

Summer Heat Produces Excessive Blue-Green Algae

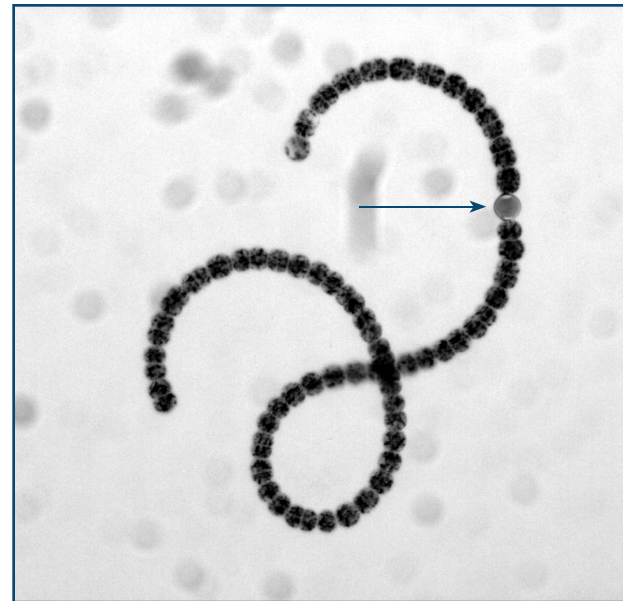
The hot, dry weather during this past summer provided ideal conditions for growing algae, particularly blue-green algae known to produce toxins. All Indiana lakes contain algae, the important base of the aquatic food chain. However, the concentration of algae varies greatly from lake to lake.

Blue-green algae, also known as cyanobacteria, prefer warm water rich in dissolved nutrients, especially phosphorus and nitrogen. These are the same nutrients that fertilize crops and lawns, but when they get into water, they fertilize algae and rooted aquatic plants. Some blue-greens have the ability to “fix” atmospheric nitrogen for use in their growth, much like legumes in your garden. Some blue-greens also have the ability to regulate their buoyancy – a big advantage for microscopic plants trying to stay near the water’s surface where the sunlight is strongest rather than sinking down to the bottom of the lake. Many blue-green algae are not preferred as food by grazing zooplankton because they may: be too large, have a slimy coating, have a disagreeable taste, or produce toxins that inhibit grazers.

Because of these advantages – nitrogen fixation, buoyancy regulation, less consumption by grazers, preference for warm water – it is not uncommon to see blue-green algae dominate a nutrient-enriched lake in mid- to late-summer.

It is the ability of some blue-greens to naturally produce toxins that had lake managers and public health officials throughout the Midwest concerned this past summer. Officials reported excessive growth of toxin-producing species of blue-green algae in Illinois, Indiana, Iowa, Michigan, Nebraska, and Kansas. Kansas officials issued a public health advisory on one lake and Nebraska issued Health Alerts on five lakes that had concentrations of the algal toxin, microcystin, exceeding 20 parts per billion. About 50 people in Nebraska reported becoming ill with diarrhea, vomiting, and nausea after being exposed to water in the affected lakes. Other people reported skin rashes and lesions.

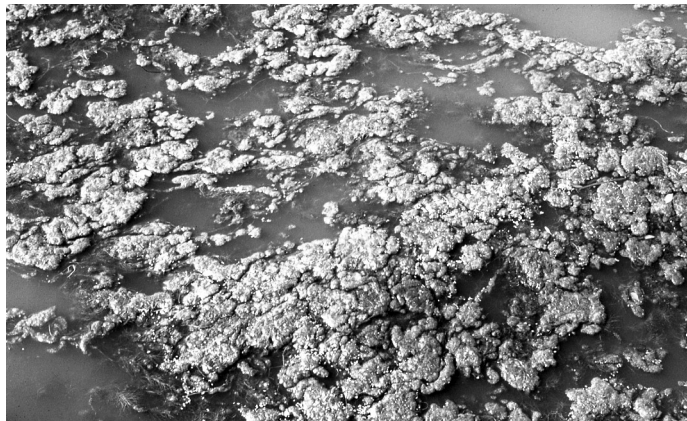
The Nebraska Health Alert cautions people to avoid “full body contact” with water in posted lakes. Microcystin was detected in 30 other Nebraska lakes but under the 20 ppb action level.



Anabaena, a blue-green alga known to produce toxins. This filament is composed of many individual cells. The round structure on the right is a heterocyst, the site of nitrogen-fixation.



A *Microcystis* bloom looks like thick, green paint.



Buoyancy causes some algae to get trapped at the water surface where the intense sunlight may stress them.

toxins and this was detectable only in trace amounts.

Sampling programs in Iowa, Illinois, and Wisconsin likewise found no detectable toxins produced by *Cylindrospermopsis*, causing some to speculate that this particular strain may not be a "toxin-producer." Many Midwestern officials feel like

Dog deaths have been reported this summer in Iowa, Minnesota, and Oregon. Nebraska further warns hunters to protect their dogs from toxic algae during the fall hunting season. Hunters shouldn't let dogs retrieve or drink from lakes or ponds suffering from algae blooms.

Many common blue-green algae, including *Aphanizomenon*, *Anabaena*, and *Microcystis*, naturally produce toxins during bloom conditions. During blooms of these species, the water may have a surface scum or look like thick, green paint. Toxins are produced as a response to stress during these blooms. Toxins can also be produced during stress caused by treating affected lakes with algaecides such as copper sulfate, so in-lake treatment is not recommended when toxin-producing algae are present. For more information about algal toxins, see the "Algal Toxins" Fact Sheet at: <http://www.spea.indiana.edu/clp/> under "Publications."

Cylindrospermopsis

One other blue-green alga that had people concerned during the summer of 2005 was *Cylindrospermopsis raciborskii*. Densities of this non-native species were high in lakes in Iowa, Illinois, and Indiana. (See *Water Column*, Vol. 13, No. 4 for more information.) Unlike

other blue-green algae, blooms of *Cylindrospermopsis* occur beneath the water surface and do not form a surface scum.

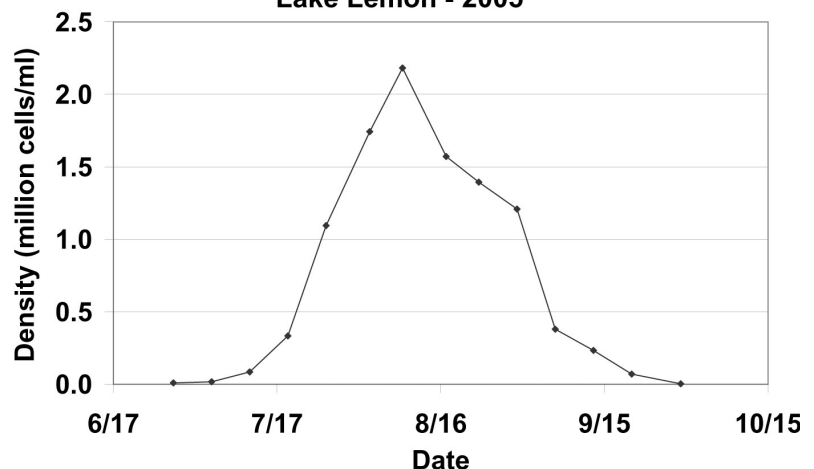
No lake had higher densities than Lake Lemon, a 1,700-acre reservoir near Bloomington, Indiana. Weekly monitoring at this reservoir by Indiana University documented a peak density of *Cylindro* of over 2.2 million cells per milliliter of lake water on August 9. Due to the diligence of Lake Lemon and local officials, a Public Health Advisory was issued for the lake on August 5. Only one sample, out of seven collected between July 26 and September 20, contained

they "dodged a bullet" this summer and are evaluating options for addressing *Cylindrospermopsis* and other toxin-producing blue-green algae for next year.

In addition to Lake Lemon, one sample was collected from Ball Lake in Steuben County by Ann St. Amand of PhycoTech and it contained only 12,000 cells/ml. Veolia Water Company (Indianapolis) monitored Eagle Creek, Geist, and Morse Reservoirs throughout the summer for algae and toxins. There is no state-wide algal toxin monitoring program in Indiana.

Cylindrospermopsis densities bloomed rapidly in Lake Lemon, and then declined almost as rapidly.

Cylindrospermopsis raciborskii Densities at Lake Lemon - 2005



Management

Not all blue-green algae are toxic; in fact, most are not. The production of toxins and the type of toxins produced can vary widely and change rapidly. A blue-green algal bloom can change from non-toxic to toxic or vice-versa without a significant change in appearance. Therefore, it is wise to use caution when lakes or ponds appear to have an algal bloom. Use the following precautions:

- Do not allow children or pets to play in water that looks like green paint or has floating algal mats on the surface
- Do not allow dogs or other pets to drink from such waters

Because use of algaecides such as copper sulfate can actually cause algal toxins to be released into the water, this is not a recommended management technique when toxin-producing algae are present.

Instead, it is best to manage the conditions that promote excessive blooms of blue-green algae in the first place. For example, implement the following practices to limit phosphorus additions to lakes:

1. Use phosphorus-free lawn fertilizers around lakeshore homes.
2. Do not fertilize within 20 feet of a lake's shoreline.
3. Do not dispose of grass clippings and leaves in the lake.
4. Have your septic system inspected and the tank pumped out at least every two years.
5. Work with watershed landowners in implementing Best Management Practices for nutrients.

In some cases, in-lake alum treatments may be used to precipitate phosphorus from the water column and inactivate phosphorus release from the sediments. Remember that any in-lake treatment requires careful evaluation by trained professionals.

Finally, it is important to monitor lakes for blue-green algal

blooms and to test, when needed, for toxin-producing algae and their toxins.

For a downloadable color poster of symptoms of blue-green algae blooms and precautions to take, go to: <http://www.pca.state.mn.us/publications/toxicalgaeposter.pdf>. This poster was created by the Minnesota Interagency Work Group on Blue-Green Algae.

ILMS Small Grants Program

If you are working for a healthier watershed and cleaner water in your lake, ILMS can help! The Indiana Lakes Management Society (ILMS) is pleased to offer small grants to qualified organizations, thanks to a Section 319 Grant from the Indiana Department of Environmental Management. Goals with this program are to support active lake associations and to help establish new lake or similar associations.

Uses for grant funds could include:

- ✓ Education and outreach to local lake communities
- ✓ Promotion of lake associations
- ✓ Reduction of boating impacts
- ✓ Identification and management of watershed issues
- ✓ Volunteer water quality monitoring and associated equipment purchases
- ✓ Other similar efforts

NOTE: Funds cannot be used as match for other grant programs

Ten projects funded by the Small Grants Program are already complete or currently underway. In 2004, Chapman Lakes Association used ILMS funds to help expand the educational efforts of the Lake Learning Expo. The LaGrange County Lakes Council is currently developing an outreach program using ILMS funds. ILMS has also helped fund on-the-ground work such as streambank stabilization

projects on Putney Ditch (Barbee Lakes) and Carpenter Drain (Crooked Lake). In Summit Lake State Park, ILMS funds will be used to help re-establish native aquatic vegetation in two ponds that have been decimated by grass carp. Two projects will use ILMS funds to establish or expand water quality monitoring efforts in LaGrange County and in the Valparaiso Chain of Lakes Watershed.

These examples represent just a few of the ways the Small Grants Program is helping local organizations improve water quality on Indiana lakes. The Indiana Lakes Management Society invites your organization to apply for the 2006 funding cycles. The deadlines for the spring, summer, and fall, 2006 funding cycles are February 1, May 1, and July 1. Please note that payment will be made in arrears and that a 25% cash or in-kind match is required. The maximum grant award is \$5000.

Get creative! ILMS is open to new ideas and will consider all kinds of projects. If your organization has been thinking of starting a project on your lake, now is the time! This is also a great opportunity to organize a lake association to help protect and enhance that lake you love.

For more information on how to apply, please contact Andi Pierce at 219-395-8424 or ilmsgrants@indianalakes.org or log on to www.indianalakes.org.

WATER COLUMN

**Published quarterly
by the Indiana Clean Lakes Program
as a medium for open exchange of
information regarding lake and
watershed management in Indiana**

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Study: Fertilizers Harm Freshwater Lakes

By Ryan J. Foley, Washington Post/The Associated Press

MADISON, Wis. – Farmers' routine application of chemical fertilizers and manure to the land poses a far greater environmental problem to freshwater lakes than previously thought, potentially polluting the water for hundreds of years, according to research published in June.

Phosphorus from fertilizers and manure has built up in the soil and will slowly end up in many lakes, where the nutrients lead to plant and algae growth in the water. The environmental problem, known as eutrophication, can turn pristine lakes into smelly, weed-filled swamps with lots of dead fish.

In a paper published in the *Proceedings of the National Academy of Sciences*, a University of Wisconsin-Madison expert blames the buildup largely on industrial agriculture's excessive use of fertilizer and manure since the 1940s.

The concentration could cause the eutrophication of lakes for centuries as the treated soil slowly washes into lakes and streams, writes Stephen Carpenter, a professor of zoology and a leading expert on freshwater lakes. The problem leads to fish kills and the growth of toxic algae that can make lakes unsuitable for swimming.

"A very small percentage of the phosphorus moves into the lake

each year and that small amount is sufficient to cause a great deal of water pollution," Carpenter said.

Carpenter and other experts previously believed reducing phosphorus that ends up in lakes would be enough to protect their water quality, but the new research said phosphorus must be removed from the soil altogether to have an impact.

The study concludes that major changes in soil management are needed to reverse the trend. It may add urgency to government efforts to stop phosphorus from fouling up lakes and streams.

Carpenter studied Lake Mendota, an urban lake in the Madison area that is a popular recreation and fishing spot, as a model for all freshwater lakes in rich farming areas. He said the lake's water quality has declined in recent decades, which will continue if left unchecked.

Carpenter said machines called manure digesters should be used to convert manure into a sludge that can be put in landfills or transferred to phosphorus-deficient areas. He also said buffer strips should be developed to protect waterways from runoff and new technologies found to remove phosphorus from soil.

"If we don't do something," Carpenter said, "the water quality will get considerably worse, the lake will smell bad, there will be algae blooms all summer long, and more and more of those blooms will be the toxic kind."

EPA Announces Clean Water Act §319 Successes

A new EPA Web site highlights successful projects under the Clean Water Act §319 Nonpoint Source Program. The featured projects have achieved documented water quality improvements, including the achievement of water quality standards and removal from state section 303(d) lists of impaired waters. The Web site initially includes 18 stories, and an additional ten new stories will be posted soon. Please visit this new Web site at: <http://www.epa.gov/nps/success/>. For more information, contact Stacie Craddock at 202-566-1204 or by e-mail at craddock.stacie@epa.gov.

Planet Sees Warmest September on Record

October 17, 2005 – Associated Press

WASHINGTON – Worldwide, it was the warmest September on record, the National Oceanic and Atmospheric Administration said Friday.

Averaging 1.13 degrees Fahrenheit (0.63 degree Celsius) above normal for the month, it was the warmest September since the beginning of reliable records in 1880, according to NOAA's National Climatic Data Center.

The second-warmest September was in 2003, with an average temperature of 1.02 degrees Fahrenheit (0.57 Celsius) above the mean.

For the United States it was the fourth-warmest September on record.

The average U.S. temperature for the month was 2.6 degrees (1.4 C) above average.

Only the West Coast and parts of the Rockies were near normal. Louisiana had its warmest September in 111 years of national records and an additional 27 states ranked much above average.



Credit: UW Extension & WI DNR

Some cities also set new records for warmest average September temperatures including: Houston-Galveston, TX; London, KY; Shreveport, LA; and Raleigh-Durham, NC.

For the month, rain and snowfall across the country were below average, with unusually dry conditions for much of the East Coast and parts of the Plains and Northwest. Georgia, South Carolina, and Maryland had their driest September on record.

Source: Associated Press

EPA Publishes New National Management Measures to Control Nonpoint Source Pollution from Forestry

EPA recently published new *National Management Measures to Control Nonpoint Source Pollution from Forestry*, a technical guidance and reference document for use by state, territory, and authorized tribal managers as well as the public in the implementation of nonpoint source (NPS) pollution management programs in forest settings. The new guidance contains information on the best available, economically achievable means of reducing nonpoint source pollution that can result from forestry activities. For more information about the guidance or to download the document (in PDF format), please visit the Web site at: <http://www.epa.gov/owow/nps/forestrygmt/>.

Got a question about your lake? Or lakes in general? Or about something you've read? Write to us at the WaterColumn and we will do our best to answer it.

MEETINGS



November 9 - 11, 2005. NALMS 2005: 25th International Symposium of the North American Lake Management Society. Monona Terrace. Madison, Wisconsin



March 8 - 10, 2006. NALMS 15th Annual Southeastern Lake and Watershed Management Conference. Columbus, Georgia



March 31 - April 1, 2006. Indiana Lake Management Conference, Pokagon State Park, Angola, IN. Contact: Mark Mongin; e-mail: markm@Sepro.com

April 25 - 28, 2006. Enhancing the States' Lake Management Programs, Conference Theme: "Planning A Survey of the Nation's Lakes." Chicago, IL. Contact: Bob Kirschner; e-mail: bkirschn@chicagobotanic.org

Perspectives

No spring, nor summer beauty hath such grace
As I have seen in one autumnal face;

—John Donne (1572–1631)
"Elegy IX: The Autumnal"

**Have you checked out the Indiana Clean Lakes Program Web page lately?
Take a look at <http://www.spea.indiana.edu/clp/>
and see what's new and happening with the Program and with Indiana lakes!**



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