

## romberg lecture

# Romberg scientists study algae behind Dungeness crab season's shutdown

By **GRETCHEN LANG**

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Scientists at the Romberg Tiburon Center for Environmental Studies are trying to uncover the root cause of the toxic algae bloom that has shut down the West Coast crab fishery and poisoned marine mammals up and down the coast, but their vital research may come to an abrupt halt if they don't receive more funding.

William Cochlan, a senior research professor of biology at Romberg, is at the forefront of research into *Pseudo-nitzschia australis*, the toxic phytoplankton that is now covering thousands of square miles of ocean off the West Coast and making headlines around the Bay Area for delaying the state's Dungeness crab season.

The algae produces domoic acid, a potent neurotoxin that accumulates in the bodies of bottom and filter feeders like crabs, mussels and small fish, making them unsafe to eat.

Cochlan and his team of graduate students have been searching for the reason the algae produces this poison in hopes of finding a way to stop it.

"If we don't understand the organism that produces the toxin, we won't find a solution," he said.

From the Oregon border to Santa Barbara, both the recreational and the commercial crab fishing seasons have been delayed indefinitely by the California Department of Fish and Wildlife until domoic acid in Dungeness and rock crabs has dropped to acceptable levels and they are safe to eat.

"Crab is an important part of California's culture and economy, and I did not make this decision lightly," Director Charlton H. Bonham said in a statement. "But doing everything we can to limit the risk to public health has to take precedence."

The Dungeness season, which is worth about \$60 million to crabbers alone and which draws some 600 boats from as far as Alaska, was scheduled to start Nov. 15. Crab lovers that have been waiting for cracked crab for their holiday tables are reluctantly making other plans, though markets and restaurants are trucking in Dungeness from Alaska, British Columbia and Washington, with Oregon's season set to start Dec. 1.

The state's Fish and Wildlife Department has been testing crabs since early September and says the most recent tests show the health risk to humans to be "significant."

At low doses, the toxin causes nausea, diarrhea and dizziness in humans. At high levels it can cause persistent short-term memory loss, seizures and death.

There have been no reports so far of fatalities from eating domoic acid-contaminated seafood in California, but it has been linked to deaths all over the world.

While it seems to have little effect on the crabs themselves, animals like sea lions and whales that eat sea life contaminated with domoic acid can sicken and die. Since September, more 200 California sea lions have been taken to the Marine Mammal Center in Sausalito with domoic poisoning. Most have died.

The first sea otter to have been spotted in Richardson Bay since 2011 was found dead last July. A necropsy by the Fish and Wildlife Department revealed brain damage due to domoic poisoning.



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**Fresh, local Dungeness crab are a holiday staple for many Bay Area residents, but the shutdown of commercial Dungeness season, which was to open Nov. 15, has put a damper on things. Though supplies are available from Washington and beyond, many markets and restaurants aren't carrying Dungeness at all.**

## at the market

At press time Nov. 15, Woodlands Market at The Boardwalk Shopping Center was carrying Dungeness crab from Alaska at \$11.99 per pound for whole and cracked crab, \$39.99 per pound for picked meat.

Nugget Markets at The Cove Shopping Center and Safeway at Strawberry Village Shopping Center are not carrying Dungeness.

Algae blooms are common in the Pacific, but this year's massive bloom of *Pseudo-nitzschia* has caught scientists by surprise. The bloom, first noticed in May, now stretches from Santa Barbara to the Aleutian Islands and has lasted months where it usually only lasts weeks, scientists say.

The Fish and Wildlife Department is pointing to warmer ocean temperatures associated with El Niño as a likely contributing factor.

Marine scientists also suspect that the large bubble of warm water sitting off the West Coast, discovered in 2013, has encouraged the bloom, but more research is needed to confirm this.

Cochlan and his team have been studying *Pseudo-nitzschia* to try to figure out both why it has suddenly become so prolific and why it produces domoic acid. The acid, he said, may give the diatom a competitive advantage over other diatoms, or it may be a reaction to a nutrient that the single-celled plant is lacking. If that is the case, scientists might be able to correct the imbalance and stop it from making the acid, he explained.

"Once we know (why this is happening) we might have the



PROVIDED BY WILLIAM COCHLAN / COCHLAN LAB, RTC-SFSU

**A micrograph shows a chain of toxic diatoms, *Pseudo-nitzschia australis*, which is responsible for the current closure of the Dungeness crab season.**

## how to help

Anyone wishing to support William Cochlan's research on toxic algae may contact Karina Nielsen, director of the Romberg Tiburon Center for Environmental Studies, at [knielsen@sfsu.edu](mailto:knielsen@sfsu.edu) or make a donation online at [arkn.ws/sfsu\\_sci](http://arkn.ws/sfsu_sci); select "I would like to support other" and write in: "RTC toxic algae research."

capability to prevent such blooms from naturally occurring or better mitigate their harmful effects," he said.

But Cochlan and his team are quickly running out of funds for this vital research, he said. Over the past year, Cochlan said he has sought funding from the National Oceanic and Atmospheric Administration, the National Science Foundation and other federal government sources to continue his work with little success. His lab, he said, might have to close by the end of the year.

"I hope the public is aware that we are trying to respond to the public's need, but we need funding to do so," Cochlan said. "Without funding we can never hope to solve this serious and persistent ecological problem."

Romberg Director Karina Nielsen said that scientists like Cochlan are funded primarily through grant money. Although San Francisco State University, which operates Romberg, provides Cochlan with lab and office facilities, he must seek federal and private grants to fund his research, Nielsen said.

"He is one of our most extraordinary scientists," she said. "It will be painful if he has to reconsider his position here because of a lack of resources."

Meanwhile there is no word on how long the crab fishery closure might last. While the algae bloom is dying down now that waters are cooling, the domoic acid will remain in the sea bed sediment for some time, scientists say, so that crabs and other bottom feeders will continue to be contaminated.

"With climate change this problem is not going away," Nielsen said. "This is what climate change will look like."

*Contributing writer Gretchen Lang of Belvedere covers the environment. She spent 15 years abroad writing for newspapers including the Boston Globe and the International Herald Tribune.*