THE MOSQUITO AND YOU: WHAT YOU NEED TO KNOW

Fight the Bite

SACRAMENTO-YOLO
MOSQUITO
& VECTOR
CONTROL
DISTRICT

WHAT'S INSIDE

- What's a vector?
- Dangerous new species
- Victim speaks out
- How to protect yourself

1.800.429.1022
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A SPECIAL ADVERTISING SUPPLEMENT

WHAT IS A VECTOR?

HINT: THEY WANT TO SUCK YOUR BLOOD

BY SHANNON SPRINGMEYER

If the word vector recalls distant memories of a high school physics or geometry class, spotting the term in the name of the Sacramento-Yolo Mosquito & Vector Control District might have you scratching your head.

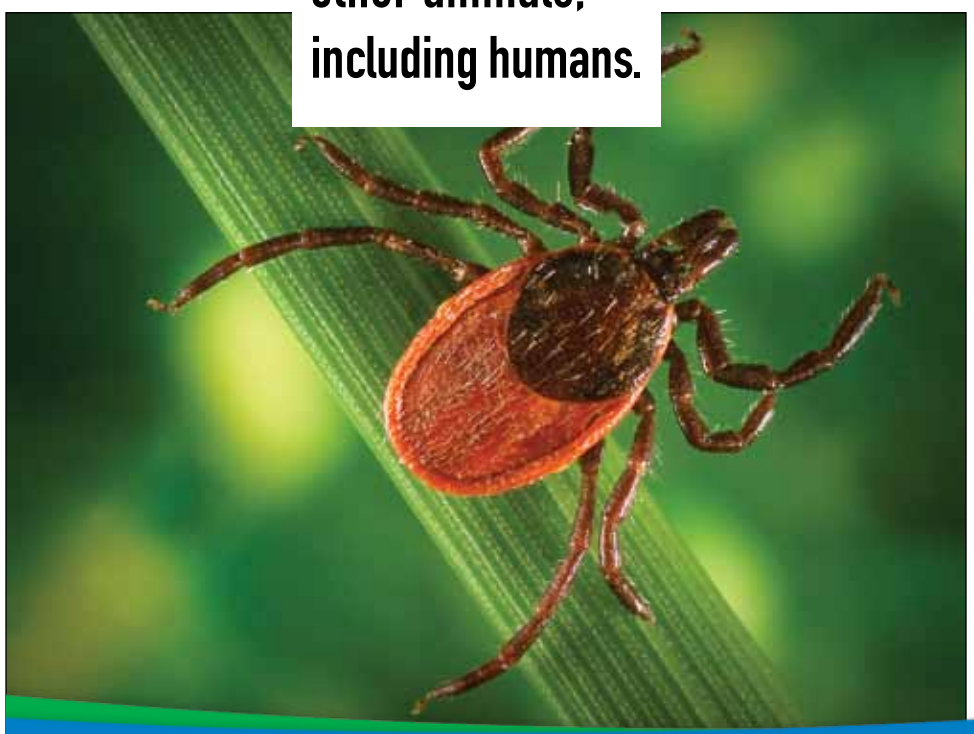
A vector in this sense is an insect or other animal that transmits a disease to other animals, including humans. Some vectors are bloodsucking insects such as mosquitoes, ticks, mites and fleas. These vectors spread disease by feeding on the blood of an infected human or other animal.

In order to respond to possible sources of dangerous infections, the District coordinates an extensive effort to gather accurate data on vectors and take appropriate control measures to minimize the threat of infection to humans.

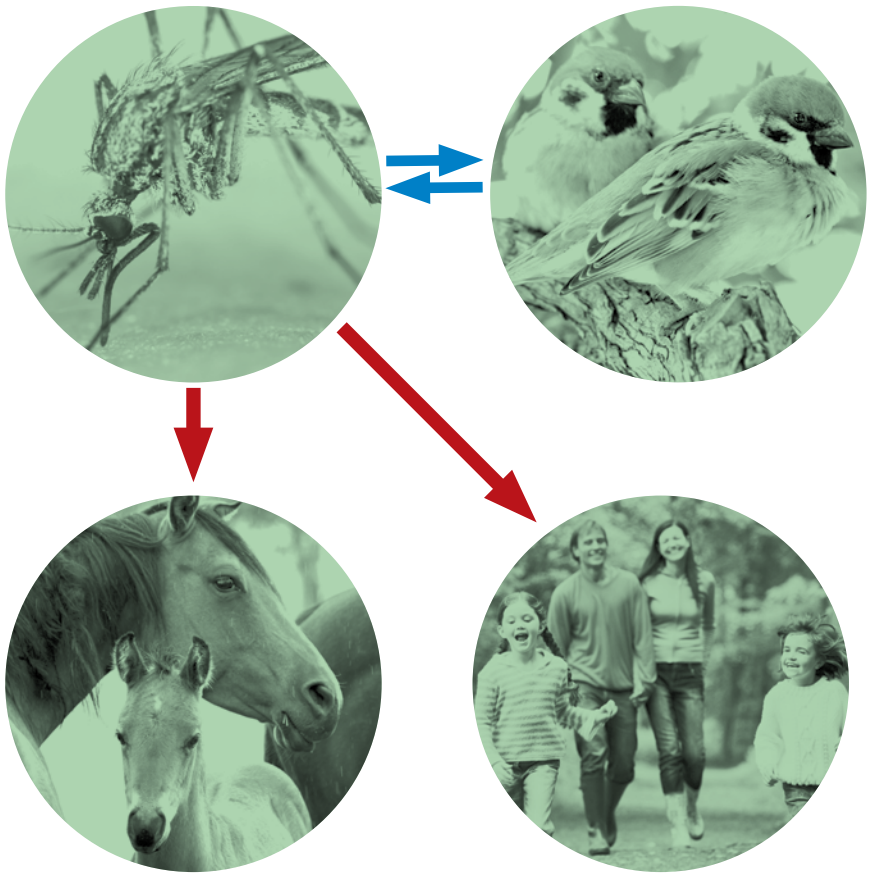
Mosquitoes remain a primary vector of concern in our area. They can transmit a variety of infections to humans, including West Nile virus, dengue fever and malaria. These pests can also infect other animals like dogs, horses, chickens and wild birds with West Nile virus, Western equine encephalomyelitis virus and canine heartworm.

Ticks are another vector of concern, as they can transmit Lyme disease and other infections to humans.

A vector is an insect or other animal that transmits a disease to other animals, including humans.



Tick



WEST NILE VIRUS TRANSMISSION CYCLE

West Nile virus cycles between mosquitoes and birds in nature. Here's how it works: A mosquito bites a bird infected with the virus. As early as five days later (under the best conditions), the virus is present in the mosquito's saliva. It may bite another bird, passing on the infection and repeating the cycle. An infected mosquito may also bite an incidental or "dead end" host, such as a horse or a human. Incidental hosts may become infected, but do not develop high enough levels of the virus in their bloodstream to pass it on to other biting mosquitoes. Ordinary human-to-human contact will also not spread West Nile virus.

NEW MOSQUITOES FOUND IN CALIFORNIA

AGGRESSIVE, NON-NATIVE SPECIES CAN CARRY DEADLY DISEASES

BY SUKHI BRAR

In Sacramento and Yolo counties we are used to seeing mosquitoes out during the summertime. Though their bites can be annoying, we usually only have to watch for them in the early morning hours, at dusk or in the evening. Unfortunately, two new species of mosquitoes have been found in California — and they like to bite any time of the day! These new species, *Aedes albopictus* ("Asian tiger mosquito") and *Aedes aegypti* ("Yellow fever mosquito"), can transmit very serious diseases.

The yellow fever mosquito likes to bite while indoors and prefers to bite humans.

The Asian tiger mosquito, though not originally from America, traveled here on cargo shipments from Asia in the mid-1980s. In the early 2000s it came to California through lucky bamboo shipments from Asia. Recently it has been found in Southern California. This mosquito is black with white, tiger-like stripes on the body, and one white stripe that runs the length of its back. What makes this species a concern is that it is an aggressive people-biter that feeds mostly during the day both indoors and outdoors. With its bite this mosquito can infect a person with diseases such as West Nile virus, dengue fever and yellow fever. This mosquito multiplies by laying eggs in items such as discarded tires and small containers left outside that have filled with standing water.

The yellow fever mosquito is another species recently found in California that poses similar dangers. This is a small, dark mosquito with a white, violin-shaped marking on its back. This mosquito likes to bite while indoors and prefers to bite humans. Like the Asian tiger mosquito, it also likes to bite aggressively and during the day. After feeding on blood, the mosquito is able to lay eggs within three days. The yellow fever mosquito also lays eggs on the sides of containers which will eventually be filled with water.

Though this type of mosquito originated in Africa and is generally found in tropical and subtropical areas of the world, it has been spotted in Fresno, Madera and San Mateo counties and can carry diseases such as dengue fever, Chikungunya and yellow fever. Scientists are not sure how it arrived in California.

Because the yellow fever mosquito likes to live indoors near humans, it is important to minimize places with standing water where it can lay eggs such as flower pots, discarded tires, plates under potted plants, cemetery vases, buckets, tin cans, clogged rain gutters, ornamental fountains, drums, water bowls for pets and birdbaths. Eggs are laid over a period of several days, are resistant to drying, and can survive for periods of six months or longer. When a container is refilled with water, the flooded eggs hatch into larvae. The lifespan of this mosquito is about three weeks.

FAST FACTS:

ALTHOUGH NOT SEEN LOCALLY YET, THESE TWO NON-NATIVE SPECIES POSE A SERIOUS THREAT

Aedes albopictus

"ASIAN TIGER MOSQUITO"

- Native to Asia, but recently found in Los Angeles County
- Small- to large-sized mosquito (approximately 2-10 millimeters)
- Easily recognized by tiger-like stripes on the body, with one white stripe along its back
- Carries diseases including West Nile virus, dengue fever and yellow fever
- Aggressive daytime biter that likes to bite humans and other mammals indoors and outdoors
- Lays eggs in natural and artificial containers with standing water

Aedes aegypti

"YELLOW FEVER MOSQUITO"

- Originated in Africa, but recently found in Fresno, Madera and San Mateo counties
- Small- to medium-sized mosquito (approximately 4-7 millimeters)
- Has a white, violin-shaped marking on its back
- Carries diseases including West Nile virus, dengue fever, Chikungunya and yellow fever
- Aggressive day biter that prefers human blood and bites indoors and outdoors
- Lays eggs in artificial containers

LEFT: CDC/JAMES GATHANY, RIGHT: CDC/ PROF. FRANK HADLEY COLLINS, DIR., CNTR. FOR GLOBAL HEALTH AND INFECTIOUS DISEASES, UNIV. OF NOTRE DAME

A BITE IN THE NIGHT

ONE WOODLAND WOMAN'S BRUSH WITH DENGUE FEVER

BY EDGAR SANCHEZ

An ominous orange-and-black warning was taped to the front door of Norma Mariscal's former home in Zapopan, Mexico one day in 2009.

"It was a leaflet from the health department urging all residents to protect themselves from the dengue virus," Mariscal, 39, recalls. "I didn't give the matter much importance. I read it, then put it in the trash."

She had no way of knowing that soon after she would find herself in the throes of dengue fever, a potentially fatal disease that is spread by mosquitoes. The two-week ordeal was so agonizing, she feared she would die.

Mariscal was accustomed to such leaflets circulating in Zapopan alongside cautionary mosquito ads on radio and television.

A couple of weeks after receiving the flier, Mariscal became violently ill. Her bones hurt and she developed a fever and a headache. "I had to sleep in a sofa because I couldn't walk up the stairs to go to bed," she says.

The next day, Mariscal's husband took her to a hospital where a doctor gave her medicine and told her she had contracted dengue fever, also known as breakbone fever for its debilitating pain felt in the joints and bones. Strangely, her body had no red spot indicating a mosquito bite, nor did she remember any encounter with an insect, leading her to believe she had been bitten while asleep.

When she returned home that day, her fever intensified. She "couldn't stand the pain" that wracked her bones, she says. "I felt exhausted, lost my appetite and I couldn't even move my fingers" because of the pain.

Dengue infection is a leading cause of illness and death for people living in the tropics and subtropics. Symptoms of dengue can be very painful and include high fever, severe headache, severe pain behind the eyes, and joint, muscle and bone pain. In its most severe form, dengue infection can result in dengue hemorrhagic fever, in which persistent vomiting, severe abdominal pain, difficulty breathing and circulatory failure may develop. These symptoms can result in shock and even death. Dengue fever infects as many as 400 million people annually, and more than one-third of the world's population lives in areas that pose transmission risk.

> **"I felt exhausted, lost my appetite and I couldn't even move my fingers. ... I had never felt anything like [dengue fever]."**
>
> Norma Mariscal, survivor of dengue fever

Though dengue fever is not contracted in California, the non-native Asian tiger mosquito and yellow fever mosquito, which are capable of transmitting the disease, have been discovered in California and officials fear they could spread.

Norma Mariscal recognizes the risks of mosquito-borne diseases after contracting painful dengue fever.
PHOTO BY ANNE STOKES

Mariscal suffered for two weeks with symptoms of the disease and feared she may never recover. Finally, however, the symptoms disappeared — for good.

"I had never felt anything like this," she says. "I was afraid I would die."

While Mariscal's horrific experience occurred in Mexico, she is aware mosquitoes transmit a variety of illnesses wherever they breed, including in Woodland, where she now lives with her husband and their daughter Fatima, age 3. As a result of her experience, she is now more vigilant against mosquitoes.

"I try to be more cautious now, above all with my daughter," she says. "When we go out in hot weather, I put long pants on her to help prevent mosquito bites. We also use mosquito repellents.

"I don't want to go through that again," she says. "I don't want others to go through it either."

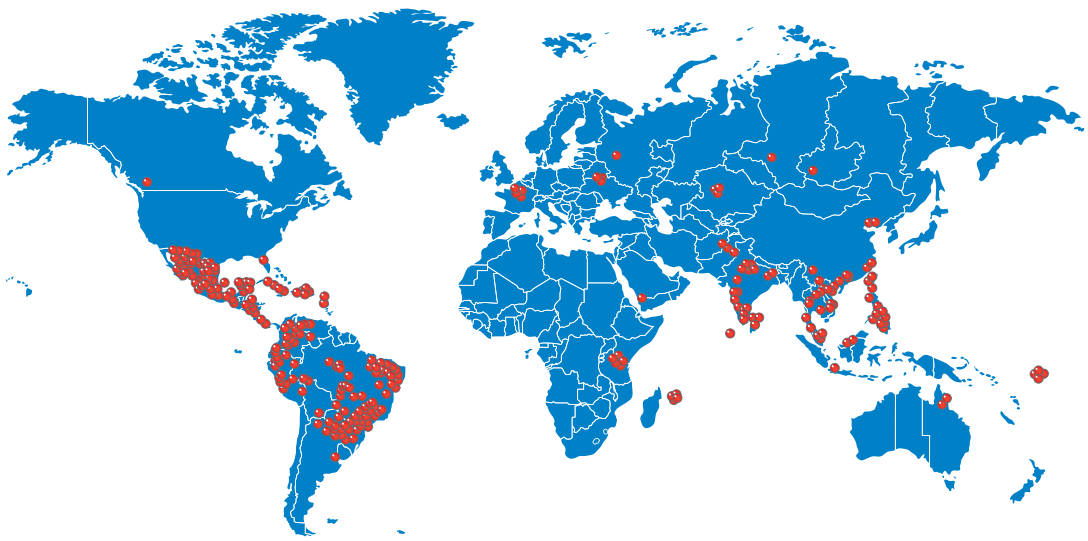
KEEPING HARMFUL DISEASES AT BAY

Harmful diseases such as dengue fever are kept out of our communities because of the vigilance of vector control districts. Districts monitor for signs that potentially harmful non-native species have moved into the area. One example is the invasive Asian tiger mosquito, which has been found in California, but not yet spotted in Sacramento or Yolo counties. This mosquito species poses a threat of harboring new infections that have not previously been a problem in the area, such as dengue fever.

MAPPING THE THREAT

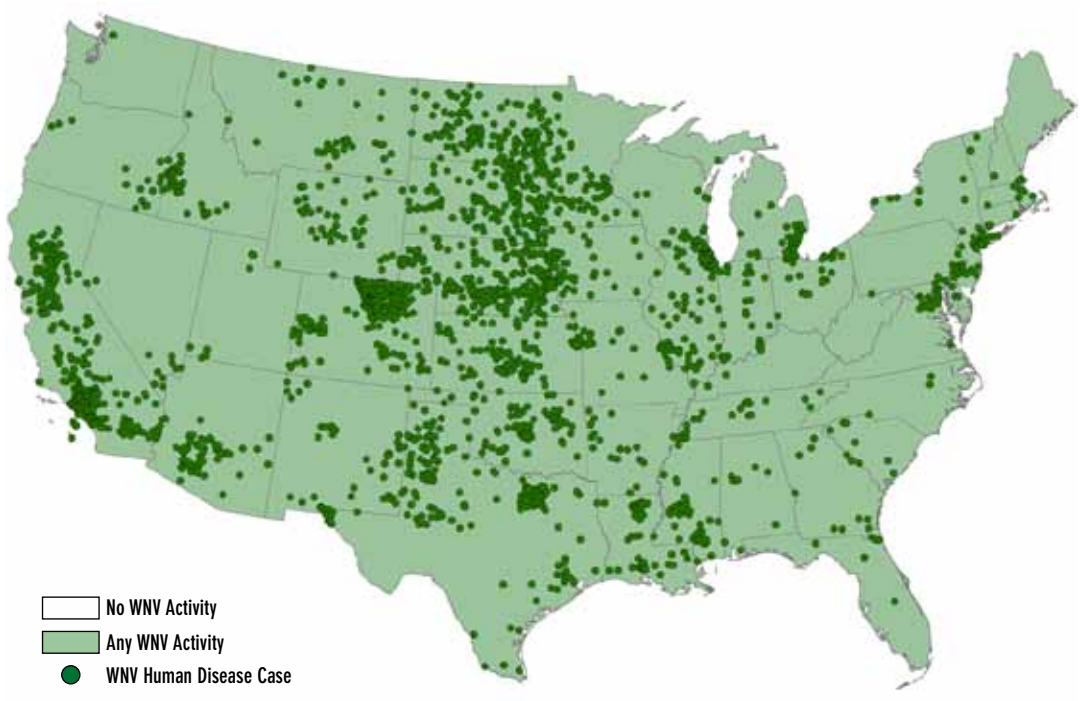
DENGUE FEVER THROUGHOUT THE WORLD

This map shows areas where dengue fever was a concern in May 2014. *Source: CDC collaboration with HealthMap.org*



WEST NILE VIRUS IN THE UNITED STATES

This map shows reported U.S. cases of West Nile virus in people in 2013. *Courtesy of CDC*



FIGHT THE BITE

MOST COMMON MOSQUITO-TRANSMITTED DISEASES AND SYMPTOMS

IN CALIFORNIA

These diseases have been found in the state

- **WEST NILE VIRUS**: Most people develop no symptoms. About 20 percent of people will develop a fever along with a headache, body aches, joint pains, vomiting, diarrhea or rash. One in 150 infected people will develop encephalitis or meningitis with symptoms that can include headache, high fever, neck stiffness, disorientation, coma, tremors, seizures or paralysis. Recovery may take several weeks or months, and some of the effects may be permanent. About 10 percent of people who develop neurologic infection due to West Nile virus will die.
- **HEARTWORM:** Dogs and other mammals can get this parasite through the bite of a mosquito that has taken larval stage heartworms as part of its last blood meal. Dogs show symptoms including a mild, persistent cough, reluctance to move or exercise, fatigue, reduced appetite and weight loss.
- **WESTERN EQUINE ENCEPHALOMYELITIS**: Virus transmitted to horses, and more rarely humans. Human symptoms range from mild, flu-like illness to encephalitis, coma and death.
- **ST. LOUIS ENCEPHALITIS**: Usually no symptoms. Some people develop fever, headache, nausea, vomiting and tiredness. Long-term disability or death can result.

IN THE WORLD

Although these diseases don't typically occur locally, they can be acquired during travel

- **DENGUE FEVER**: Dengue is a leading cause of illness and death in the tropics and subtropics, with 400 million people affected annually. Symptoms may include a sudden high fever, severe headaches, pain behind the eyes, severe joint and muscle pain, vomiting or skin rash.
- **MALARIA**: A mosquito-borne disease caused by a parasite. In 2012 an estimated 207 million cases of malaria occurred worldwide, most of them in Africa, with 627,000 reported deaths. People with malaria often experience fever, chills and flu-like illness. Left untreated, severe complications may develop, resulting in death.
- **CHIKUNGUNYA:** The virus was first found in Tanzania in 1953 and has since caused numerous human epidemics in many areas of Africa and Asia and most recently in limited areas of Europe and the Caribbean. Symptoms include fever and joint pain. It is usually not fatal.
- **YELLOW FEVER**: It is found in tropical and subtropical areas of South America and Africa. Symptoms include fever, headache, muscle aches, nausea, vomiting, loss of appetite, dizziness, and red eyes, face or tongue. If the disease enters the toxic phase, more severe symptoms including heart dysfunction, liver and kidney failure, brain dysfunction, seizures and coma, or death can result.

NO PLACE TO HIDE

DISTRICT SURVEILLANCE EFFORTS HELP THWART MOSQUITOES

BY SHANNON SPRINGMEYER

Life's not easy for a mosquito on the run around these parts. A visit to the Sacramento-Yolo Mosquito & Vector Control District lab seems more like an episode of CSI: Entomology, revealing just how hard technicians in the field and in the lab work year-round to keep citizens safe from these biting pests.

"During the fall, winter and spring, even before we get to West Nile virus season, our surveillance efforts never stop," District lab director Paula Macedo says.

Laboratory technicians set mosquito traps at 50 to 60 permanent sites throughout both counties each week, plus more at targeted locations. Back in the lab, specially trained technicians meticulously sort the tiny bodies of the trapped mosquitoes under the microscope into one of over 20 possible species found locally. Next, the mosquitoes themselves are tested for diseases that can harm the human population, such as West Nile virus, malaria or other infectious diseases.

The District also relies on public reporting in its surveillance. The public can help by calling to report neglected pools, standing water and dead birds. If larvae are found in water sources, technicians will treat the source with the necessary product. District technicians also utilize the amazing mosquitofish, which can devour approximately 200 mosquito larvae a day.

Dead birds are usually the first indication of West Nile virus activity. The District also places sentinel chicken flocks in targeted areas as a way to detect West Nile virus as early as possible.

If birds or mosquitoes test positive for West Nile virus or other dangerous infections, the District will evaluate a treatment in the area in order to prevent the virus from being transmitted to humans. Some residents have voiced concern over spraying for adult mosquitoes, asking why it is necessary if there are no human cases of West Nile virus.

"It is important to remember we want to prevent human disease, not wait for it to happen. Spraying for adult mosquitoes is used to protect public health," Macedo says.

"It's important to remind the public that much of our surveillance and control efforts are targeted at killing mosquitoes when they are still developing in the water. That's why our outreach messages are constantly emphasizing the need to eliminate standing water," Macedo adds. "However, once they become flying adult mosquitoes there are few options to quickly and effectively reduce their population in order to decrease the risk to the public."
The materials used by the District have been approved by the Environmental Protection Agency and have passed rigorous tests. They are the same products that are routinely used to treat thousands of acres in many communities throughout the United States.

"During the fall, winter and spring, even before we get to West Nile virus season, our surveillance efforts never stop."

Paula Macedo,
Sacramento-Yolo Mosquito & Vector Control District lab director

Luz María Rodriguez, Sacramento-Yolo Mosquito & Vector Control District public information officer, says that District surveillance efforts and the targeted preventative measures they enable are critical in order to save lives.

"It's precisely because of the important work that the lab does to detect West Nile virus activity that our control operations know where to target their efforts and effectively reduce the populations of infected mosquitoes," she says. "That's how we all work together as a cohesive organization to ensure we are protecting the public."

Q&A WITH DISTRICT MANAGER GARY GOODMAN

BY MIKE BLOUNT

HOW IS SACRAMENTO-YOLO MOSQUITO & VECTOR CONTROL DISTRICT WORKING TO BE ENVIRONMENTALLY SAFE?

We always use an integrated vector management approach to control mosquitoes. What it means is that we make sure we identify the problem, and then we take steps to minimize that problem using the least invasive methods possible. For example, we set out traps to identify an abundance of mosquitoes, and then we identify the species and any risks associated with those mosquitoes in terms of diseases they can transmit to humans.

WHAT ARE THE CONSEQUENCES OF NOT CONTROLLING THE MOSQUITO POPULATION?

The mosquito is the most dangerous animal on the planet. It has been responsible for more human deaths than any other animal in the world since time began. Many vector control districts in California were formed due to the sheer abundance of mosquitoes at the time. People couldn't use their yards, real estate values dropped significantly and you couldn't take part in outdoor activities because of the number of mosquitoes outside. So many of the districts were formed in response to improve the quality of life. With the introduction of West Nile virus in 2003 and other potential diseases in the future, mosquito control districts throughout the state are committed and dedicated to protecting the public from mosquitoes and the diseases they can transmit. Public health is our top priority.

WHAT LAWS AND REGULATIONS DO YOU FOLLOW AND HOW ARE THEY HELPING YOU BE BETTER STEWARDS OF THE ENVIRONMENT?

There are several agencies that we comply with. All of the pesticides we use are regulated by the U.S. Environmental Protection Agency and the state of California's Department of Pesticide Regulation. We have to follow all the laws and regulations regarding those pesticides. We're also regulated by the Department of Public Health to make sure we're all qualified and trained.

HOW IS THE CURRENT DROUGHT AFFECTING MOSQUITO BREEDING?

Contrary to popular belief, drought conditions may create more mosquitoes. Creeks and streams where water flows normally may dry up, creating puddles of stagnant water that will produce mosquitoes. This also causes birds and mosquitoes to congregate at the same limited water sources, which allows for a higher risk of virus transmission to people.

Given the current drought conditions, conserving water is a great idea, but it has to be done properly. Homeowners need to take precautions and ensure they are using containers such as rain barrels to collect the water and not household items such as buckets or garbage cans, which can quickly produce mosquitoes. If you are using a container to collect water, make sure to use a screen or a fine mesh seal to keep the mosquitoes out.

WHAT ARE SOME THINGS PEOPLE CAN DO AT THEIR HOMES TO HELP CONTROL MOSQUITO POPULATIONS?

Be water wise. It is frustrating to us at times when we talk about this because you can drive down almost any street and see people watering their lawns, but also watering the roadside ditch and their storm drains. Manage your water so it only stays on your lawn. Once it goes down into that roadside ditch or storm drain, we now have water that can develop mosquitoes.

The second thing you can do is regular water maintenance on your property. If you have pets, pour out their water dish once a week. The mosquito life cycle takes around seven to 10 days. Pouring out that water and replacing it will interrupt that cycle. For swimming pools, ponds or watering troughs — things that are impractical to drain and replace the water regularly — give us a call. There are an awful lot of ways we can manage the water without necessarily having to apply pesticides.

Gary Goodman is the Sacramento-Yolo Mosquito & Vector Control District Manager. PHOTO COURTESY SYMVCD

"The mosquito is the most dangerous animal on the planet. It has been responsible for more human deaths than any other animal in the world since time began."

Gary Goodman, manager of Sacramento-Yolo Mosquito & Vector Control District

HELP FIGHT THE BITE!

CONTROLLING MOSQUITOES AND PROTECTING YOU AND YOUR HEALTH

WHAT YOUR DISTRICT DOES:
SERVICES AT A GLANCE

MOSQUITOFISH

Several species of small fish, such as mosquitofish, feed on mosquito larvae. A technician will determine the amount needed and will then plant the fish in a standing water source, such as an unmaintained pool, at no charge.

SPRAY NOTIFICATION

When ultra-low volume (ULV) spraying is necessary to prevent disease transmission, information about where and when spraying will occur is available on the District website's Spraying Update page. Residents can also subscribe to the District mailing list and receive an email notification.

HOME SERVICE

If you are being bitten by mosquitoes and believe you have a problem, you can call for a field technician to visit your home. Technicians can also be alerted to problematic sources of standing water in your area and can be dispatched to address the problem.

FREE REPELLENT

Organizers of large outdoor events can receive free insect repellent to protect those attending.

Information about these services and more is available at ***www.FIGHTtheBITE.net.***

EDUCATION

The District offers community presentations and a school program that includes an annual FIGHT the BITE contest. Interactive presentations on mosquito control and prevention are also offered to groups and individuals of all ages.

WHAT YOU CAN DO:
FOLLOW THE 7 'D'S

Drain standing water

Dawn and **D**usk are times to avoid being outdoors

Dress appropriately when going outside

Defend yourself with an effective insect repellent

Doors and window screens should be in good working condition

District can be contacted for more information

REPORT PROBLEMS

Report dead birds by calling 1-877-968-2473

Report neglected swimming pools to the District

1.800.429.1022
FIGHTtheBITE.net
www.facebook.com/SYMVCD

Sacramento County: 8631 Bond Road, Elk Grove, CA 95624

Yolo County: 1234 Fortna Ave., Woodland, CA 95776

SACRAMENTO-YOLO
MOSQUITO & VECTOR CONTROL DISTRICT

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