Harmful Algal Blooms and Climate Change

How Global Warming Helps Toxic Plankton

What causes a bloom? How will these change?

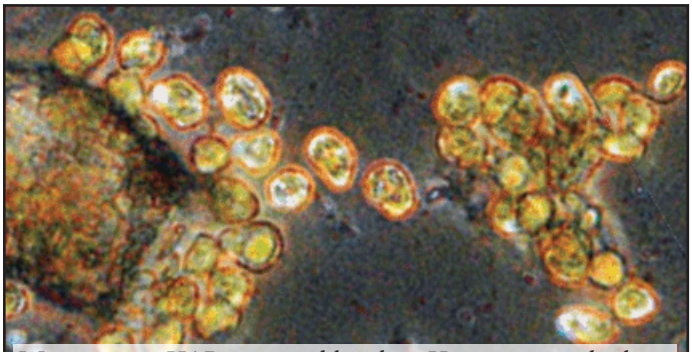
Warmer water: like land plants, most phytoplankton grow better in warmer conditions. Some plankton can't bloom at all unless the water is above a certain temperature. As our climate warms, we can expect bloom-friendly water temperatures for longer periods of the year.

Lower salinity: for *Alexandrium*, which causes PSP, having lower salinity (as after a hard rain) can help a bloom start. Climate projections call for more and harder rains in Southeast as the climate warms, so we should expect lower salinity surface waters more often.

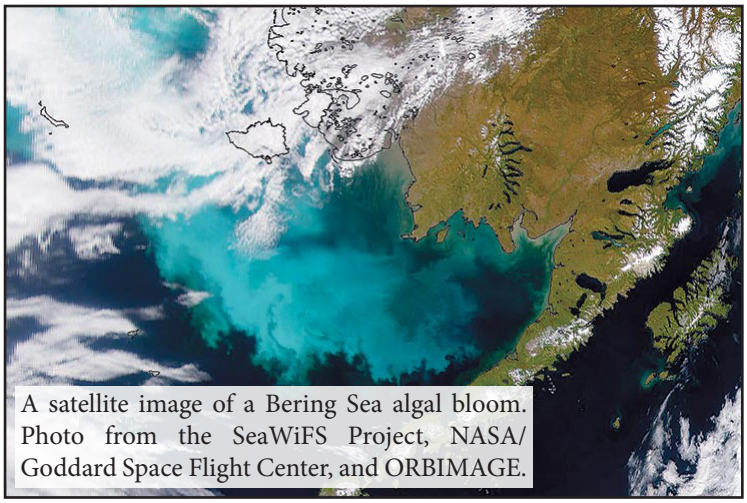
Lots of nutrients: many plankton species bloom best when nutrient-rich waters upwell from the deep ocean. This is not a strong factor in *Alexandrium* or *Pseudo-nitzschia* blooms, however. It is unclear how nutrient availability will change as climate change progresses.

More light: most phytoplankton need lots of light to start growing quickly. It is unlikely that light levels will be significantly affected by climate change.

Higher CO_2: like land plants, phytoplankon "eat" carbon dioxide. As climate change progresses, this may make it easier for plankton to grow quickly, but it is still not clear which species will benefit the most.



Warm-water HAB species like this *Heterosigma akashiwo* may become more common in Alaska as climate change progresses. This species can be toxic to fish. Photo: SeaGrant



A satellite image of a Bering Sea algal bloom. Photo from the SeaWiFS Project, NASA/ Goddard Space Flight Center, and ORBIMAGE.

A few notes about safety:

1) Remember, shellfish can be unsafe at ANY time of the year! Toxic blooms are much more common in the summer, but many clam species can hold on to toxins for months.

2) Many blooms do not discolor the water. Do not assume that you will be able to see a HAB.

What about ocean acidification?

Ocean acidification (OA) is often known as the "evil twin" to global warming. As carbon dioxide is absorbed by our ocean, the water becomes gradually more acidic. This is bad news for shell-forming organisms, including quite a few phytoplankton species, who will have difficulty making their shells as OA progresses.

But how will OA affect HABs? While research is still ongoing, preliminary research on ASP-causing Pseudonitzschia suggests that it produces more toxin as the water becomes more acidic. Alaska already has some of the most acidic water in the nation, so as plankton species move north with warmer water, they may start producing more toxins simply due to their migration. Meanwhile, as our water gets more acidic, we may see an increase in the toxicity of our resident phytoplankton species as well.

Find out more:

Find out the latest HAB news at seator.org. Contact the Sitka Tribe's Environmental Lab for information about testing your shellfish, harvesting protocols, and current conditions.

Call us at 907-966-9650 or email seator@sitkatribe-nsn.gov.

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