

## HOW DO WE PROTECT YOU?

The Marin/Sonoma Mosquito and Vector Control District is aware of the impact high populations of treehole mosquitoes can have on the public. Some of the things we do to manage treehole mosquito populations are:

- Support research that is designed to identify more efficient control methods.
- Conduct adult mosquito surveillance to monitor mosquito population levels and help direct control operations.
- Engage in community-wide efforts to reduce adult mosquito abundance.
- Conduct outreach to educate the public about mosquitoes and mosquito-borne disease.

## WHAT CAN YOU DO?

Ways you can control treehole mosquitoes on your property are:

- Inspect trees for holes, including holes as small as ½" that lead to cavities that may hold water. Contact a licensed arborist to discuss appropriate measures to remove or prevent water from accumulating in treeholes.
- Remove buckets, toys, tarps or other items holding water.
- Check your gutters for clogs and standing water.
- Contact the District for help inspecting your property and identifying problem areas; where appropriate, an adulticide may be applied to reduce numbers of adult mosquitoes.
- For temporary relief from treehole mosquitoes in your backyard, try using one or more oscillating fans pointed away from seating areas. Treehole mosquitoes are weak flyers and have difficulty flying against the wind generated by the fans.

## THE MOSQUITO LIFE CYCLE

All mosquitoes have four distinct developmental stages: egg, larva, pupa and adult. Depending on the species, a female mosquito will either lay her eggs in the form of an egg raft, in clusters, or singularly.

### EGGS

The adult treehole female deposits eggs individually on the damp sides of the treehole. The eggs remain dormant until the treehole fills with enough water to flood the eggs, usually the following spring.



### LARVA

The larva comes to the surface to breathe through a tube called a siphon. It feeds on micro-organisms and organic matter in the water. In a matter of days the larva will molt (shed its skin) four times. On the fourth molt it will change into a pupa.



### PUPA

The pupa cannot eat. It breathes through two tubes on its back. The adult mosquito grows inside the pupal casing and within a few days, when it is fully developed, it will split the casing and emerge as an adult mosquito.



### ADULT

The newly emerged adult rests on the surface of the water until it is strong enough to fly away and feed.



## 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.

## OUR SERVICES

Our programs and services are funded through property taxes and benefit assessments and are provided at no additional cost to all residents of Marin and Sonoma counties.



**Marin/Sonoma Mosquito  
& Vector Control District**

595 Helman Lane

Cotati, CA 94931

Monday through Friday

7:00am to 3:30pm

707.285.2200

[www.ms mosquito.org](http://www.ms mosquito.org)



# TREEHOLE MOSQUITOES AND DOG HEARTWORM



PROTECTING PUBLIC HEALTH SINCE 1915



# HAVE YOU NOTICED MORE MOSQUITOES LATELY?

Warmer weather and longer days in Marin and Sonoma counties trigger the emergence of treehole mosquitoes (*Aedes sierrensis*), a common mosquito and the most important vector of canine (dog) heartworm.

Treehole mosquitoes are widely distributed in western North America from Mexico to British Columbia, and throughout California. Adult mosquitoes of this species are characteristically very small, dark insects with brilliant white bands on their legs. They can live up to six months, and are active from early spring through the summer, when they often appear as swarming white spots.

## WHERE TREEHOLE MOSQUITOES DEVELOP

The treehole mosquito life cycle is centered around standing water that accumulates in holes in the trunks and branches of trees, or in artificial containers and tires. A wide variety of trees are commonly used by treehole mosquitoes, with oaks, bay, walnut and eucalyptus being the most common due to the high tannin levels.



Identify treeholes and other sources that hold water and eliminate or treat the water to prevent adult mosquitoes.

Treehole mosquito larvae can also be found in discarded tires or containers where plant debris and leaves have accumulated. The eggs remain dormant until the cavity or container is filled with water by rain or irrigation.

Female mosquitoes can lay 200 to 300 eggs on the damp surface of a treehole or container just above the water line. When the treehole or container is filled with water the eggs hatch, producing larvae which develop into pupae as temperatures become warm enough to support adult mosquito activity. A few days later, adult mosquitoes emerge. Female mosquitoes will then seek a blood meal, mate, and return to a suitable water-filled treehole or container to continue the cycle.

## ADULT MOSQUITO BEHAVIOR

The mating behavior of treehole mosquitoes is unlike other mosquitoes you may encounter. Generally, adult males emerge about two weeks before the females. They feed on nectar or other plant juices, and then form “mating swarms” around mammals, including humans. Once the female mosquitoes hatch, they unknowingly enter the mating swarms while looking for a blood meal from a human or other mammal.

When people encounter the male mating swarms in the early spring they may feel they are being attacked; however, male mosquitoes do not bite. After emergence of the female mosquitoes, aggressive biting is possible. In years where summer rain occurs, it is possible to have treehole mosquitoes present later in the year.

Visitors to parks, open space and other areas with mature trees and orchards during peak treehole mosquito season need to take personal protection measures, as aggressive mosquito activity can occur. Personal protection measures against mosquito bites include applying an effective repellent and wearing long sleeves and long pants.

# CAN TREEHOLE MOSQUITOES TRANSMIT DISEASE?

Treehole mosquitoes are not known to commonly transmit pathogens or disease to humans, but due to their aggressive biting secondary infections may occur. These mosquitoes, however, are the primary vector of the parasite that causes heartworm (*Dirofilaria immitis*) in dogs and cats.

**Treehole mosquitoes are unlikely to transmit West Nile virus.**

## TREEHOLE MOSQUITOES AND DOG HEARTWORM

The treehole mosquito is the primary vector of dog heartworm (*Dirofilaria immitis*) in Marin and Sonoma counties. Treehole mosquitoes become infected when they feed on dogs or coyotes that harbor the heartworm parasite.

Once the mosquito has become infected, it can transmit the parasite to other animals. There are medications available that can prevent the infection of dog heartworm.

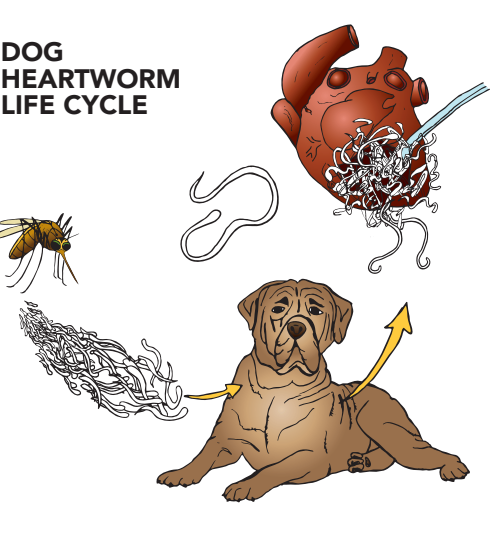
Contact your veterinarian for more information about preventing dog heartworm.

## HOW IS HEARTWORM TRANSMITTED TO YOUR DOG?

When an infected mosquito feeds, the heartworm larvae drop out of the mosquito’s mouth parts and enter the animal through the puncture wound.

The heartworm larvae live in the subcutaneous tissue for an average of two months before migrating to the dog’s lungs and pulmonary artery of the heart where they multiply.

# KEEP YOUR DOG HAPPY AND HEALTHY WITH REGULAR HEARTWORM CHECKS



## HEARTWORM SYMPTOMS

Symptoms may vary from animal to animal. Generally, in the early stages of infection the dog will appear to be healthy. Symptoms begin to show as the disease progresses, usually in the advanced stages.

### EARLY STAGE

- Usually no symptoms

### ADVANCED STAGE

- Chronic cough
- Swelling
- Lethargy
- Jaundice
- Respiratory distress