

# Toxic red tides: Scientists track neurotoxin-producing algae

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which can increase the amount of harmful toxins in the shellfish that California residents consume — ramping up in frequency and severity locally, scientists at USC have developed a new algae monitoring method in hopes of one day being able to predict when and where toxic "red tides" will occur.

"We have, what we fear, is a hotspot here for some types of [toxic](#) algal blooms," said David Caron, professor of biological sciences at the USC Dornsife College.

Caron's lab developed a quantitative assay, a procedure for measuring the quantity of specific types of [algae](#) in water samples taken from the coast. For the past four years, he used it in Redondo Beach's King Harbor to monitor the *Alexandrium catenella* algae, which produces saxitoxins, a group of neurotoxins that Caron called "one of the most toxic biologically produced chemicals in the world."

"Just like other species, microscopic species conduct warfare – chemical warfare," Caron said. Saxitoxins are thought to help *A. catenella* keep from being eaten and to out-compete other, similar organisms.

Problems with *A. catenella* occur because the algae are food for clams, mussels, anchovies and sardines.

"That's when we get into trouble, when it gets into something we would eat," Caron said. In humans, the ingestion of saxitoxins causes paralytic

shellfish poisoning.

Caron said that the California Department of Public Health does "a great job of keeping us safe" through water sampling, mussel sampling, and regular closures of shellfish harvesting during certain high-risk times of the year.

Over the past 10 years, however, a different type of algae that produces the neurotoxin domoic acid has been increasing on the west coast. Domoic acid produces amnesic [shellfish](#) poisoning in humans, and has been the cause of thousands of marine animal deaths off California during the past decade.

The first documented case of animals being sickened by algal blooms in this region occurred in the 1990s. Since 2003, such events have occurred almost annually in a worrying increase of such blooms, Caron said.

The cause of the increase in toxic algae blooms remains the subject of speculation. This could be the result of an ongoing change in the ecosystem off of California's coast, or it could be that scientists are witnessing a cyclical phenomenon. Extensive monitoring of toxic [algal blooms](#) is relatively new in the region, Caron said.

Caron said he hopes that his new assay will help scientists – not just to spot the blooms, but to monitor the changes in environmental conditions that lead to such blooms. In particular, he's hoping to discover what causes a harmful species of algae to bloom as opposed to a benign species.

Caron's research, headed by postdoctoral investigator Marie-Eve Garneau of the University of Zurich, was published online on September 16 by *Applied and Environmental Microbiology*, was supported by funding from the National Oceanic and Atmospheric Administration, the

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