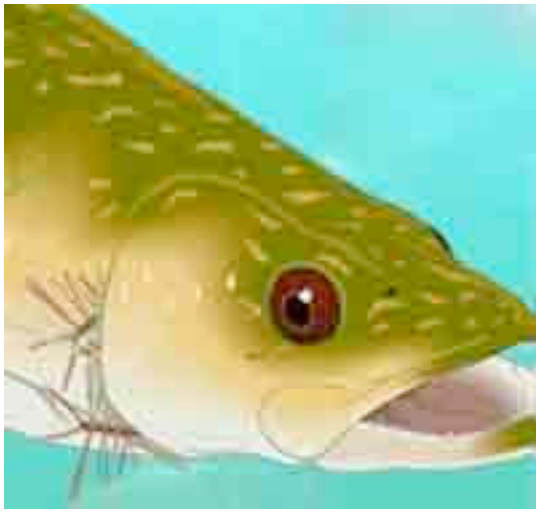
Toxic and Harmful Algal Blooms
"Help! It's an HAB!"

Harmful algal blooms (HABs) negatively impact organisms in a variety of ways that can range from cell and tissue damage to organism death. Although toxin production is one of the major mechanisms by which the blooms cause such severe damage (see "Tracing the Toxins" at http://www.bigelow.org/edhab/tracing_toxins.html for more information), there are several other consequences of HABs.



Gill irritation – Some HAB species, specifically spine-forming diatoms and mucus-producing algae, cause significant problems for fish and crustaceans. When large numbers of spiny phytoplankton or excess mucus gets caught in the animals' gills, the animals can experience respiratory failure.

Starvation – Many harmful algal species actually cause other organisms to starve to death. Some species interfere with the feeding mechanisms of zooplankton; others are unpalatable due to a mucus layer, size restrictions, or taste. And finally, some HAB species that are palatable to zooplankton have such poor nutritive value, the zooplankton actually starve even though they are physically eating.

Poor reproduction – Some plankton and filter feeders are capable of consuming HAB species, but exhibit decreased reproductive success as a result. For this reason, a consequence of many blooms has included a decrease in species abundance and diversity.

Predation – There is evidence that another capability of at least one harmful algal species is predation. After killing the fish or at least making it lethargic, *Pfiesteria piscicida* digests the fish tissue.

Anoxia and reduced water quality – High concentrations of decomposing and respiring cells can contribute to anoxic conditions and the formation of toxic sulfides in the water. The lack of oxygen, in addition to the production of sulfides, creates a deadly scenario for most marine life.

Reduced light penetration – Dense blooms of harmful algal species can significantly reduce the light penetration in the water column. This negatively impacts the survival of seagrasses that depend on the sunlight to provide their energy for photosynthesis. For more information on HABs and light penetration, see Bigelow's HAB site: http://www.bigelow.org/hab/color.html.

So, what can we do about HABs? Scientists, governments, non-profit groups and industries are currently trying to decide how to answer that important question. Many suggestions have been proposed to mitigate the effects of HABs and to develop technologies to help detect and prevent blooms in the future. These suggestions range from developing monitoring programs that provide early detection of harmful algal blooms, to introducing a potential pathogen to kill the bloom. Many of the techniques have been tested and some of them have even been incorporated in certain regions of the world (http://www.bigelow.org/edhab/techniques.html). The most challenging aspect of dealing with HABs is that any action taken to control the bloom can have enormous impact on the rest of the environment.