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Cyst Mapping of Alexandrium catenella in Surface Sediments of Puget Sound from 2013-2021

Dr. Cheryl Greengrove
University Of Washington Tacoma

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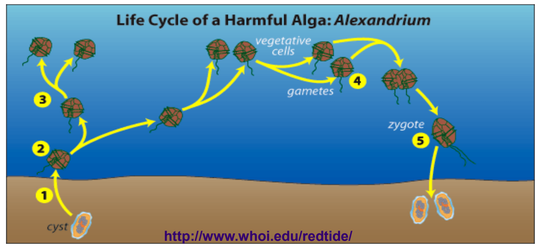
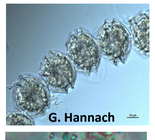
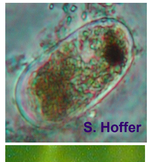
Cheryl Greengrove and Julie Masura – University of Washington Tacoma

HARMFUL ALGAE PROBLEM

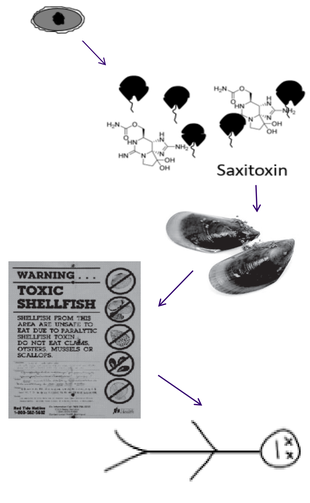
Alexandrium catenella is a dinoflagellate that produces saxitoxin, a powerful neurotoxin, known to bioaccumulate in filter-feeding shellfish. Mammals consuming these shellfish can experience paralytic shellfish poisoning, a severe toxin-induced illness. *Alexandrium* overwinters in seafloor sediments as a cyst, and in the spring and summer, when environmental conditions are right, these cysts can germinate and become vegetative cells within the water column. Identification and enumeration of cysts are used to determine regions where there is a greater potential for these harmful algae to bloom.

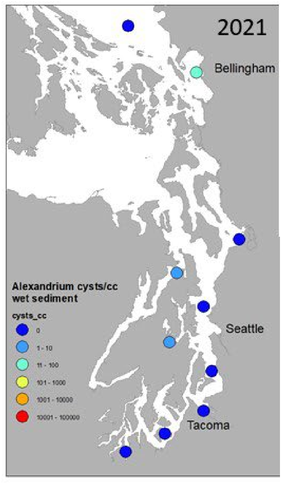


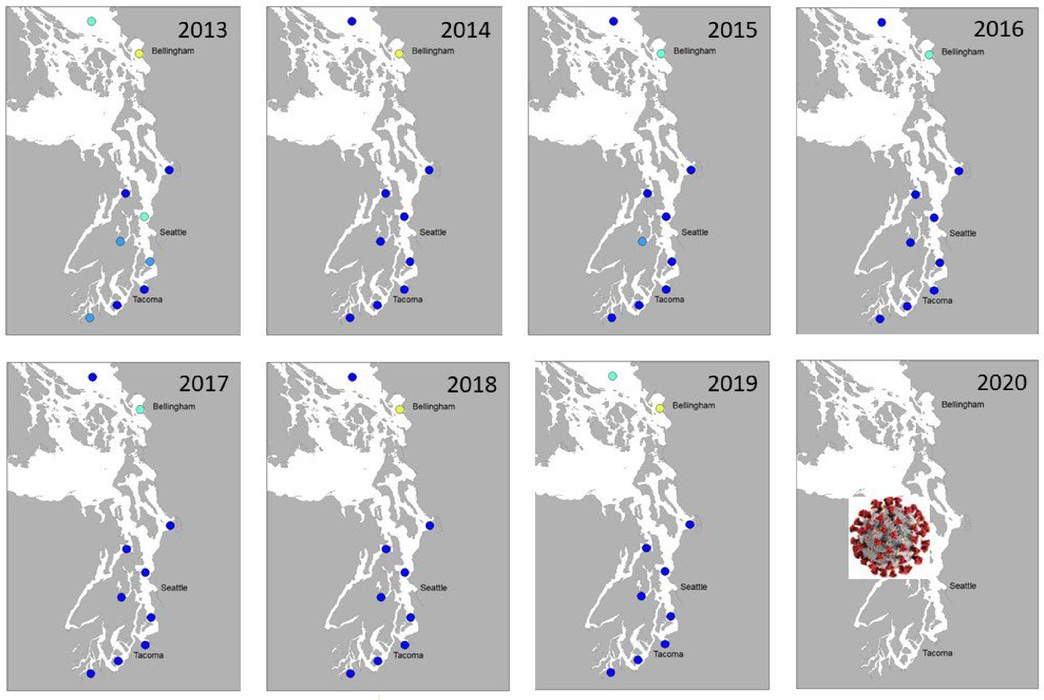




A. catenella top to bottom: , vegetative form in chain, cyst in visible light, stained cyst in epifluorescent light.







Time series of cysts per 1 ml wet sediment at 10 long-term stations in the Salish Sea.

RESEARCH PARTNERSHIP

This project explores harmful algae in sediments collected throughout the Puget Sound from 2013-2021 to create baseline observations and determine if *Alexandrium catenella* cyst concentrations in sediments have changed over time. Washington State Department of Ecology's Marine Sediment Monitoring Group has provided sediment samples to analyze for cysts since 2013. Ten long-term stations have been sampled using a 0.1 m^2 stainless steel van Veen grab sampler to recover 2-3 cm of the top sediment from the seabed.

Note: Sampling was done in spring so results may be an underestimate of overwintering cysts as some may have already germinated into the water column.

DEPARTMENT OF ECOLOGY State of Washington

https://ecology.wa.gov/Water-Shorelines/Puget-Sound/Sound-science/Marine-sediments

UWT *ALEXANDRIUM* QUICK FACTS

- Most locations with cysts in 2013
- Highest concentration of 190 cysts/cc in 2014
- Cysts present each year in Bellingham Bay
- No sampling in 2020 due to COVID
- 2021 cysts found in Bellingham Bay, Inner Budd Inlet, and North of Hood Canal
- Low cyst counts possibly due to sampling in spring

UNDERGRADUATE RESEARCH

Each year the sediment samples are analyzed by undergraduate researchers for grain-size distribution, total organic content percentage, harmful algae abundance, and microplastic concentration as part of a summer research experience. *A. catenella* cysts were processed by sieving, fixing, etching, and staining the cysts for identification using a modified Yamaguchi et al. (1995) standard microscopy method.

Yamaguchi, M., Itakura, S., Imai, I., Ishida, Y. 1995. A rapid and precise technique for enumeration of resting cysts of Alexandrium spp. (Dinophyceae) in natural sediments. Phycologia 34, 207–214.

Gary Livingston and Zoe Manuel preparing sediment samples for analysis.

For more information, contact
cgreen@uw.edu