

## Vector Checkup by Evan Tuchinsky 08/25/16

Zika carrying mosquitoes haven't been found in the North State, but it's a matter of time as California's climate changes

**Matt Ball takes Zika personally.** Same with West Nile virus, chikungunya and the dozen other serious illnesses people can contract simply from the miniscule bite of a pesky mosquito.

Ball has a professional obligation to keep these threats at bay, as manager of the Butte County Mosquito and Vector Control District. He also has a responsibility at home: Every day, he thinks of his 6-year-old son living and playing on the Ridge. Last year, when the county experienced its record-worst West Nile outbreak—55 human cases, over half with the most severe strain (neuroinvasive)—the afflicted included a half-dozen children under age 14.

Since first detecting the virus in California in 2003, public health officials have confirmed 225 Butte County residents having contracted West Nile. Eight of them died.

"If that was your wife or your son or your grandma," Ball noted, "*one* is too many.

"Same with Zika: My level of concern is great, because even though [public health officials] are considering us a lower risk but still a possibility, one child being born with microcephaly is something I can't tolerate."

Zika—transmitted primarily via mosquitoes, but also via sex with an infected man or blood transfusions from an infected person—can cause brain defects in a developing fetus. One birth defect is microcephaly, an abnormally small head.

"I couldn't imagine seeing a child having those lifelong complications just because of the bite of a mosquito," Ball said.

In California, particularly the North State, Zika has been an *over-there* issue despite media saturation the past year. The focus first was on Latin America, particularly Brazil, because of the Olympics; then Miami because of a localized outbreak; then the Gulf Coast and Caribbean because of the tropical climate that spawned comparable flare-ups.

Now, Zika has become an *over-here* issue.

A few mosquito species capable of carrying Zika have made their way to California where—thanks to the effects of climate change—they're finding the habitat hospitable. The California Department of Public Health (CDPH) has confirmed 170 cases in 26 counties, and though they're all linked to travel, the vector threat looms. Of those, two babies have been born with Zika-related microcephaly.

Dr. Karen Smith, California's state health officer, advises in a news release that, in the face of Zika, "pregnant women and couples planning to have children need to be especially cautious."

**Connecting climate change to Zika may seem** like an interdisciplinary leap, but it's all biology—"common sense," as Ball explains it.

Temperatures have been rising worldwide, setting high marks year upon year this decade. Case in point: NASA and the National Oceanographic and Atmospheric Association recently declared July 2016 the hottest month on record (i.e., since 1880, when tracking began).

Mosquitoes breed in specific climate conditions. They are active when it's hot and humid. So, concurrent with the change in climate has come a change in



Matt Ball shows off a new addition to the Butte County Mosquito and Vector Control District: indoor tanks that allow for year-round breeding (and, thus, distribution) of larvae-eating mosquitofish.

PHOTO BY EVAN TUCHINSKY

Learn more:

For maps projecting the spread of Zika, go to [www.sci-news.com](http://www.sci-news.com) and [www.plos.org](http://www.plos.org) (search "Zika map").

To get local updates and prevention tips for vector viruses such as Zika and West Nile, visit [www.bcmvcd.com](http://www.bcmvcd.com) (click on "Information"). Also check [www.cdph.ca.gov](http://www.cdph.ca.gov) (see "Latest CDPH News").

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“mosquito season.” Climate Central, an organization of climate scientists and journalists, reports that three-fourths of U.S. cities have experienced an increase in the number of days with mosquito activity.

This corresponds with the experience locally. Ball said the North State mosquito season traditionally runs June through September. In the previous four years, afflicted by drought, mosquito season ran February through November. This wet winter did not delay matters—mosquitoes again went active in February—and Ball projects another continuation through November.

“Climate change is definitely playing a new role in mosquito control,” he said, explaining that the expanded opportunity for breeding has an “exponential” effect on the population.

Then there’s immigration. According to CDPH, two known Zika vectors have been found in 12 counties in the state. Butte isn’t one of them.

The first one, known as the Asian Tiger mosquito (*Aedes albopictus*), initially appeared in California around 2002 in ports at Alameda and Los Angeles. That infestation was contained, Ball said, but a small Asian Tiger population took root in the L.A. basin five years ago and since has expanded into Orange County and the Inland Empire.

The other carrier, the Yellow Fever mosquito (*Aedes aegypti*), first appeared in three Central Valley counties; now that species has been found all the way from Hayward to San Diego. Another relative, the Australian Backyard mosquito (*Aedes notoscriptus*), also has appeared in Southern California; there are no indications it is a vector, but Ball said “it’s plausible other mosquitoes can carry this,” and research is ongoing.

Mapping, notably projections of Zika spread conducted by Kansas University researchers, shows the Sacramento Valley as a potential hotbed of vector-borne disease.

“Climate change isn’t just about warming the temperature so the mosquitoes have a longer reproductive period,” said Chico State biology professor Kristina Schierenbeck, who studies the impact of climate change on plant and animal species. “They’ll continue to move north as climate warms and we continue to have anomalous weather patterns.”

Schierenbeck sees what’s happening with mosquitoes as reflective of a broader phenomenon of species migration and climate-related change, covered in her book *Phylogeography of California*.

“It’s not just Zika we have to worry about,” she added, “it’s a lot of other diseases associated with environmental decline.”