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FISHERIES

Research finds new toxic hot spot off Calif. coast

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Recreational razor clamming can bring thousands of visitors to the Washington state coast. Toxins concentrated in razor clam and Dungeness crab fisheries have caused economic damage to coastal communities, and new research has identified another harmful algal bloom hot spot that's contributing. NOAA

Another algal bloom hot spot has been confirmed off the California coast near the Oregon border, according to new research published earlier this month.

The extreme marine heat wave nicknamed "the blob" that blanketed the Pacific Ocean between 2013 and 2015 and closed fisheries from Southern California to northern British Columbia contributed to the location's establishment. The [research](#) was published in the journal *Frontiers in Climate*.

"Cells were able to live in that warm water anomaly and those cells were then brought to the coast, where they populated this new seed bed in Northern California," said lead author Vera Trainer, an oceanographer for NOAA's Northwest Fisheries Science Center.

Some species of marine algae produce natural toxins, including domoic acid. Shellfish eat these phytoplankton. But harmful algal blooms, or HABs, occur when the toxin is produced in higher quantities. It accumulates in shellfish and can build to a point where it is harmful or even fatal to humans. Crabs and clams can retain toxins for relatively long periods of time, and cooking or freezing doesn't help.

Researchers previously thought there were only two main areas of high domoic acid concentration affecting the Pacific Northwest — the Juan de Fuca eddy near the Canadian border and Heceta Bank off the coast of central Oregon — as well as two more in California. But high levels of toxins in razor clams in Oregon and Washington, and some Dungeness crab, didn't appear to correspond with either location in the region.

"It just didn't make sense that those two areas that were previously known were causing these issues," said Matt Hunter, shellfish and phytoplankton bloom project leader for the Oregon Department of Fish and Wildlife and co-author on the study.

Water and shellfish sampling in 2015 identified a new hot spot between California's Cape Mendocino and Oregon's Cape Blanco. Further research cruises from 2016 to 2018 confirmed it.

Razor clams often act as an indicator for the toxin. Domoic acid binds to their fatty tissue and accumulates. Then the toxin builds up from the bottom of the food chain, from filter feeders like clams to their predators, like crabs.

"If we see domoic acid in razor clams in Oregon and Washington, then we know we have a very large bloom," Hunter said. "Razor clams have an affinity for domoic acid. They're like the canary in the beach mine."

The first domoic acid event identified in a lab was off the coast of Washington in 1991.

"Domoic acid on the West Coast is a relatively new thing in the grand scheme of biological processes," Hunter said.

The paper's release coincides with delaying some commercial fishing in Washington and Oregon this year. Recreational Dungeness crab fishery closures in Washington were expanded Monday after testing showed domoic acid levels higher than the standards for safe consumption. The opening of the commercial Dungeness crab fishery in Washington and along Oregon's north coast has also been delayed.

"We wish we had better news, but our first priority is public safety," Dan Ayres, Washington Department of Fish and Wildlife coastal shellfish manager, said in a statement.

Future marine heat waves are 20 times more likely to occur because of climate change, a [paper](#) shows, and [researchers](#) say they expect to see more frequent HABs. Trainer said her main takeaway is "there are unexpected consequences of climate change, but we are learning to adapt."

High concentrations of domoic acid have ripple effects, from hurting local fishing to making it harder for consumers to find the seafood they want. Delayed seasons can even interfere with whale migration patterns.

"It can cause huge problems in our ecosystem, and we are one of the key predators in our ecosystem, so it affects us as well," Trainer said. "It's affecting our purchasing power, and it's also affecting communities who live on the coast."

While hot spots aren't permanent, the algae's "seed bed" is what scientists are concerned about. The recipe for another outbreak is lying dormant, waiting for conditions ripe to multiply and bloom. Data shows that once *Pseudo-nitzschia* are seeded in a retentive region, blooms will be "frequent and increasing in intensity," according to the paper.

"What we know is during these productive events, it's like springtime where your lawn is seeded with dandelions," Trainer said. "The seed population is still there. So when the weather and the conditions are ripe for cells to come from the sediment to the surface again, this population will grow and succeed in this particular area."

While Washington has a state-funded HAB monitoring program, Oregon and California don't and rely on a combination of volunteers and federal grants. This hurts the region's ability to be proactive in detecting HABs and shutting fisheries only where necessary, instead of relying on blanket closures, Hunter said.

The emergence of a newly identified highly toxic area is helpful for scientists looking to improve early warning systems off the Pacific coast.

"The knowledge of these hot spot sites really benefits us," Trainer said. "We can focus on monitoring sites that we know are most likely to harbor these cells."

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