



Harmful Algal Blooms in Alaska

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Harmful Algal Blooms

Definition

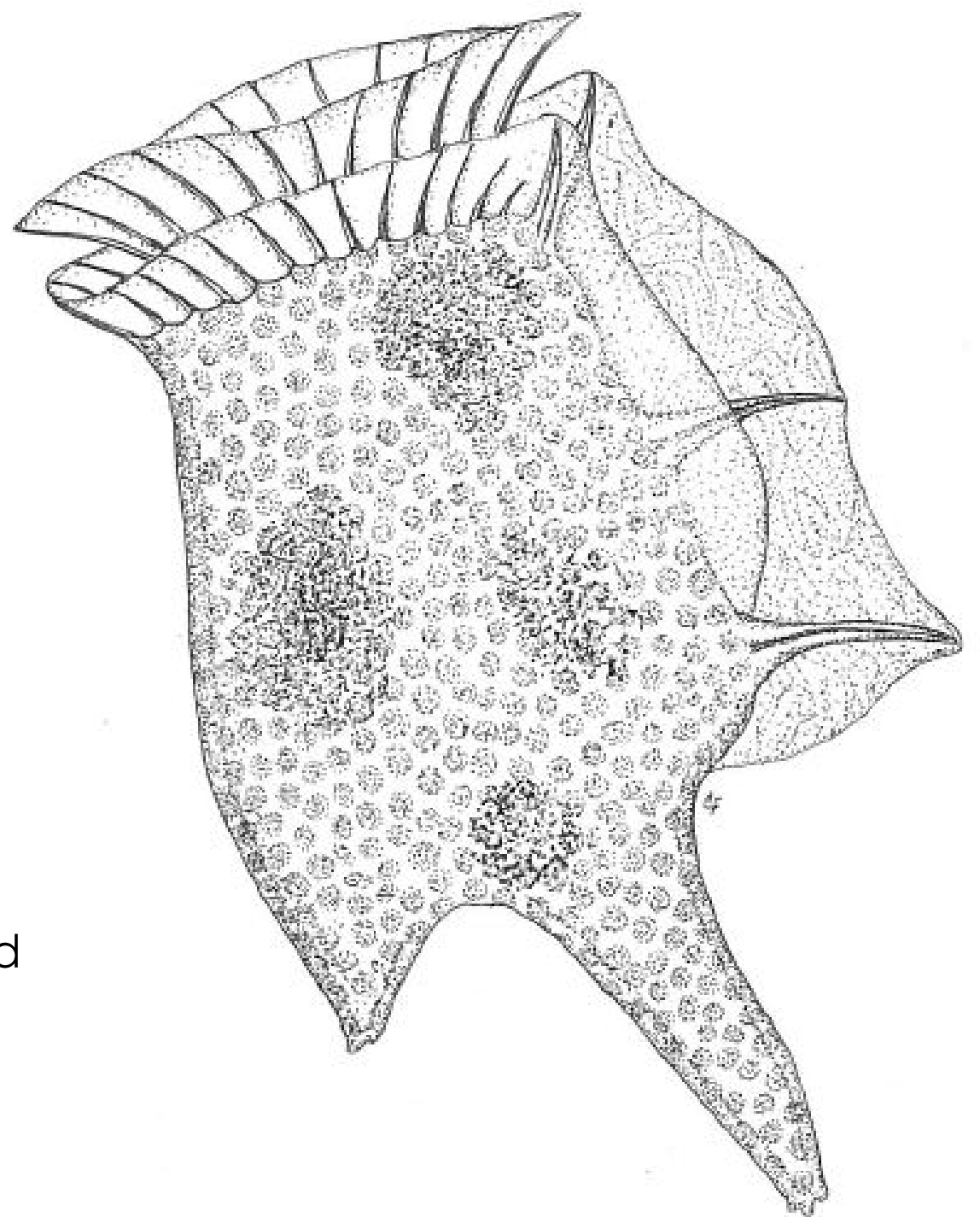
'Harmful algal blooms, or HABs, occur when colonies of algae – simple plants that live in the sea and freshwater – grow out of control and produce toxic or harmful effects on people, fish, shellfish, marine mammals, and birds. The human illnesses caused by HABs, though rare, can be debilitating or even fatal.' – NOAA

Paralytic Shellfish Poisoning – saxitoxins

Amnesiac Shellfish Poisoning – domoic acid

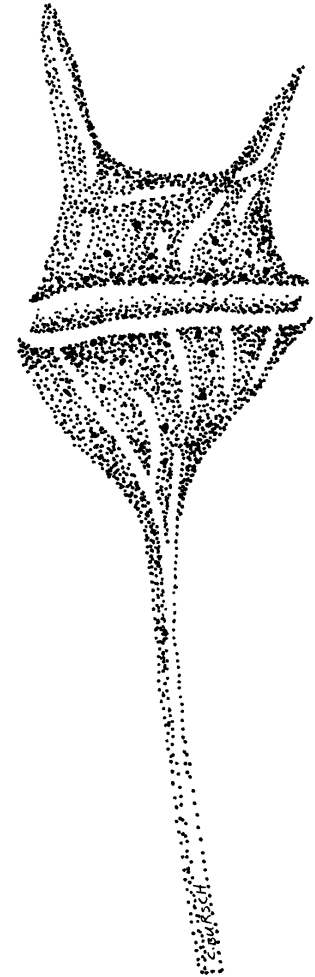
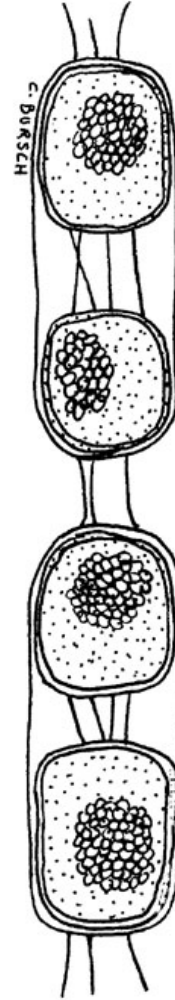
Diarrhetic Shellfish Poisoning – oxidaic acid

Cyanobacteria blooms - cyanotoxins

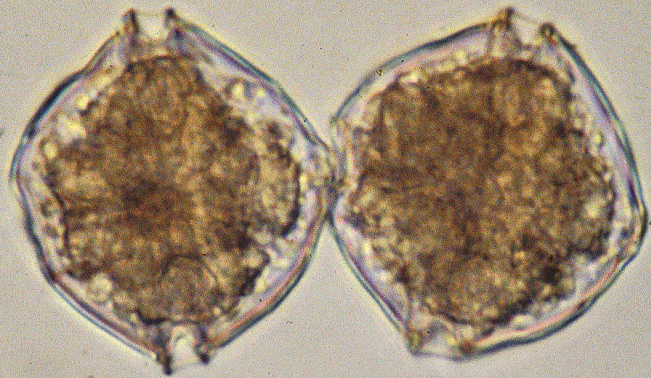


HAB species are Phytoplankton

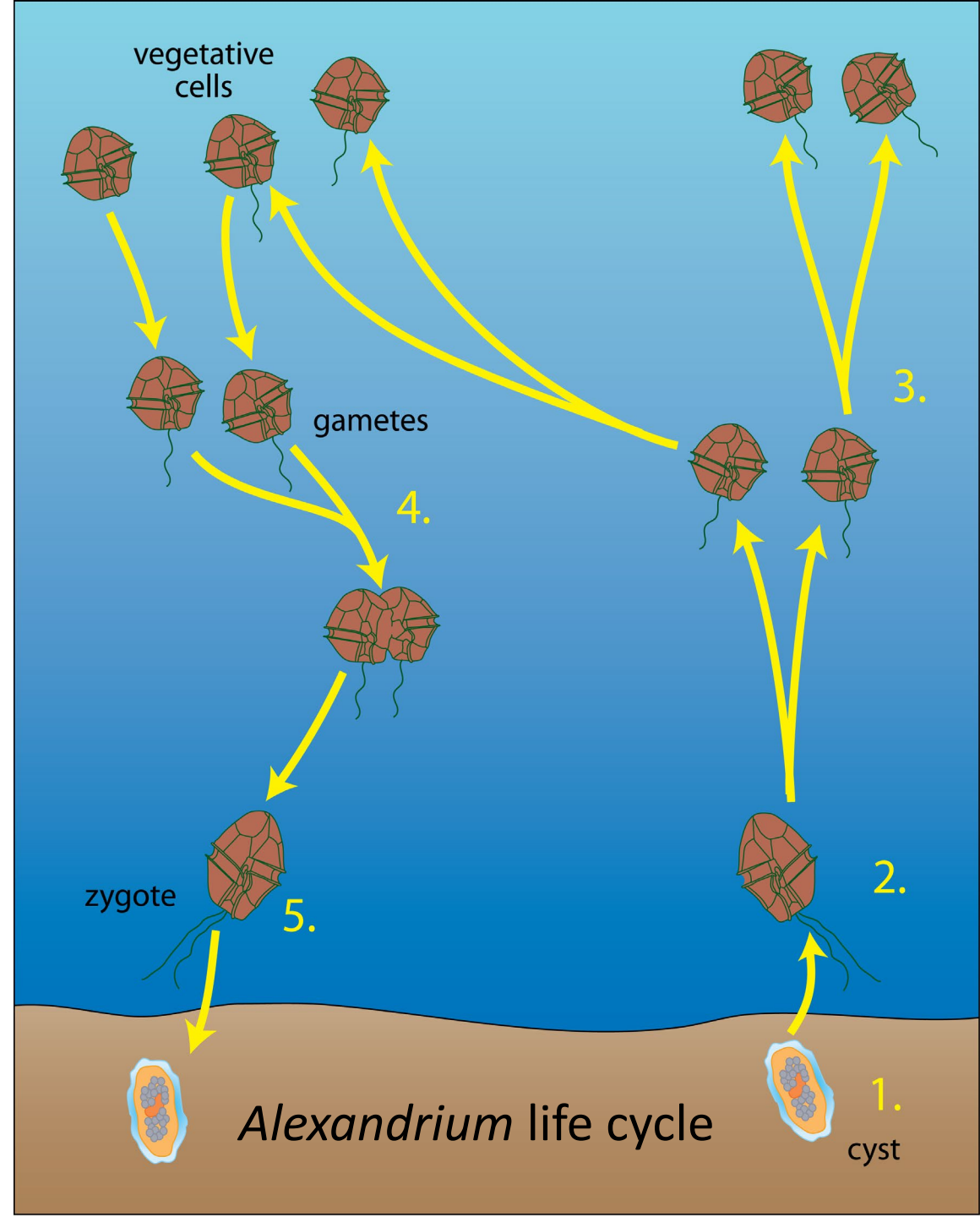
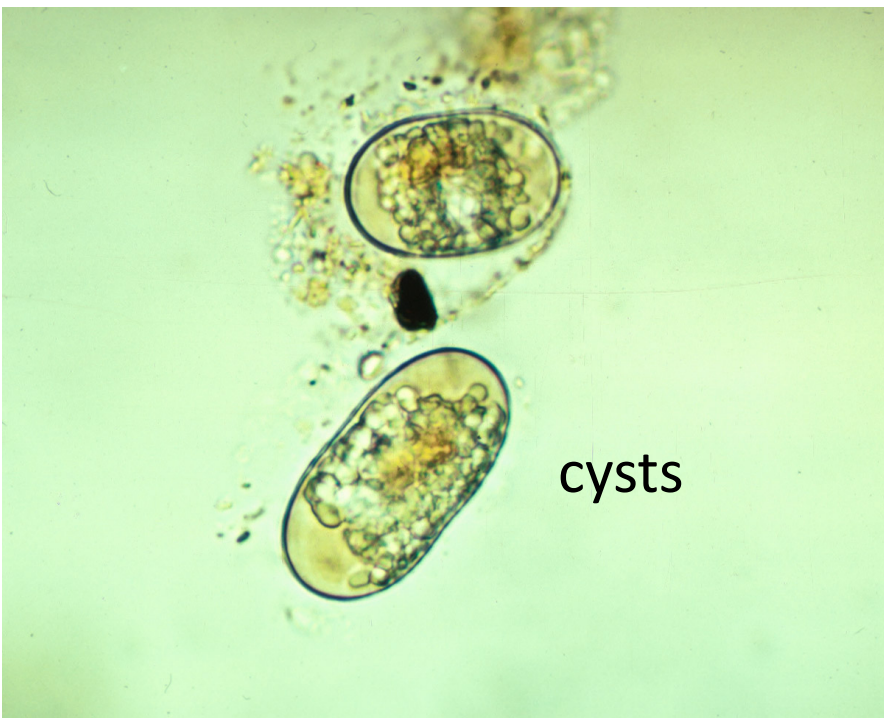
- Planktonic Algae
 - Protists with chloroplasts
 - Single celled – or a group of single cells
 - Use chlorophyll a in photosynthesis
 - Live and die floating in the water
- Diatoms
- Dinoflagellates
 - *Alexandrium* (Paralytic Shellfish Poisoning)



Alexandrium cells



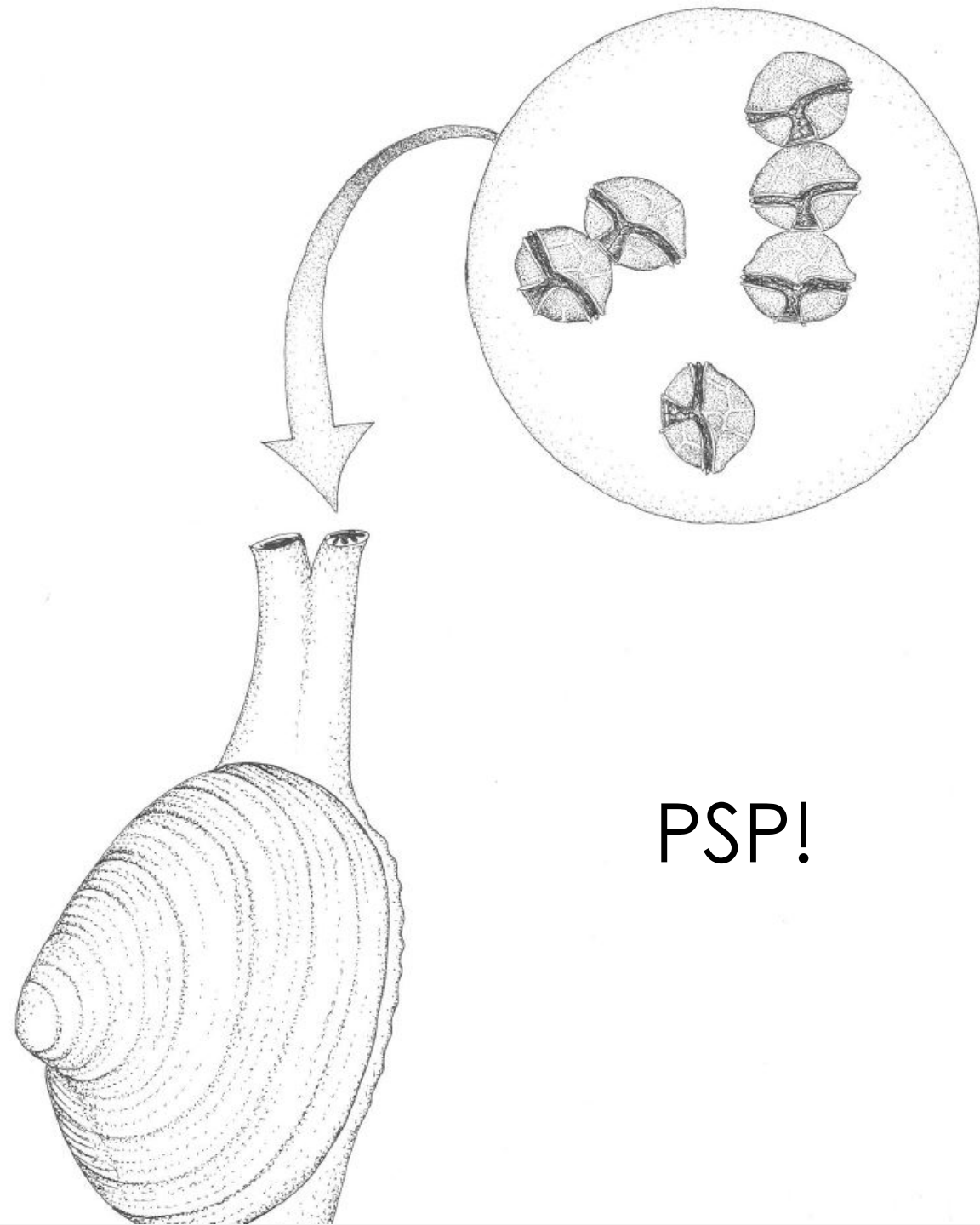
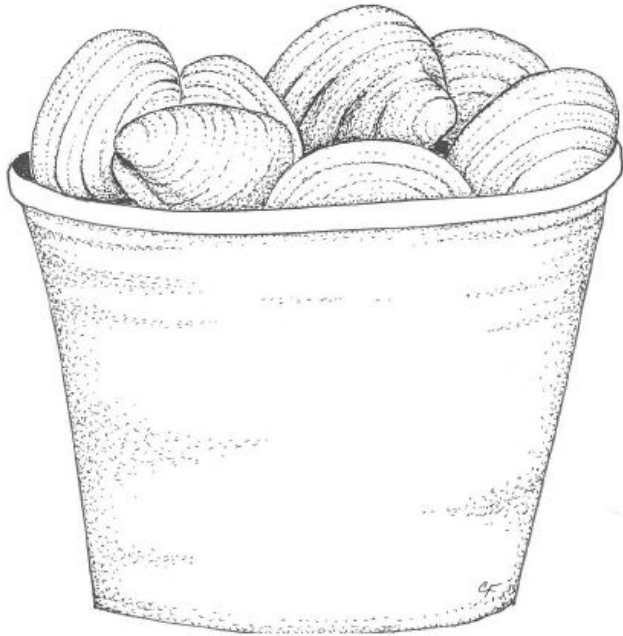
cysts



Alexandrium life cycle

HABs in Alaska

- Toxin Accumulation in shellfish
- Human Consumption
- Aquatic farm industry impacts



HABs in changing ocean and coastal waters

Tobin, E. D., C. L. Wallace, C. Crumpton, G. Johnson, and G. L. Eckert. 2019. Environmental drivers of paralytic shellfish toxin producing *Alexandrium catenella* blooms in a fjord system of northern Southeast Alaska. *Harmful Algae* **88**:101659.



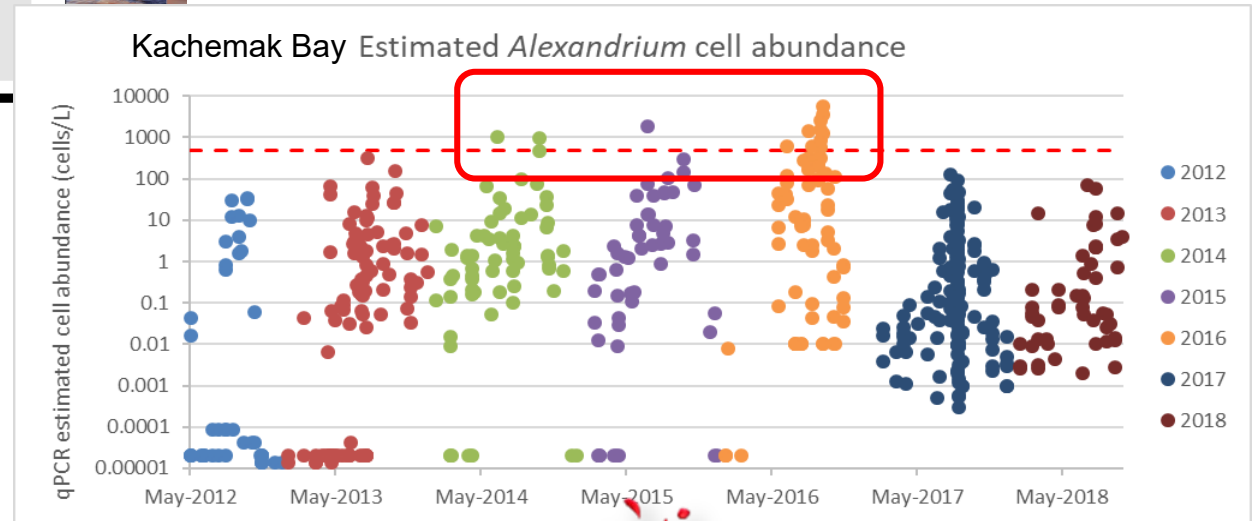
Contents lists available at [ScienceDirect](#)

Harmful Algae

journal homepage: www.elsevier.com/locate/hal

Environmental factors influencing the distribution and abundance of *Alexandrium catenella* in Kachemak bay and lower cook inlet, Alaska

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Sep 21, 2019 WashingtonPost

[Capital Weather Gang](#)

The 'Blob' is surging back in the Pacific, leading to fears of mass die-offs of marine life and unusual weather patterns

Emerging HAB issues in Alaska



2018/2019 Bering Strait / Chukchi Sea: *Alexandrium* Algae, Saxitoxin, and Clams

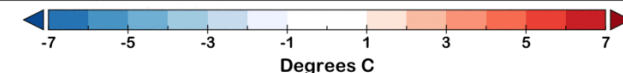
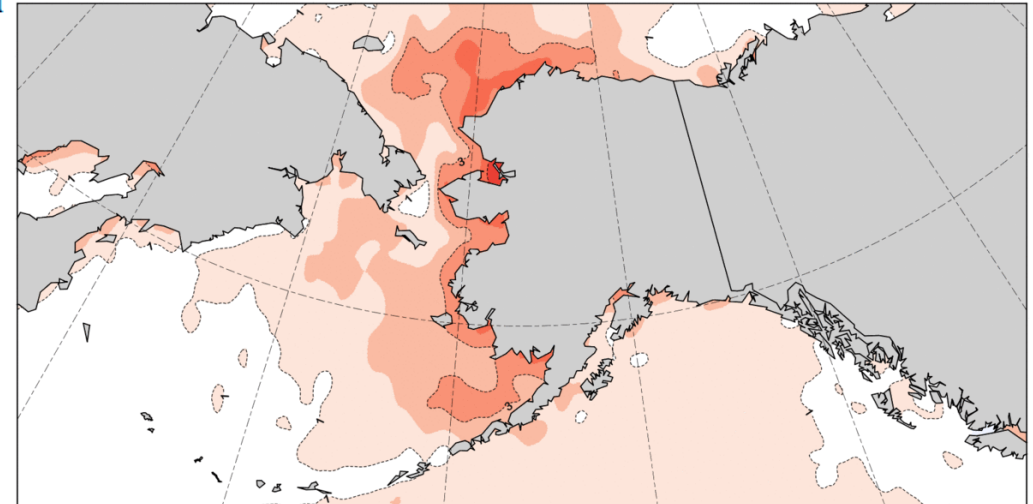
During summer 2019, high concentrations of the algae called *Alexandrium catenella* were detected in the Bering Strait/Chukchi Sea. *Alexandrium c.* algae can produce the biological toxin called saxitoxin. Eating a high level of saxitoxin can cause Paralytic Shellfish Poisoning (PSP) in humans and marine mammals. Saxitoxin targets the nervous system and blocks nerve function. PSP symptoms include breathing difficulties and paralysis in humans as well as marine mammals. The *Alexandrium* algae concentrations were high enough in the seawater to potentially make shellfish unsafe to eat. Although most shellfish sampled onboard HEALY were safe to eat, clams at two locations had high saxitoxin levels and were unsafe to eat. People should remain vigilant and

Lefebvre, K., et al. 2016. Prevalence of algal toxins in Alaskan marine mammals foraging in a changing arctic and subarctic environment. *Harmful Algae* 55:13-24.

Domoic acid poisoning?

Cyanobacteria?

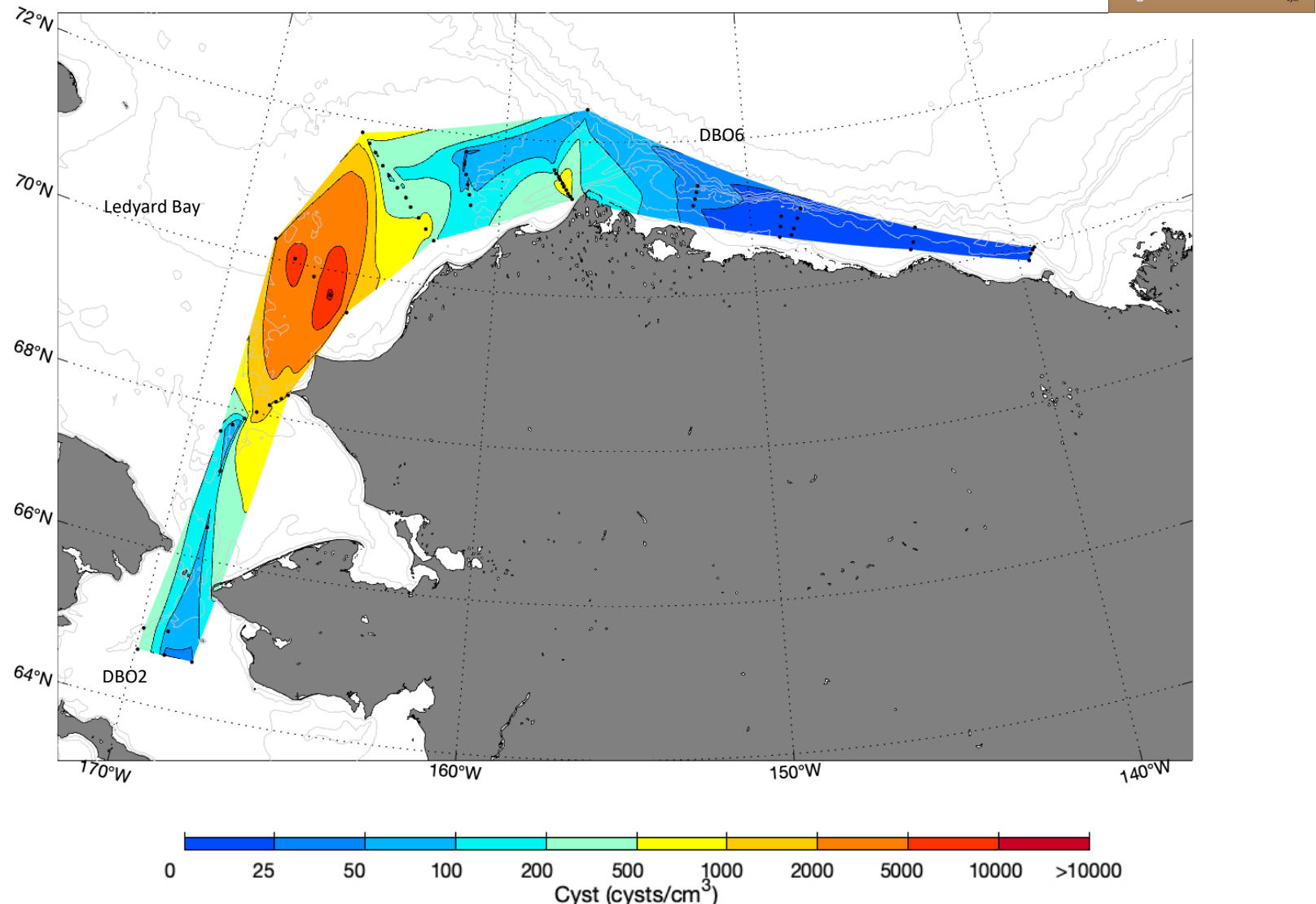
Average Sea Surface Temperature Departure from Normal
May-October, 2019



OISSTv2 courtesy of NOAA/PSD/ESRL

Healy 1801+ 1803 Cyst Map - 2018

- Massive *A. catenella* cyst bed documented in the Chukchi Sea
- This feature extends at least 200 km offshore and up to 600 km alongshore
- Cyst concentrations (up to 11,000 per cm^{-3}) are the highest ever reported for this species globally.
- Positive but low cyst concentrations in the Bering Strait and Beaufort Sea regions



Courtesy: Don Anderson, WHOI

Potential HAB Impacts in Alaska

- Ecosystem Impacts
 - Seabirds
 - Marine Mammals
 - Commercial Fisheries: Crabs
 - Forage species?
- Subsistence Harvest
- Water Security



Alaska HAB Challenges

- Lack of statewide monitoring program/emerging threats
- Response Coordination
- Communications
- Medical concerns in remote communities

