Western pond turtles found to be exposed to pesticides in Sequoia National Park

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Western pond turtles at Sequoia National Park still carry agricultural pesticides from past decades in their bodies. Credit: Brian Todd/UC Davis

Western pond turtles in Sequoia National Park and other California remote wildlands have been exposed to an assortment of agricultural and

industrial contaminants, according to a study from the National Park Service and the University of California, Davis.

In the study, published online in the journal *Chemosphere*, scientists sampled for 57 compounds, including pesticides, in turtles, invertebrates, and sediments from three sites: Sequoia National Park, Whiskeytown National Recreation Area, and Six Rivers National Forest.

None of the turtles at any of the sites carried pesticides currently in use, only those used in previous decades. However, both current pesticides and those used in the past were prominent in sediments and in the insects, snails and mollusks that turtles eat at Sequoia National Park, which is immediately downwind of Central Valley agriculture.

Protected parks not immune to pesticides

Previous studies have linked pesticide use upwind of Sequoia National Park to the disappearance of a rare frog species, the foothill yellow-legged frog. Also, a 2013 study by this study's lead author Erik Meyer, a scientist with Sequoia and Kings Canyon National Parks, found that turtles in Sequoia National Park had signs of physiological impairment consistent with pesticide exposure.

UC Davis doctoral student Evan Eskew searches for western pond turtles in a stream in Sequoia National Park. Credit: Brian Todd/UC Davis

"Pesticides don't recognize boundaries," said co-author Brian Todd, a UC Davis associate professor of Wildlife, Fish and Conservation Biology. "Even though we think of National Parks as being protected from conservation threats like development, they're not immune from pesticides and global contaminants that cross park borders."

The study also found:

- Some contaminants of an industrial nature at Clear Creek in Whiskeytown National Recreation Area in the northern Sacramento Valley. The site is near Highway 299, downstream from historic mines and mills, and is prone to wildfires.
- The fewest contaminants were detected on the South Fork Trinity River in Six Rivers National Forest, near the Klamath Mountains of northwest California. This site is the most remote of the three studied and is not downwind of industrial or agricultural areas.

Unintended consequences

Western pond turtles can be key indicators of exposure to environmental contaminants. They tend to acculumate contaminants due to their long life spans—they can live 50 years or more—and their generalist diets, making it easier for scientists to track a lifetime of exposure.

Todd noted that while the research team studied nine common pesticides, there were nearly 900 active ingredients applied to agricultural lands in California during the study. The interactions of those ingredients are not well understood.

"We need more information on how these compounds interact and how they affect non-target organisms," Todd said. "Then we can continue to refine the types of pesticides used so they have fewer and fewer unintended consequences."

More information: Erik Meyer et al. Organic contaminants in western pond turtles in remote habitat in California, *Chemosphere* (2016). DOI: 10.1016/j.chemosphere.2016.03.128

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