

HARMFUL ALGAL BLOOMS IN THE GREAT LAKES

What they are & how they can affect your health

What are algal blooms?

What makes them harmful?

There are many species of single-celled organisms living in the Great Lakes, including algae. Algae are a natural part of our waterways. When certain conditions are present, such as high nutrient or light levels, these organisms can reproduce rapidly. A dense population of algae is called a bloom. Some of these blooms are harmless, but blue-green algae, which are referred to as cyanobacteria by the scientific community, are capable of producing a toxin. Because cyanobacteria can produce toxins, they are commonly referred to as harmful algal blooms or HABs. HABs pose health threats to humans, animals and fish. The most common species of toxic cyanobacteria in the Great Lakes are:

Microcystis aeruginosa

Anabaena circinalis

Anabaena flos-aquae

Aphanizomenon flos-aquae

Cylindrospermopsis raciborskii

Cyanobacterial Blooms

Cyanobacteria are bacteria that are able to photosynthesize, hence the blue-green color. Cyanobacteria live in fresh, brackish, or marine water. They usually are too small to be seen individually, but sometimes can form visible colonies. Some cyanobacterial blooms can look like foam, scum, or mats on the surface of fresh water lakes and ponds. The blooms can be blue, bright green, brown, or red and may look like paint floating on the water. Some blooms may not affect the appearance of the water. As algae in a cyanobacterial bloom die, the water may smell bad. If you detect an earthy or musty smell, taste or see surface scum's of green, yellow, or blue-green, the water may contain blue-green algae. Only examination of a water sample under the microscope will confirm their presence. In Lake Erie, the dominant cyanobacteria is *Microcystis*.

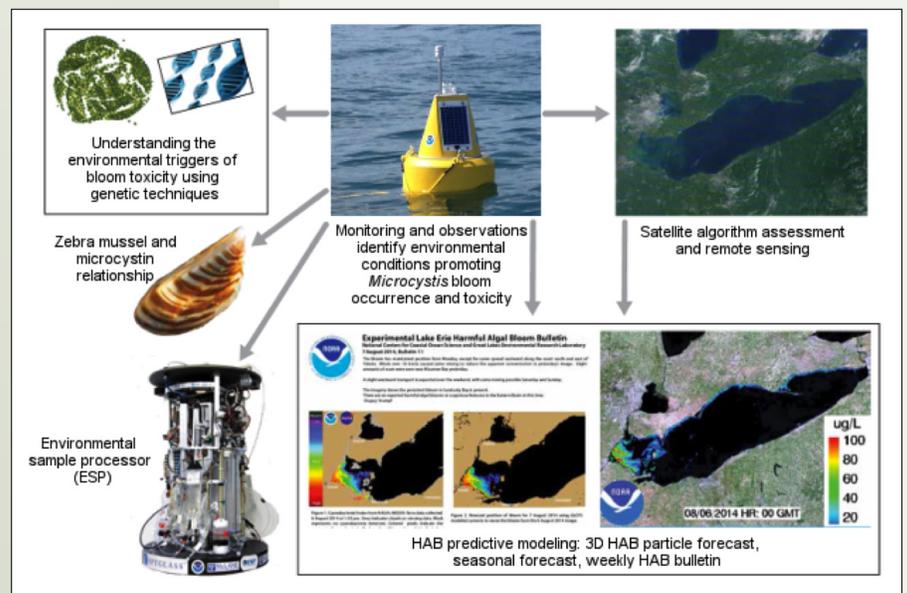
Right: The overarching research goal of the NOAA Great Lakes HABs program is to understand the drivers of bloom ecology, which will aid in enhancing predictive models that forecast bloom size, location and toxicity.



Above: The blue-green algal bloom in Lake Erie, as seen from the MODIS satellite on September 6, 2015, highlights the worst bloom of this century in terms of extent and density. The bloom was less concentrated at the time of this photograph than in August 2015.

NOAA's HAB Program Research Approach

The NOAA Great Lakes HABs (Harmful Algal Blooms) program is a collaborative effort between scientists at GLERL and the Cooperative Institute for Limnology and Ecosystems Research (CILER). Our team is focused on understanding ecosystem health effects in the Great Lakes related to human-influenced water quality degradation. We use an integrated approach to understand the environmental drivers of and predict HABs. This approach consists of using satellite images, remote sensing, buoys, a comprehensive monitoring program in Lake Erie and Saginaw Bay, Lake Huron and advanced genetic techniques to understand the long and short-term seasonal dynamics of HAB events. The data we collect is used to inform predictive models used by key Great Lakes stakeholder groups, such as drinking water managers. Effective management of coastal ecosystems requires timely and continuing predictions of ecosystem change. Our research will improve forecasts of water quality to reduce risks to ecosystem health associated with recreational exposure, consumption, and treatment of Great Lakes water.



For more information, visit www.glerl.noaa.gov/res/HABS_and_Hypoxia

The Do's and Don'ts of HABs

Do avoid contact with water where algae are visible (e.g. pea soup, floating mats, scum layers, etc), or where water is discolored.

Do rinse yourself and/or your pet off after swimming in any ponds, lakes or streams, regardless of the presence of a visible algal blooms.

Do obey posted signs for beach closings.

Do contact your local health department or department of natural resources to report any large blooms.

Don't drink untreated surface water, whether or not blooms are present. Remember, **BOILING THE WATER WILL NOT REMOVE THE TOXINS.**

Don't use algaecides to kill the cyanobacteria— when the cells die, the toxins are directly released into the water.

Don't allow children or pets to play in or drink water where scum is present.

Don't water-ski or jet-ski over algal mats.

Don't irrigate lawns or golf courses with water that looks or smells bad.

MORE INFORMATION

Harmful Algal Blooms
www.glerl.noaa.gov/res/HABs_and_Hypoxia

Monitoring Data
www.glerl.noaa.gov/res/HABs_and_Hypoxia/WLEMicrocystin.html

HAB Tracker—GLERL's 5-day HAB forecast, updated daily
www.glerl.noaa.gov/res/HABs_and_Hypoxia/habsTracker.html

Toxins produced by cyanoHABs

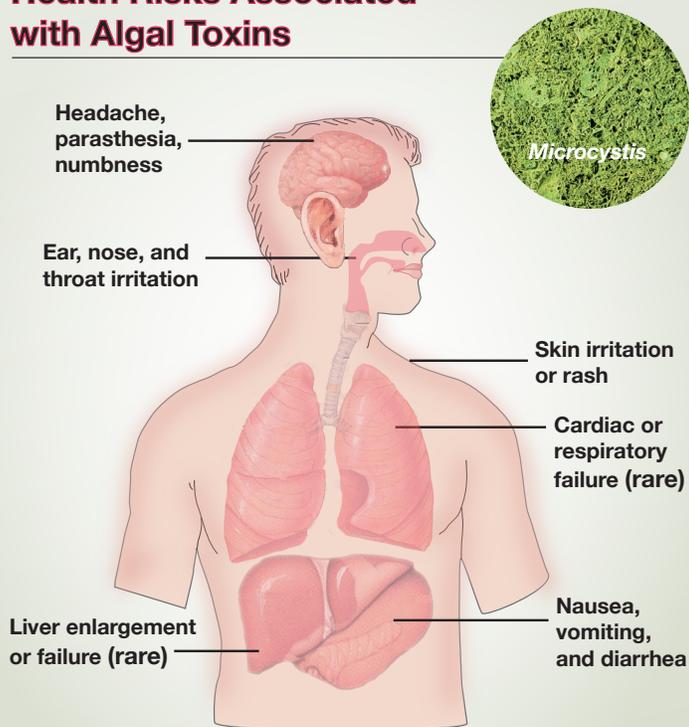
CyanoHABs can produce a wide array of neurotoxins, liver toxins (hepatotoxins), cell toxins, and skin irritants. Neurotoxins include anatoxin-a, anatoxin-a(s) and saxitoxin, and are commonly produced by the *Anabaena* and *Oscillatoria* species. Consumption of large amounts of these toxins by animals or humans can result in muscle cramps, twitching, paralysis, and cardiac or respiratory failure.

Hepatotoxins (liver toxins) include microcystin and cylindrospermopsin, and are produced by the *Microcystis* and *Cylindrospermopsis* species. These toxins produce symptoms including nausea, vomiting, and acute liver failure.

Dermatotoxins (skin irritants) include aplysiatoxin, lyngbiatoxin-a, and lipopolysaccharides. Nearly all blue-green algae produce dermatotoxins. These toxins produce symptoms including skin irritation, rashes, and gastrointestinal distress. Sensitivity to these toxins varies widely among individuals.

TOXIN	ACUTE EFFECT	SYMPTOMS
Anatoxin-a	Neurotoxicity	Not documented
Anatoxin-a (s)	Neurotoxicity	Not documented
Cylindrospermopsin	Hepatotoxicity, renal toxicity, chromosome breakage, aneuploidy	Enlarged liver, malaise, anorexia, vomiting, headache.
Microcystin	Hepatotoxicity	Paresthesia and numbness of lips and mouth within ½ to 3 hours after exposure, extending to face, neck, extremities; motor weakness; incoordination; respiratory and muscular paralysis.

Health Risks Associated with Algal Toxins



If you experience any of these symptoms, call your physician or the National Emergency Poison Control Hotline IMMEDIATELY.

POISON CONTROL HOTLINE 1- 800-222-1222