

Mosquitoes like it hot

Is there a link between drought and record levels of mosquitoes carrying West Nile virus?

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Intuitively, at least, drought conditions would seem a silver-lining remedy for at least one significant health concern: West Nile virus. Mosquitoes carry the disease, transmitting it when they bite. Mosquitoes breed in standing water. Dry conditions should mean fewer mosquitoes and, thus, less WNV this year.

But more mosquitoes are carrying the virus than ever before. According to Dr. Ronald Chapman, director of the California Department of Public Health, “the proportion of mosquitoes infected with West Nile virus is at the highest level ever detected in California.” In the news release announcing this prevalence, he added: “We expect to see more people become infected as this is the time of year when the risk of infection is the highest.”

As of Sept. 10, the DPH confirmed 238 Californians have contracted WNV—double the rate of last year. Butte County, one of 36 counties where the virus has been detected, has 17 WNV patients to date, compared with 24 for all of 2013.

“It’s not because we’re not out there treating,” said Doug Weseman, assistant manager of the Butte County Mosquito and Vector Control District, the agency charged with suppressing insect-borne disease locally. “We’ve treated more rice this year—probably a record number.”

Low precipitation doesn’t mean farmers have stopped irrigating.

“We would have a good season for mosquitoes as far as numbers and virus if they didn’t grow rice and the wetlands didn’t flood up,” Weseman said. “If it was just urban sources that we were after, we could control that a lot better. But with all the rice—not just our rice, but neighboring counties’ rice—you’re going to produce mosquitoes big time.”

Meanwhile, he said, “these warmer temperatures we’re having are definitely what the mosquitoes are looking for. They love to breed in that warm weather ... and they like it a certain temperature before they even start moving. Usually that’s around the 60s.”

Last week, morning temperatures dipped into the 40s and 50s, and Vector Control officials finally noticed a slowdown in mosquitoes’ early-day activity.



Doug Weseman, assistant manager of the Butte County Mosquito and Vector Control District, searches for mosquito larvae with a dip net.

Dr. Mark Lundberg, Butte County's public health officer, said WNV cases have been spread across the county. Six Chicoans have contracted the disease, which also has appeared in Oroville, Paradise, Gridley, Biggs and Durham. The age distribution is also wide: 25 to 80.

Most WNV patients develop flu-like symptoms, but some suffer neurological conditions such as encephalitis or meningitis—swelling of/around the brain—that can be fatal. No one in Butte County has died from WNV this year, but Lundberg said the disease has claimed lives in nearby counties—one in Shasta, one in Glenn, two in Sutter.

The virus itself isn't any more infectious this year, Lundberg said, "and that is always a worry, but we haven't seen much difference there. Something scientists are going to have to watch is if there's been a shift in the genetics [of the virus], and if that shift happens, will it change its virulence and how it affects our environment, how it infects humans?"



The once-rare Enterovirus D68 underscores this process. Enteroviruses are associated with a range of illnesses, including the common cold. EV-D68 was discovered 52 years ago in California; but this fall suddenly came alive, causing an unprecedented number of cases of respiratory illness in many Midwestern states.

"These are the kinds of things that with any virus can happen—[and] with West Nile, could happen," Lundberg said. "It hasn't happened to my knowledge."

Discussion of such weather and biological shifts raise a question: Is climate change having an effect on West Nile virus?

"I wouldn't rule it out," Weseman said. "Climate change, if it brings warmer temperatures, that's definitely going to increase mosquito breeding."

Mark Stemen—professor at Chico State, president of the Butte Environmental Council and chair of Chico's Sustainability Task Force—goes one step further.

"The real striking thing when people think about climate change is they think about how hot it gets, but they don't necessarily think how cold it *doesn't* get," he said. "As a result of that, the mosquitoes don't die as early or as quickly as they used to."

Scientific research links the spread of WNV to changes in climatic conditions, Stemen says, pointing to a factor that often goes overlooked.

"Mosquitoes need water, but they don't die because they don't have water, they die because they get cold," he said. "For a lot of scientists, it really is the record-high lows that we're experiencing all over. We've always had water; what's really new is record-high low temperatures."

Lundberg isn't ready to draw conclusions on WNV locally.

"The epidemic just started in Butte County back in 2004," he said, "so has climate change affected West Nile virus since 2004? I'd have to say I can't imagine it impacting at all... But ask me in 200 years—I bet we'll see some trends then."

Stemen agrees that it would be foolhardy to make broad assertions based on a 10-year sample of a limited geographic area like Butte County.

"Science at its core is all about replication, so you've got to see it again and again," he said. "But the pattern is evident; in this one example, we can't say, but we can look all across the spectrum."

"Climate change is causing things to act in ways that we don't understand," Stemen continued. "Everyone focuses on the climate; it's the change that's really going to get us."