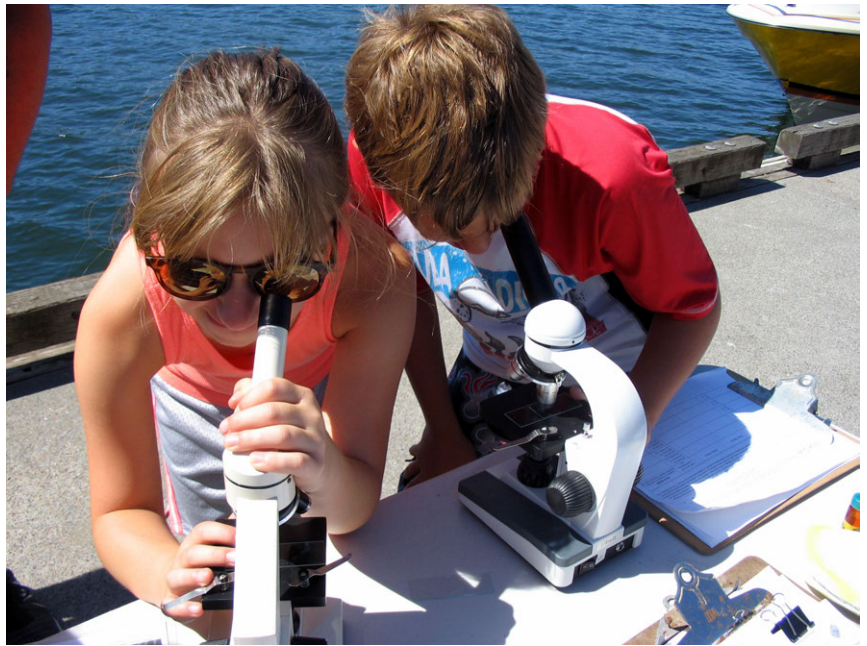


BEST PRACTICES



What's Blooming in Budd? Dinophysis!

This summer marks the 8th year of Stream Team's What's Blooming in Budd plankton monitoring program in partnership with Pacific Shellfish Institute. Each summer, community scientists, like you, lower nets into the water to collect data that supports the work of researchers and resource managers throughout the region. Most notably, samples are screened for harmful algal bloom species (HABs) as part of the National Oceanic and Atmospheric Administration's (NOAA's) SoundToxins program. HABs are blooms of phytoplankton that cause harm to people, animals, or local water quality. The information collected can provide early warning of HABs, track changes over time, and ultimately help scientists forecast when toxic events might occur.



Did you know that Budd Inlet holds the State's record for the highest Diarrhetic Shellfish Poisoning (DSP) toxin levels measured in mussels? HAB species *Dinophysis*—has become a recent hotbed of DSP activity, experiencing closures every year since 2015. In 2016, DSP toxins in Budd Inlet mussels reached 250 $\mu\text{g}/100$ grams of tissue! Washington Department of Health (WDOH) routinely monitors shellfish throughout the state and closes growing areas when DSP toxins exceed 16 $\mu\text{g}/100$ grams. Consumption of contaminated shellfish tissue can lead to nausea, vomiting, abdominal pain, and diarrhea.

What does What's Blooming in Budd data tell us about *Dinophysis*?

We have observed *Dinophysis* blooms during both early and late summer. Samples have been comprised of a mixture of 6 different species, the most common being *D. fortii*, *D. acuminata*, and *D. norvegica*. When coupled with WDOH toxicity data, we observe that the primary species detected during toxic blooms appear to be *D. acuminata* and *D. fortii*, whereas, the early summer blooms have consisted of much higher abundance of *D. norvegica*, but no apparent shellfish toxicity.

What do IFCBs do?

The upsurge in toxic events in Budd Inlet has attracted the attention of NOAA Oceanographers, Vera Trainer, Stephanie Moore and Brian Bill as well as Naomi Estrada-Packer, a graduate student at The Evergreen State College. As part of a NOAA Ecology and Oceanography of HABs grant, Trainer and collaborators are placing an Imaging Flow Cytobot (IFCB) in lower Budd Inlet this summer to intensively monitor and capture images of this species and its prey. This effort is part of a nationwide network of IFCBs used for monitoring and providing early warning of *Dinophysis* blooms.

What makes Budd Inlet such an attractive environment for Dinophysis? One feature, as Estrada-Packer's research suggests, is stratification, or the layering of warm fresh water over cold saltier water. Estrada-Packer observed that river discharge, surface water temperature, and high nitrogen to phosphate ratios were strongly related to Dinophysis abundance. Dinoflagellates thrive under stratified conditions where—unlike diatoms—their whip-like flagellas give them a competitive advantage, allowing them to migrate into deeper waters to access available nutrients.

Become a Community Scientist

If you haven't met a dinoflagellate up close and personal, then we invite you to attend a What's Blooming in Budd event where you will meet not only Dinophysis, but Ceratium, Akashiwo, Protoperidinium and others. In every drop of water lives a microscopic world of plankton that serves as the heartbeat of the marine ecosystem. Visit the Pacific Shellfish Institute blog at pacshell.org/whats-blooming-in-budd.asp and be part of the exciting new Dinophysis research that is currently unfolding and discover What's Blooming in Budd!

Learn more about Soundtoxins, WDOH's biotoxin program, or what's blooming in Budd at:

- soundtoxins.org
- doh.wa.gov/CommunityandEnvironment/Shellfish
- pacshell.org

How can you reduce Pollution in Puget Sound?

- For dog owners, Scoop It, Bag It, Trash It....every poop, every time!
- Avoid fertilizers with weed killers. Use natural-organic slow release fertilizers, compost, or grass mulch instead.
- Wash cars on the lawn or visit a commercial car washing facility.
- Properly maintain the health of your septic system.

Source: Stream Team News, Summer 2020