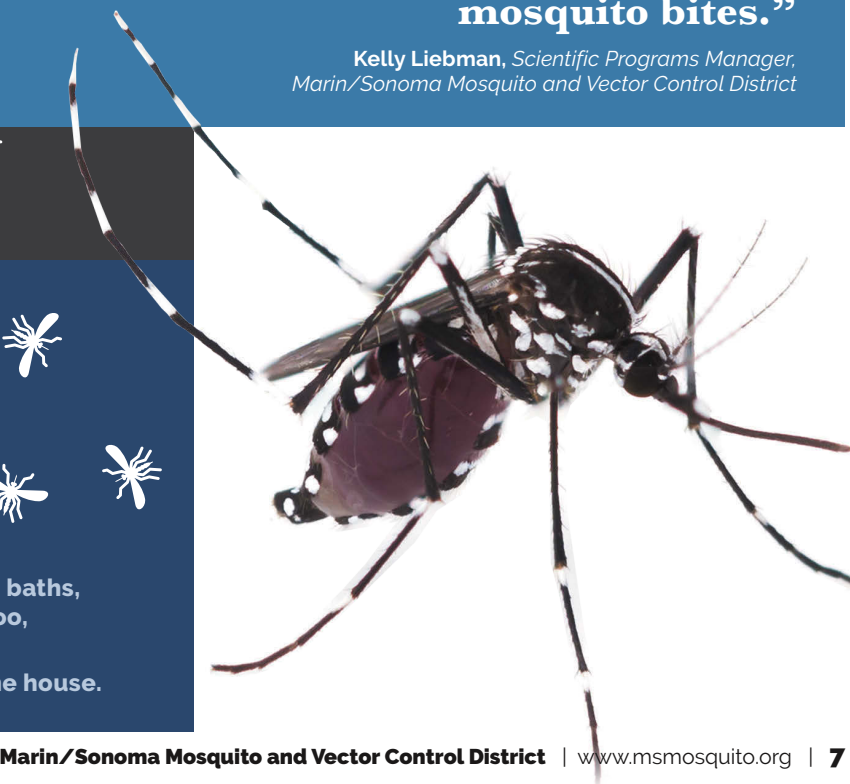
- Small black and white mosquitoes with striped legs and white-tipped palps
- Distinctive lyre shape on thorax distinguishes them from native species

Aedes albopictus

- Small black and white mosquitoes with striped legs and white-tipped palps
- Distinctive white stripe on thorax distinguishes them from native species

Where to find them:

- Eggs are laid on the side of artificial containers including tires, tin cans, bird baths, tubs, buckets, and flower pots, as well as natural containers such as bamboo, bromeliads and tree holes.
- Larvae can be found in containers/plants both outside and inside the house.



Our Mission

The Marin/Sonoma Mosquito and Vector Control District, founded in 1915, protects the health and welfare of the communities it serves from mosquitoes and vector-borne diseases by utilizing cost-effective, environmentally responsible integrated vector management practices.

DISTRICT PROGRAMS

Our programs and services are supported by property taxes and are provided at no additional charge to all residents in Marin and Sonoma counties. Our services include:

- Mosquito Control & Mosquitofish
- Ground-nesting Yellowjacket Control
- Rodent Control Advice
- Educational Presentations

WAYS YOU CAN HELP

- Limit water sources and standing water in your yard, which can attract rodents and provide an ideal habitat for mosquitoes.
- Stock permanent water features with mosquitofish. The fish are available for free from the District.
- Report neglected pools and spas in your neighborhood.
- If you are experiencing a mosquito problem, contact the District for help at 707-285-2200 or www.ms mosquito.org.



PHOTOGRAPHY BY CLAUDINE GOSSETT



Contact us **TODAY**

www.ms mosquito.org

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Cotati, CA. 94931
707-285-2200

Office Hours: M-F,
7:00 a.m.-3:30 p.m.
(Closed 11:30-12:30 p.m.
daily for lunch)