Blue-green algae in Florida waters

Effects on water quality

FAST FACTS

Blue-green algae occur naturally in bodies of freshwater.

High nutrient levels can cause algal blooms.

Blue-green algae, or "cyanobacteria," are structurally similar to bacteria but, like plants, use sunlight to grow. Blue-green algae occur naturally in both freshwater and marine (salt) water bodies. Most live with other types of algae and microscopic animals in floating "plankton."

Blue-green algae multiply quickly in lakes with high nutrient levels, particularly when the water is warm and the weather is calm. This proliferation causes "blooms" of blue-green algae that turn the water green, often with floating layers of green scum.

Some species of blue-green algae do not need much of the nutrient nitrogen present in the water because they use nitrogen gas from the air to grow. These "nitrogen-fixing" algae actually increase nitrogen levels in the water.

Lower levels of the nutrient phosphorus in the water usually limit growth of the blue-green algae. Therefore, reducing phosphorus levels in water bodies is the most effective means of preventing blooms of blue-green algae.

Blooms of blue-green algae may be harmful to lake ecosystems. Plankton is the base of the food chain in open water bodies; algae (phytoplankton) use sunlight to make food and are eaten by microscopic animals (zooplankton). Small fish eat the zooplankton, and larger fish and other large animals eat the small fish. However, blue-green algae are often toxic, difficult to eat or are of poor nutritional value for zooplankton. Consequently, zooplankton, particularly types that are the best fish food, often decline during blooms.

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Algae, like green paint on canvas, can be seen from the air as they spread across the St. Johns River near the I-295 bridge. Hot temperatures in August 2005 and excessive nutrients in the water helped contribute to the abundant and persistent algal bloom.

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This decline is followed by declines in numbers of small fish and then of larger fish and replacement of game fish (fish with high recreational or economical value) with rough fish (fish that have a low value).

Equally important, persistent blooms block sunlight that feeds plants growing on the bottom of lakes, resulting in the loss of rooted aquatic vegetation, which is valuable habitat. When blooms end, the decay of the blue-green algae consumes much of the oxygen in the water, causing fish to die. The dead algal cells settle to the bottom of water bodies, creating layers of soft sediments.

Blooms of blue-green algae were recorded as early as 1188. A small number of blue-green algae species are responsible for most freshwater algal blooms worldwide. Many are from the algal groups, or "genera," *Anabaena*, *Aphanizomenon*, *Cylindrospermopsis*, *Microcystis*, and *Planktothrix* (or *Oscillatoria*). Several species from these genera occur in freshwater lakes in Florida.

A species common in Australia, *Cylindrospermopsis raciborskii* was first identified in the United States in the 1950s and in Florida in the mid-1990s. Recently, it has been found in many lakes throughout Florida. *Cylindrospermopsis raciborskii*, a nitrogen-fixing blue-green alga, is different from some other bloom-forming blue-green algae that occur in Florida because it rarely forms surface scums and it appears to require less phosphorus to grow.

Cylindrospermopsis was continuously dominant in Lake Griffin in Lake County for at least three years. The St. Johns River Water Management District is working to restore this degraded lake through a multifaceted restoration program, which emphasizes reduction of nutrient levels, particularly phosphorus, in the lake water. Since phosphorus reduction, there has been a reduction in the magnitude and duration of *Cylindrospermopsis* blooms in Lake Griffin.

Blue-green algae and their associated toxins are believed to have existed in Florida lakes for thousands of years. However, information regarding toxins from blue-green algae and risks to humans, fish and wildlife is very limited. Also, little is known about the environmental conditions that cause toxin production.

Although toxins from blue-green algae have an aquatic origin, they appear to be more hazardous to terrestrial mammals. Primary problems associated with toxins from blue-green algae include damage to the nervous system or liver of animals that ingest the toxins.

Algal toxins are released when the cell dies or is ingested. Most toxic events attributed to blue-green algae involve livestock, when animals are forced to drink water from a lake where large amounts of algae have been concentrated along the shoreline due to prevailing winds. Previous toxic events where human health has been at risk from toxins from blue-green algae have evolved from the application of copper sulfate to control blooms in public water supplies. The mass death of algae caused by the copper sulfate released toxins into the water.

The few reported cases of toxins from blue-green algae in Florida lakes involved *Microcystis* and *Anabaena*, and more recently, *Cylindrospermopsis raciborskii*.

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Docks on the east side of the river at Mandarin reach into an algal bloom along the St. Johns River near Jacksonville.

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