Understanding Harmful Algal Blooms

Microalgae support estuarine food webs and are an important component of shellfish diets. However, under certain environmental conditions, some microalgae species can rapidly accumulate and produce harmful toxins. This phenomenon, known as a harmful algal bloom, can cause toxins to concentrate in the tissues of organisms, including Dungeness crab and other shellfish.

When toxin levels are high, people can become sick from consuming contaminated shellfish or recreating in toxic waters. Additionally, coastal economies can be impacted when recreational and commercial shellfish harvesting is restricted to protect the public.

Research at South Slough Reserve is seeking to understand how changing climate conditions are impacting harmful algal blooms, as well as precursors to raised toxin levels.

NOAA Margaret A. Davidson Fellow, Taylor Dodrill, sampling sites throughout the Coos Bay for harmful algal bloom toxins.

Sampling Water for Harmful Algal Bloom Toxins

Between September 2020 and August 2023, researchers from South Slough Reserve and the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians conducted monthly sampling at nine sites within Coos Bay during the summer, and a subset of four sites throughout the year. Water samples were analyzed to check microalgae community composition and test for toxic algae.

Results:

Researchers observed four types of microalgae in the Coos Bay area that had high toxin levels at certain times of the year.

- Freshwater cyanobacteria, *Microcystis* and *Dolichospermum*, bloomed at a sampling site at Tenmile Lake in September 2021. Toxin levels were above regulatory limits for drinking water.
- *Alexandrium* and associated saxitoxin, typically found in estuaries and saltwater, were detected in June 2021 at the BLM Boat Launch site in the Coos Estuary.
- *Pseudo-nitzschia* and associated domoic acid concentrations in seawater hit alert levels in June 2021 at the BLM Boat Launch site in the Coos Estuary. Seawater alert levels typically trigger additional testing of shellfish tissue.

Discussion:
Researchers observed toxin levels that present a concern for shellfish harvesting and recreation in the estuary. Freshwater cyanotoxins have caused drinking water contamination and recreational use. Algal toxins such as domoic acid and saxitoxin have been the cause of many fishery closures on the West Coast. Prediction or early detection of harmful algal blooms may help mitigate these impacts. As such, monitoring and research on this issue should continue.

Future Research

Next, researchers will pair the harmful algal bloom sampling data with water quality data to understand more about water conditions that increase the likelihood of harmful algal blooms.

Researchers are also in the processing of surveying shellfish harvesters to understand how they perceive the risks of harmful algal blooms, as well as attitudes toward harvest area closures and guidance from government agencies. In the coming months, researchers will review the survey responses to develop strategies to best communicate about this issue.

What Can You Do About Harmful Algal Blooms?

- Talk to your family and friends about harmful algal blooms.
- Call the shellfish biotoxin hotline before harvesting Dungeness crab and other shellfish, 1-800-448-2474.
- Support legislation to fund harmful algal bloom monitoring, research, and communications development in Oregon.

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About the Lead Researcher

Taylor Dodrill is a NOAA Margaret A. Davidson Fellow and PhD candidate whose research is focused on understanding the causes of harmful algal blooms and how climate change may be impacting toxic microalgae events in Coos Bay.