

MOSQUITOES:

HOW YOU CAN HELP FIGHT THE BITE



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Life Cycle of the MOSQUITO

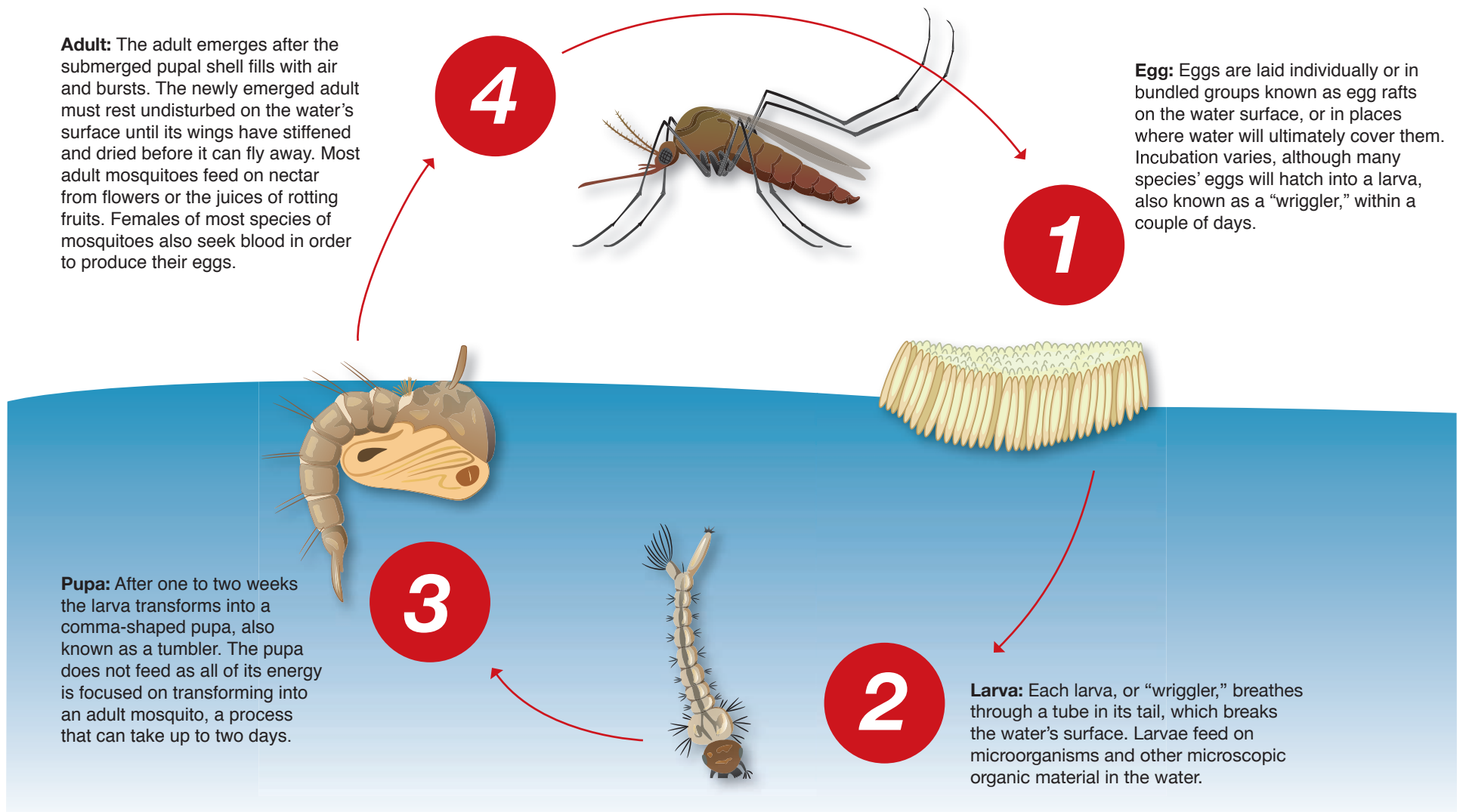
THE MORE YOU KNOW, THE EASIER THEY ARE TO CONTROL

Adult: The adult emerges after the submerged pupal shell fills with air and bursts. The newly emerged adult must rest undisturbed on the water's surface until its wings have stiffened and dried before it can fly away. Most adult mosquitoes feed on nectar from flowers or the juices of rotting fruits. Females of most species of mosquitoes also seek blood in order to produce their eggs.

Egg: Eggs are laid individually or in bundled groups known as egg rafts on the water surface, or in places where water will ultimately cover them. Incubation varies, although many species' eggs will hatch into a larva, also known as a "wiggler," within a couple of days.

Larva: Each larva, or "wiggler," breathes through a tube in its tail, which breaks the water's surface. Larvae feed on microorganisms and other microscopic organic material in the water.

Pupa: After one to two weeks the larva transforms into a comma-shaped pupa, also known as a tumbler. The pupa does not feed as all of its energy is focused on transforming into an adult mosquito, a process that can take up to two days.



Frequent fliers: Common mosquitoes around the residential home

Banded Foul Water Mosquito (*Culex stigmatosoma*)

Commonly found breeding in water sources such as winery waste, sewage and dairy ponds. Adult females prefer to feed on birds, but they will not pass up a human blood meal. This mosquito can transmit West Nile Virus.

Fish Pond Mosquito (*Culiseta incidens*)

As its name suggests, this mosquito breeds in fish ponds, ornamental water gardens, rainwater barrels, and poorly maintained swimming pools and hot tubs. Small water sources, such as buckets, cans and tires, can also serve as breeding habitat for this species of mosquito. This mosquito feeds in the evening or in shady places during the day. It is easily identified by its size, just under 1/2 inch, and its dark, spotted wings.

House Mosquito (*Culex pipiens*)

Generally an urban dweller, this mosquito can be found all year and breeds in whatever standing water it can find: flooded basements, septic tanks, utility vaults, sumps and buckets, etc. This night-feeding mosquito readily enters a home to find a blood meal. It can transmit St. Louis Encephalitis and West Nile Virus.

The INVADERS

NEW MOSQUITOES IN CALIFORNIA



Photo courtesy of CDC

Asian Tiger Mosquito

(*Aedes albopictus*)

- Native to Asia, this mosquito has been found in several southern California counties and cities
- A very aggressive biter that feeds during the day on all domestic and wild animals and humans
- A carrier of West Nile Virus, Chikungunya, Dengue Fever, Yellow Fever and Zika
- Eggs are laid in natural and artificial containers and are capable of withstanding drying for up to one year
- Recognized by the tiger-like white stripes on its black body and distinctive single white stripe along its back
- Once established, very difficult to eliminate from urban residential areas

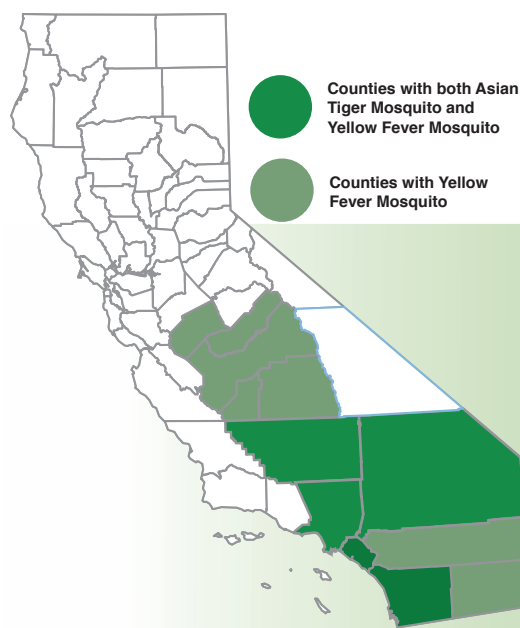


Photo courtesy of CDC

Yellow Fever Mosquito

(*Aedes aegypti*)

- Detected in at least 125 cities and 12 counties in California, including Fresno and Madera
- A very aggressive biter that feeds during the day on humans and sometimes animals
- A carrier of West Nile Virus, Chikungunya, Dengue Fever, Yellow Fever and Zika
- Prefers to lay eggs in small containers that can hold water
- Has a white, violin-shaped marking on its back
- Once established, very difficult to eliminate from urban residential areas



Why we should be concerned

These invaders are trouble. The Asian Tiger Mosquito and the Yellow Fever Mosquito have quickly adapted to California's urban environment. Any water-holding container, including discarded bottles, bottle caps and plastic bags, is prime breeding habitat. Because they have different

behavior patterns and different habitat preferences than their indigenous cousins, these invasive mosquitoes are not as easily controlled. The best way to control these mosquitoes is to manage the presence of potential habitat and standing water in and around your yard.

HAVE YOU SEEN ONE
OF THESE INVADERS?
**TRAP THE MOSQUITO
AND CONTACT
THE DISTRICT
AT 707-553-9610.**

Managing Mosquitoes AROUND YOUR HOME

USE THIS HOME & GARDEN CHECKLIST TO HELP MAKE
ACTIVITIES AROUND YOUR HOME MORE ENJOYABLE

☐ **Bird baths or fountains**

Flush out completely once a week and refill

☐ **Clogged rain gutters**

Remove leaves, dirt and debris; keep clean to maximize water flow and prevent standing water

☐ **Open boats**

Check for water inside; cover with a tight tarp

☐ **Pet dishes**

Rinse and replace water two times a week

☐ **Septic tanks**

Keep tightly sealed; make sure septic vents are properly installed and screened to prevent mosquito access

☐ **Sprinklers**

Don't over-irrigate your landscaping; excess water can provide mosquito breeding habitat

☐ **Sumps**

Design and construct to prevent standing water or screen to prevent mosquito access

☐ **Trash bins**

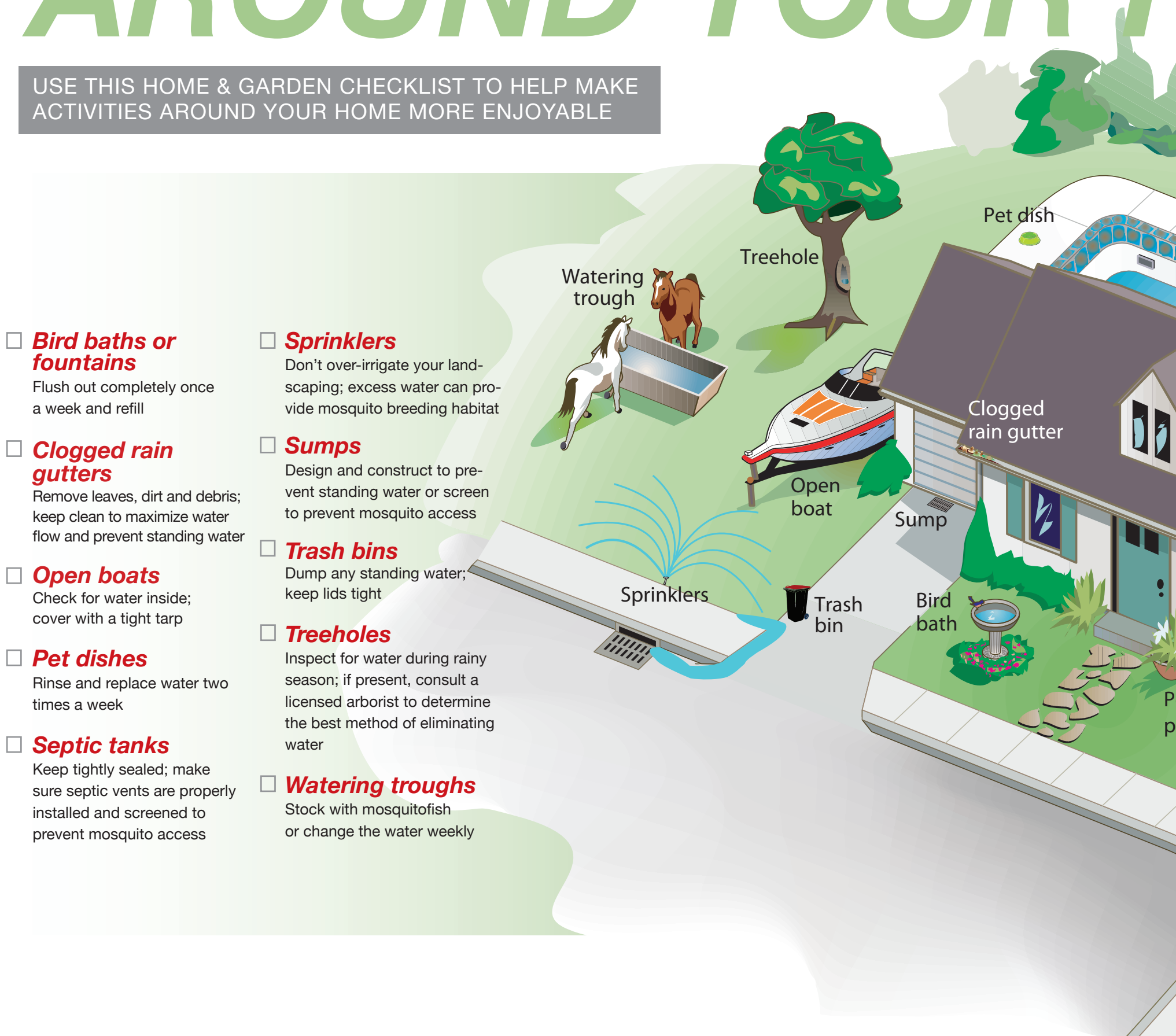
Dump any standing water; keep lids tight

☐ **Treeholes**

Inspect for water during rainy season; if present, consult a licensed arborist to determine the best method of eliminating water

☐ **Watering troughs**

Stock with mosquitofish or change the water weekly



HOME



☐ **Barbecues**
Keep properly covered

☐ **Buckets/containers**
Empty; store upside down or cover to prevent filling with water

☐ **Fish ponds**
Stock with mosquitofish; clear excess vegetation

☐ **Leaky pipes**
Drain the area; correct leaky plumbing, dripping air conditioner, etc.; **water under houses is a major source of mosquitoes in urban areas**

☐ **Pools**
Keep clean and filtered; keep water off any cover; stock with mosquitofish if no longer being maintained

☐ **Potted plants**
Flush water from saucers once a week or keep saucers filled with sand

☐ **Rainwater barrels**
Use a tight-fitting lid or mesh covering to prevent mosquito breeding or stock with mosquitofish

☐ **Spas and hot tubs**
Keep clean, filtered and heated; if no longer in use, keep empty or remove

☐ **Tarps**
Remove water that can collect after a rain

☐ **Tires**
Dispose of properly or cover so water does not collect inside; drill drainage holes in tire swings

☐ **Toys**
Remove water that collects inside and store upside down

☐ **Wheelbarrows**
Dump standing water; store upside down to prevent filling with water

NO WATER = NO MOSQUITOES

GOT TREEHOLES?

MANAGING TREEHOLE MOSQUITOES AROUND YOUR HOME OR ORCHARD

BY RODNEY OROSCO

The battle against the Western Treehole Mosquito, *Aedes sierrensis*, in Napa County has gone high tech. No, it does not involve lasers or Artificial Intelligence. It does, however, involve a water absorbent polymer (WAP).

When it comes to defeating this resilient mosquito, which can transmit Dog Heartworm, Napa County Mosquito Abatement District Manager Wes Maffei says it's helpful to know a little biology.

Immature treehole mosquitoes need water to develop, and water tends to collect in treeholes during the rainy season. These mosquitoes lay their eggs in a treehole, where they sit waiting for the winter rains to fill them with water. The water found in a treehole is perfect for immature treehole mosquitoes to develop and become adults. Even just a little will do — treehole mosquitoes can lay eggs in a treehole no bigger than your thumb.

This cycle can happen multiple times in a season.

"The first hatch in early winter results in a long slow development with the adults emerging in late March,"

Maffei says. A second adult emergence can also occur with an unusually wet spring. "In April, the developmental time is shortened, taking less than two weeks for the mosquito to develop," he says.

How does one stop this life cycle? That's where the WAP comes in.

The water absorbent polymer, the size of a BB, can absorb 200 times its weight in water, and is non-toxic. Once placed in a treehole, the polymer will absorb water, expand, and then shrink back to its original size during the dry season. Remarkably, the polymer can do this for up to four to five years.

As Napa County Mosquito Abatement Field Operations Supervisor Peter Ozorio says, "It is nifty stuff."

What excites Ozorio is the polymer eliminates the water in a treehole that is important to the development of immature treehole mosquitoes. With no water you have no mosquitoes.

The past two years the District has been using this polymer to help it in its fight to manage the Western Treehole Mosquito.

"With the polymer, we can reduce the breeding source and reduce pesticide use," Ozorio says.

Because the polymer is commonly used in potted plants, nurseries and school science projects, it can be purchased at many nurseries as well as online. Ozorio hopes more homeowners will go high tech in fighting the Western Treehole Mosquito. But first, "Check with an arborist before doing anything to your trees," he says.

Peter Ozorio fills a treehole with water absorbent polymer (shown in detail below).

PHOTO BY OWEN KAHN



**"WITH THE POLYMER,
WE CAN REDUCE THE
BREEDING SOURCE AND
REDUCE PESTICIDE USE"**

PETER OZORIO
Field Operations Supervisor



How Your District WORKS WITH YOU to Manage Mosquitoes

Napa County Mosquito Abatement District makes every effort to use the safest materials and methods available to control mosquitoes. It is the goal of the District to minimize environmental impacts by using integrated pest management (IPM) practices. This approach can prevent a mosquito from developing and minimize the use of pesticides.

INTEGRATED PEST MANAGEMENT STRATEGIES

EDUCATION



Educating the public on how to eliminate mosquito breeding sources can protect the public from mosquitoes and mosquito-borne illnesses. Education can also protect the environment by reducing the use of pesticides to control mosquitoes. Napa County Mosquito Abatement District conducts presentations for businesses, schools and community organizations on how to prevent mosquitoes in the community.

SURVEILLANCE



Regular surveillance is conducted in areas that have been identified as mosquito breeding sites — these include creeks, ditches, storm drains, marshes and tire piles. Surveillance also allows the District to monitor for invasive species and regularly test for the presence of mosquito-borne diseases like West Nile virus throughout the county.

PHYSICAL CONTROL



Physical control is one of the most effective ways the District is able to reduce mosquitoes. Once a breeding area has been discovered, District employees increase water circulation, or, when appropriate, eliminate the water source and then continue to monitor the location.

BIOLOGICAL CONTROL

Biological control involves the use of parasites, pathogens, and predators of mosquitoes to reduce mosquito populations. Certain strains of the bacterium *Bacillus sphaericus*, a pathogen, as well as mosquitofish, a predator, are currently used by the District. Both are effective biological control agents that affect larval (immature) mosquitoes. *Bacillus sphaericus*, although limited in its effectiveness, can provide short-term control for some species of mosquitoes found in freshwater habitats. The 2-inch long mosquitofish are used to provide excellent long-term mosquito control for backyard fish ponds, water gardens, rainwater barrels, and livestock watering troughs. These fish are free and can be picked up at the District.



CHEMICAL CONTROL

This is the least preferred approach and involves the application of insecticides either by hand, or by using hand cans, backpack sprayers, granular spreaders, ATVs, truck mounted spray rigs, or aircraft. The chemicals currently used by the District are *Bacillus thuringiensis* var. *israelensis* (Bti) spores, methoprene (an insect growth regulator), BVA-2 mineral oil, pyrethrin, and etofenprox. These materials do not remain long in the environment, degrading within a few hours to a couple of days.





Napa County Mosquito Abatement District has a long history of managing mosquito populations. But we can't do it alone. Managing water around your home can keep mosquito populations from getting out of control and reduce the risk of mosquito-borne illness. Together, we can keep mosquitoes and other vectors at bay.

CONTACT

Office hours: 8 a.m. to 4:30 p.m. Mon-Fri

Phone: 707-553-9610

Website: www.napamosquito.org

WHAT THE DISTRICT CAN DO FOR YOU

- Assist landowners and agencies in **eliminating mosquito sources**
- Respond to **public complaints** of mosquitoes
- Provide **mosquitofish** free of charge (April – October only)
- Monitor **mosquito populations** and mosquito-borne diseases
- Provide **control** of larval (immature) mosquitoes
- Provide **information** to the public about mosquitoes, mosquito-borne disease and other insects.
- Conduct **ground-nesting yellowjacket** control
- Provide **tick** information, identification, and disease surveillance
- Conduct **rodent** inspection and provide management advice