

# Harmful Algal Blooms in Alaska

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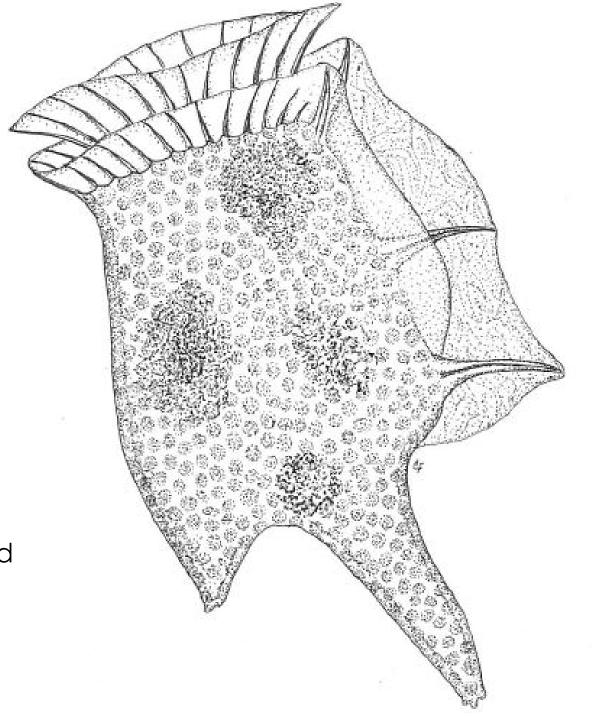
## Harmful Algal Blooms

### **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

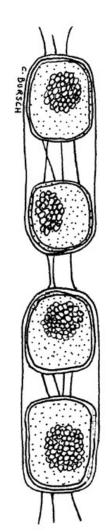
Paralytic Shellfish Poisoning – saxitoxins Amnesiac Shellfish Poisoning – domoic acid Diarrhetic Shellfish Poisoning – oxidaic acid

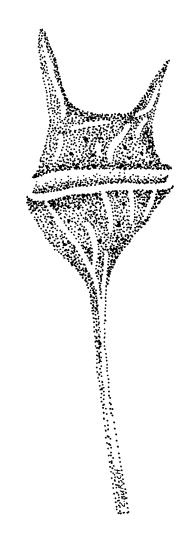
Cyanobacteria blooms - cyanotoxins



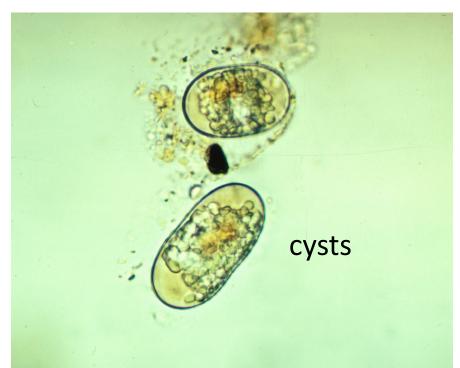
## HAB species are Phytoplankton

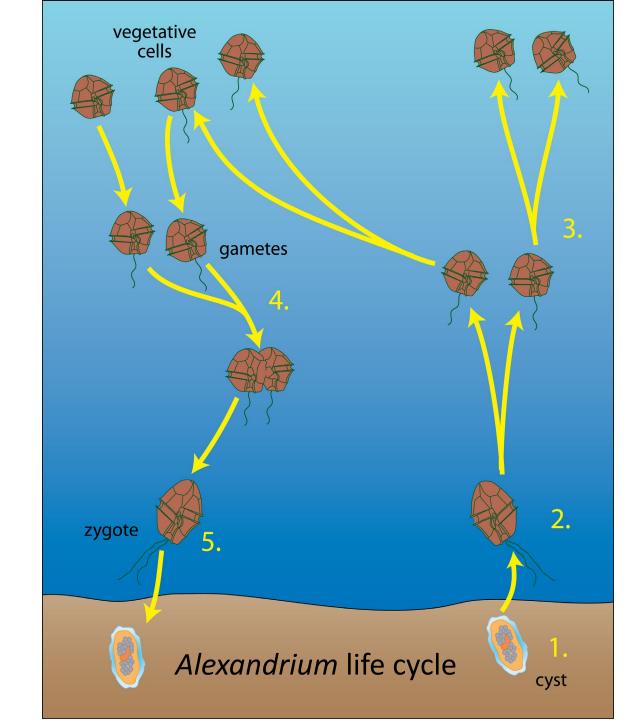
- Planktonic Algae
  - Protists with chloroplasts
  - Single celled or a group of single cells
  - Use chlorophyll a in photosynthesis
  - Live and die floating in the water
- Diatoms
- Dinoflagellates
  - Alexandrium (Paralytic Shellfish Poisoning)





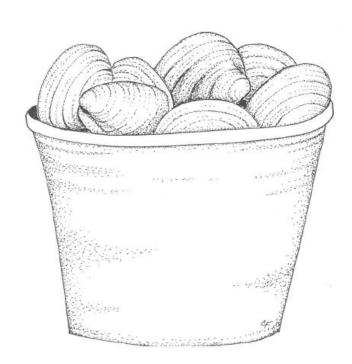


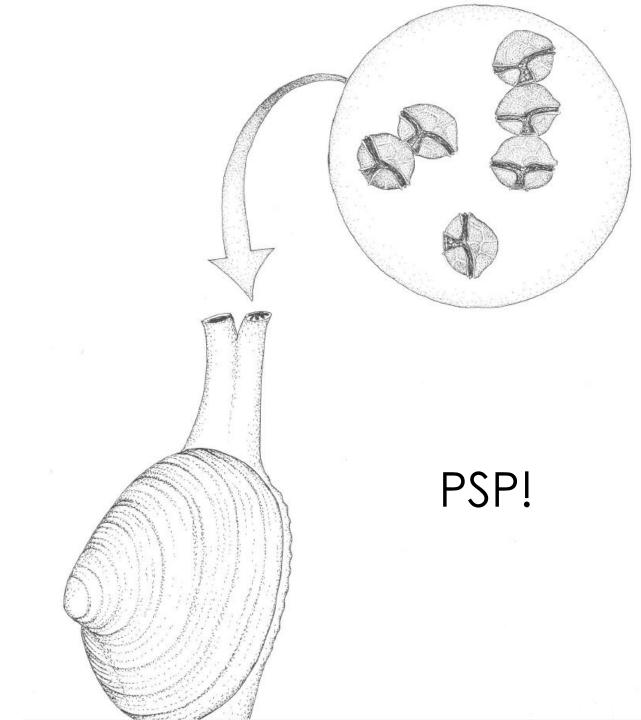




### **HABs** in Alaska

- 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.

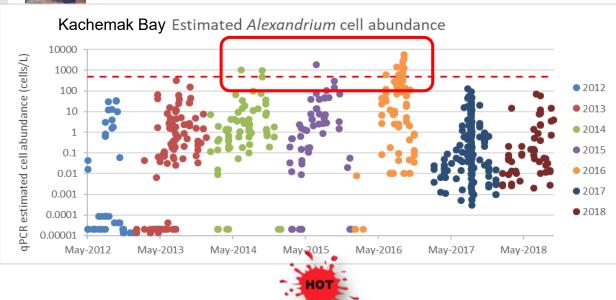
Contents lists available at ScienceDirect

Harmful Algae

ELSEVIER 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**









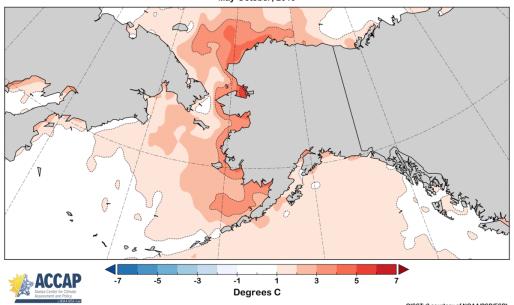
#### 2018/2019 Bering Strait / Chukchi Sea: Alexandrium Algae, Saxitoxin, and Clams

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.

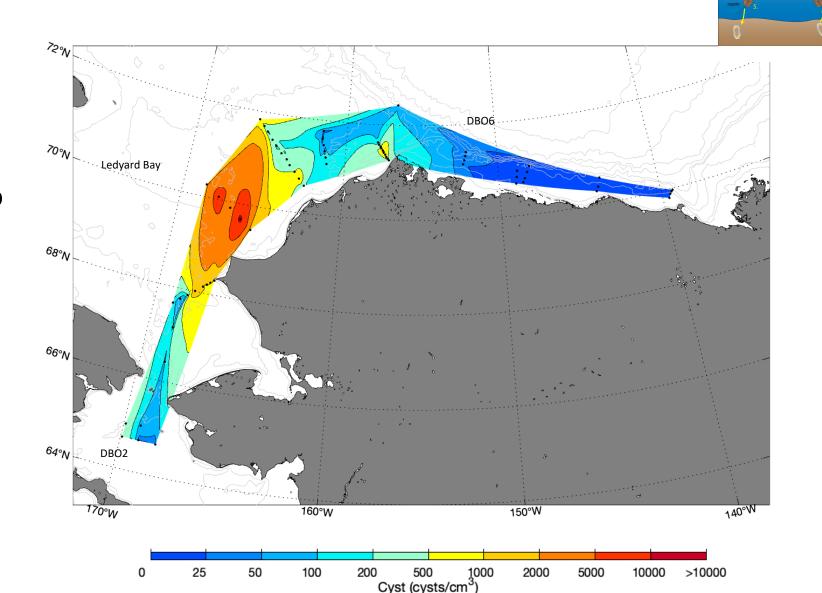
## Domoic acid poisoning? Cyanobacteria?

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



## 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<sup>-3</sup>) 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

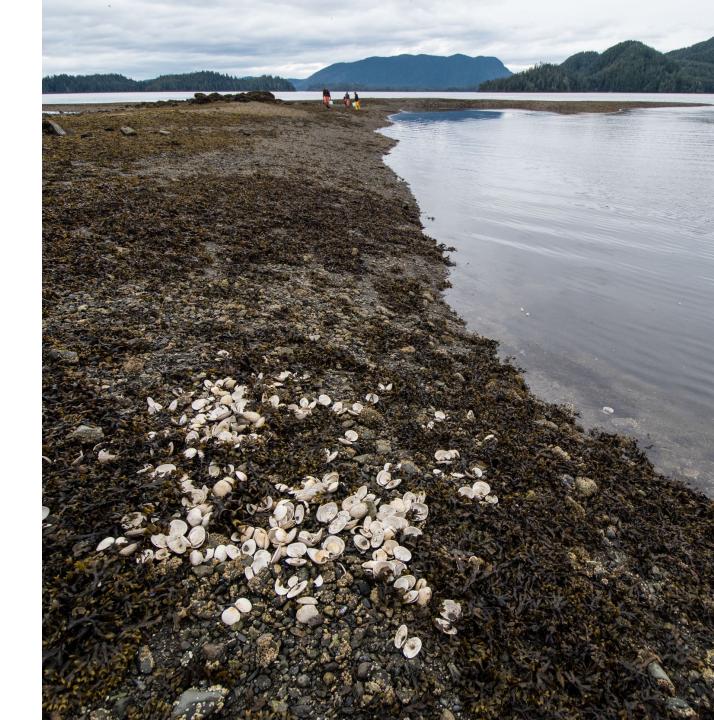
- Ecosystem Impacts
  - Seabirds
  - Marine Mammals
  - Commercial Fisheries: Crabs
  - Forage species?
- Subsistence Harvest
- Water Security



## Alaska HAB Challenges

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





## **NCCOS HAB programs**

- Competitive funding
   ECOHAB, MERHAB, PCMHAB
- Research & tech development
   Labs: Alaska, North Carolina,
   South Carolina & Maryland
   Example: CyAN partnership
- Community monitoring
   Phytoplankton Monitoring Network



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## NOAA awards \$10.2 million for harmful algal bloom research

Projects will help improve efforts to protect marine resources, public health and coastal economies

Oceans & Coasts | harmful algal blooms (HABs)







October 1, 2019 — NOAA will fund 12 new research projects around the country to better understand and predict harmful algal blooms (HABs) and improve our collective response to them.



NOAA's National Centers for Coastal Ocean Science (NCCOS) is allocating \$10.2 million in FY 2019 to fund HAB research across the nation. Approximately \$8.4 million of that will cover the first year of new 3- to 5-year projects, and \$1.78 million will go to 3-year projects already in process. Funded under NOAA's ECOHAB and MERHAB programs, new projects will begin in Alaska, California, Chesapeake Bay, Florida, the Great Lakes, New England and the Pacific Northwest. A full list of the new grant awards is available online.

Award recipients will conduct research to identify conditions that increase bloom toxicity; model toxin movement from the water into shellfish, fish and marine mammals; and improve toxin monitoring and forecasts. NCCOS research programs help states and regions around the nation mitigate the effects of HABs, which can include contaminated drinking water, fisheries closures and disruption to recreation and tourism.

Among the new and continuing projects in Florida, totaling \$2.9 million in 2019 will be efforts to help the state continue to improve how it monitors and