The Scoop on Mosquitoes

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What reactions do you have when you hear the word "mosquito?" Does it conjure the sound of insistent buzzing in your ears? Does it make your skin crawl with the thought of itching bites? Does it fill you with concerns for human health?

I'd hazard a guess that for most of us, the answers are yes, yes, and yes. These sentiments are not without good reason. Not only are their bites itchy and irritating, but there's the risk of transmission of vector-borne diseases, such as West Nile virus and dog heartworm. In short, we all know mosquitoes are a nuisance—but how much do we really know about them?

Good mosquito habitat: a seasonal pond on the flank of White Hill. Photo by Charles Kennard

According to the Marin/Sonoma Mosquito and Vector Control District (MSMVCD), there are over 20 different types of mosquitoes across the two counties. While their prevalence changes over the year given various environmental factors such as temperature, the five most common species documented in the 2023 MSMVCD surveillance report were *Culex erythrothorax*, *Culex tarsalis*, *Culiseta inornata*, *Aedes sierrensis*, and *Aedes dorsalis*. So far, no invasive mosquitoes have been detected in Marin or Sonoma counties, but MSMVCD is on high alert for *Aedes aegypti* and *Aedes albopictus*, both of which have become established elsewhere in California and have the potential to transmit viruses such as dengue and Zika.

Mosquitoes' life cycles depend on aquatic habitats, both fresh and brackish. Eggs are laid in standing water, where they develop into larvae, then pupae, and then leave the water as adults, all over 7−10 days.

MSMVCD notes mosquitoes need as little as a half inch of water to complete their life cycle. Therefore, efforts around our backyards, such as clearing gutters, draining plant saucers, and regularly changing water in bird baths can go a long way in curtailing their breeding grounds.

Nevertheless, the aim to reduce larger areas of standing water to protect public health can become counterproductive. There are claims across the country that draining wetlands is a laudable method for controlling mosquitoes, as it reduces their habitat. However, mosquito eggs can remain dormant in dry habitats for over a year. That means even if an area is drained, it may hold enough water after a rainfall event to allow mosquitoes to hatch, especially since their life cycle is so short. Meanwhile, if wetlands remain intact, they can provide habitat for natural predators that help keep a mosquito population in check, such as birds, frogs, fish, and other insects.

But what if a mosquito population does get out of hand around us? MSMVCD mentions biological control is one effective method, often taking the form of mosquitofish. They are available from MSMVCD for individuals to release in ornamental ponds or other humanmade water sources, but it is essential that these water sources are not connected to waterways. Larvicides also reduce adult emergence and consequent disease risk. Microbial larvicides, such as *Bacillus thuringiensis var. israelensis* (Bti) and *Bacillus sphaericus* (Bs) have become preferred over chemical treatments in recent decades, as these bacteria selectively target mosquito larvae with minimal effects to nontarget organisms. However, other reports show they still prove toxic to closely related flies such as non-biting midges, which are an important food source for many wetland species.

Furthermore, the National Wildlife Foundation (NWF) points out we should think twice before hiring a mosquito control company to treat our yards with an insecticide. Many of these services use pyrethrin and pyrethroid-based pesticides to treat adult mosquito populations. While these chemicals are regulated and approved for use by the Environmental Protection Agency, it is not without a cost. These broad-spectrum insecticides kill other insects they contact. That means goodbye to beloved pollinators such as bees and butterflies, not to mention other beneficial insects such as ladybugs and dragonflies. When insects are eliminated in such a fashion, this has ripple effects across the food web. The NWF references research concluding as much as 96 percent of all North American birds feed their young exclusively on insects. For MSMVCD's part, they note that the use of adulticides is considered a last-resort method.

Only female mosquitoes seek out blood, while mosquitoes of both sexes use a proboscis to feed on flower nectar and fruit juices. The historical perception was that mosquitoes were mere "nectar thieves," that is, consuming nectar without providing any pollination services. However, recent research with plants such as orchids, tansies, goldenrod, and yarrow has shown evidence that mosquitoes do function as pollinators. These latest developments open up further avenues for exploration, including assessing the extent of mosquitoes' contribution to reproductive biology and plant conservation, or determining if a nectar or sugar-based bait could be developed as an ecologically-sound control method.

In sum, there's no argument that mosquitoes are an annoyance, and large populations are a reasonable cause for concern that necessitates control. There are simple actions we can take around our homes to reduce creating incidental habitat. However, it may be worth considering viewing mosquitoes and their management with nuance, now that we know more about them.

For further reading, see the Xerces Society's 2018 report, "Ecologically Sound Mosquito Management in Wetlands."