

Mosquitofish

The fact that fishes are valuable to mosquito control was recognized in the late 19th century. In 1905 mosquitofish were transported from their native environment to New Jersey and Hawaii and also to California in 1922. By 1923, 25 hatcheries had been established in our state and mosquitofish were made available to counties for anti-malarial mosquito control work.

Mosquitofish will eat whatever food is available to them. They consume both plant and animal life. They are also surface feeders and are attracted to sudden motion, much like a cat is. Studies have shown that a single mosquitofish can eat up to 50 mosquito larvae in a 30 minute period and a maximum of 168 in an eight hour period.

Mosquitofish bear their young alive. They can give birth to just a few fry or as many as a couple of hundred baby fish. This process can recur 3-5 times during a season, typically in the warmer months. Some female mosquitofish born early in a reproductive season may themselves produce 1 or 2 broods of fish that same season. Mosquitofish can dramatically increase in numbers in a short period of time.

The Sutter-Yuba Mosquito and Vector Control District makes use of mosquitofish in thousands of mosquito sources annually. Technicians evaluate a mosquito source based on how long they believe the particular water source will last and if the water source looks as if it will support fish life. Some typical sites where mosquitofish are used include: stock watering troughs, ditches, ornamental ponds, rice fields, sewage oxidation ponds, borrow pits, sumps, agricultural or irrigation seepage, and other areas where water will produce mosquito larvae for a long period of time.

Mosquitofish are available to residents of the district for stocking their own mosquito sources from April 1st through October 1st each year, free of charge. The fish can be picked up at 701 Bogue Road in Yuba City between the hours of 7 AM and 3 PM Monday through Friday. A small ice chest with a tight fitting lid or a similar container is necessary for fish transportation.

Property Maintenance Checklist

You can eliminate mosquitoes on your own property. Check your property for these often overlooked mosquito sources. Regularly dumping or flushing with fresh water or introducing mosquitofish will keep these sources mosquito free all season.

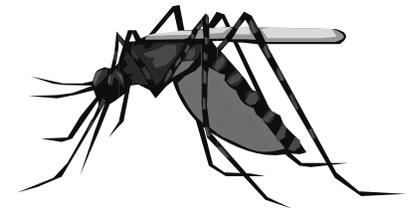
- ◆ Animal water troughs and dishes
- ◆ Birdbaths
- ◆ Uncapped metal fence posts
- ◆ Sumps or other drains
- ◆ Leaky faucets, pipes and evaporative coolers
- ◆ Burn barrels and dumpsters
- ◆ Flat roofs and clogged gutters
- ◆ Garden lighting, ornaments and sculpture
- ◆ Tires and miscellaneous containers
- ◆ Ornamental ponds
- ◆ Potted plants
- ◆ Dirty pools and spas
- ◆ Tree holes
- ◆ Wheelbarrows

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Mosquito

Life and

Biology



Mosquito Development

Mosquito development can be broken into four stages. The first stage begins when a mosquito lays her eggs. Eggs are laid in groups called rafts in some species.



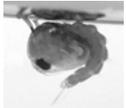
egg raft

Egg rafts are laid directly on standing water. Usually these eggs will hatch within 2-3 days. In other species, eggs are laid singly. Most species that lay their eggs singly, do so on muddy or damp soil. These eggs may lie dormant for long periods of time until the ground becomes flooded again. They hatch within minutes of being submerged. In both cases larvae are produced in the egg hatch.



The 4 larval instars (stages)

Larvae go through four instar periods. The larvae grow in each instar until they reach a size where they must shed their exoskeleton, or molt. This process repeats itself three more times. After the 4th molt, the larvae are fully developed and enter a pupal stage. In this pupal stage, the larval structures change or metamorphose into adult structures. When this change is complete, an adult mosquito will emerge from the pupal case.



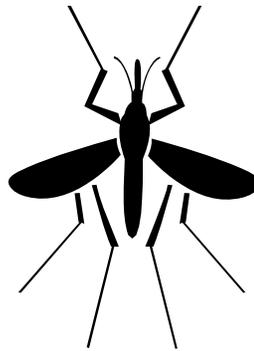
pupa

Newly emerged adults are not able to fly. Generally 12-14 hours must pass before their bodies are fully developed and capable of flight. The whole process from hatched egg to flying adult takes between 4 and 14 days. Variables such as food availability, temperature, and day length have a large influence on the time necessary for mosquito development. Most mosquitoes mate in swarms, normally at twilight. Then the female mosquito will require a bloodmeal to develop her fertilized eggs. Some autogenous species are able to develop their eggs, or sometimes their first brood of eggs, without a bloodmeal. Male mosquitoes do not have mouthparts suited for taking blood. They feed primarily on flower nectar and plant juices. Adult female mosquitoes finish the reproduction cycle by laying their eggs.

Mosquito-borne Diseases

Mosquitoes have plagued humans since prehistoric times. Specimens discovered in fossilized amber have been found intact, some containing a full bloodmeal in their gut. Surprisingly, throughout history, more people have died of mosquito-borne diseases than from any other single cause of mortality, including wars and famine. Only in the last 100 years has science been able to prove that mosquitoes can transmit important pathogens of man and animals and develop methods to intervene.

Mosquitoes are known vectors of human disease. West Nile Virus (WNV), Western Equine Encephalitis (WEE), St. Louis Encephalitis (SLE), Dengue Fever, malaria and Yellow Fever are all human diseases transmitted by mosquitoes. Even in circumstances when a mosquito-borne disease reaches epidemic levels, only a small percentage of mosquitoes will actually become infected.



The State of California utilizes mosquito abatement districts, health departments and other agencies to set up and operate mosquito-borne virus detection programs. The results of these programs give Health Department, University of California, and State government officials and Mosquito Control Districts localized information on disease presence. This allows officials to make decisions regarding mosquito abatement programs before human disease occurs. The State recognizes that only some of the many mosquito-borne diseases exist here in California. In general WEE, SLE, WNV, and malaria are considered public health threats to Californians.

Canine Heartworm

Heartworm is a serious and potentially fatal disease affecting dogs. Infections have also been reported in cats, ferrets and other animals. Mosquitoes often pick up the parasite from foxes, coyotes or wolves where the disease can run rampant. Heartworm parasites (*Dirofilaria immitis*) are then transmitted to an animal through the bite of an infected mosquito.

Canine Heartworm

After the heartworm larvae have been transmitted to a dog or other animal, the larvae develop into immature adults and travel to the arteries surrounding the heart. This process takes up to 4 months. The worms reach maturity in about 6 months. Adult worms may reach lengths of 6 - 14 inches and are usually found in the pulmonary artery near the right side of the heart and also in the lungs. Infections of several hundred worms have been reported, but this is very unusual. Infected cats have fewer and smaller worms than dogs.

At maturity, the worms may reproduce, releasing offspring called microfilaria. These pathogens can be picked up by another mosquito during a blood meal. Inside the mosquito, the microfilaria develop into larvae and can then be transmitted to another animal. This is how the infection cycle is repeated again and again.



For central California, the responsible vector is mainly the western treehole mosquito (*Aedes sierrensis*). Other mosquitoes capable of heartworm transmission include *Anopheles freeborni* and *Aedes vexans*.

Infections with just a few worms can have serious consequences. Treating an infection through your veterinarian is important for re-establishing your pet's good health. Since most pets do not exhibit symptoms in the early stages of infection, annual testing at your vet's office is the best method for insuring early detection. Adult heartworms can be destroyed through a series of injections or in an emergency, removed through surgery. There is no vaccine to prevent infections, but there are methods of prevention that are nearly 100% effective. Only your veterinarian can help you choose the right medication and prevention schedule for your pet.