

The Sea Grant Files

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Algae Blooms and You

Today I'm going to talk about scum, mainly the blue-green kind; the kind that can make otherwise beautiful lakes look ... and sometimes become ... toxic.

Here at the edge of Lake Superior, near the 47th parallel north, we haven't had to worry much about blue-green algae ... or as they are more properly called, cyanobacteria. Cyanobacteria are normally a small part of northern Minnesota's aquatic ecosystems and typically they remain as benign as other native photosynthesizers like green algae and diatoms.

This summer, however, for the second time that people have ever noticed, a cyanobacteria bloom formed in Lake Superior near the Apostle Islands. The first blue-green bloom was recorded near the sea caves in 2012. Both of these blooms are thought to be the result of significant pulses of nutrients delivered into the lake in connection to extreme rains ... first the epic 2012 Solstice Flood and now this year's violent south-shore soaker.

Blooms are easy to spot because massive amounts of algae discolor the water. They can look like a paint spill or pea soup. Diatoms and green algae can grow out-of-control, too, but blue-green blooms are the type that dominate lakes and the news. Not only do cyanobacteria shade out competitors by floating on the surface, they also go to war against phytoplankton by blocking their abilities to take up carbon. But what makes cyanos particularly scummy, however, is that many species can produce toxic substances, mostly neurotoxins, hepatotoxins, dermatotoxins, cytotoxins, and the like. Blooms that have turned toxic have killed pets, livestock, wildlife and people by causing liver failure or massive neurological damage. The cyano-species microcystis, for instant, can produce microcystin, one of the more easily detected toxins. Even microcystin that becomes airborne can cause neurological damage and liver tumors from prolonged exposure.

Reports of cyanobacteria blooms have increased in the U.S. but scientists aren't clear about how much of the reporting is because more people are noticing and calling officials, and how much is because environmental conditions are changing in a way that favors cyanobacteria.

Andy Bramburger, research associate with the University of Minnesota's Natural Resources Research Institute, is tackling such questions about bloom frequency and distribution with funding from Minnesota Sea Grant. Among other techniques, he and his colleagues are quantifying algae pigments in layers of sediment that date back to pre-European settlement days.

"We're looking at an array of lakes," said Dr. Bramburger. "They are in urban areas, farm fields, boreal forests and hardwood forests across the state. It is striking what a difference land use makes in influencing cyanobacteria growth and blooms."

Minnesota Sea Grant's Director, John Downing, and his colleagues Christine Cherrier from the University of Washington and Robinson Fulweiler from Boston University couldn't agree more. Their research, published last month in *Ecology Letters*, indicates that if the land use within a watershed is more than 60% agricultural, the receiving waters are likely to be plagued with

blooms. Why? Runoff. Precipitation that washes fertilizers and pollutants into lakes and rivers fuels cyanobacteria and algae growth. Dr. Downing said, “In many places where cyanos have been the subject of long-term monitoring, they’ve increased abundance and dominance. The likely causes are increased nutrients due to human activities and climate change yielding higher water temperatures that favor them.”

Scientists like Downing and Bramburger are definitely considering the ways Earth’s changing climate might be influencing the color of Minnesota lakes. In addition to extreme rain producing more extreme nutrient pulses, warmer temperatures encourage algae production and prolong the growing season. Some studies also suggest that cyanobacteria fare better in warmer, less dense water because diatoms, a more desirable but typically heavier type of algae, sink.

Minnesota Sea Grant isn’t alone in the quest for data about the frequency of harmful algae blooms. This week, Hilary Snook, a senior scientist for US Environmental Protection Agency’s New England Regional Laboratory, will be in Duluth talking about the Cyanobacteria Monitoring Collaborative and what citizens and students can do to help monitor blooms.

He’ll be introducing BloomWatch, a downloadable app that became available earlier this year. BloomWatch uses crowd-sourcing to find and report potential harmful algae blooms. “Blooms can show up and then dissipate quickly due to weather,” said Mr. Snook. “Often, state or local officials don’t have time to assess a bloom before it’s gone. We’re hoping you and your smartphone helping will improve our ability to understand where, how, and when cyanobacteria may be proliferating and causing issues.”

In addition to BloomWatch, Mr. Snook says people can become involved in the Cyanobacteria Monitoring Collaborative through CyanoScope and the Collaborative’s Cyanomonitoring component. Both CyanoScope and the Cyanomonitoring program involve equipment and commitment that might appeal to Lake Associations and classrooms. In fact, the Cyanomonitoring component asks that people like yourself look at the blue-green phycocyanin pigment in water samples using a fluorometer to help experts like Snook and Bramburger to determine where, when and why cyanobacteria are blooming.

The Minnesota Pollution Control Agency is also collecting harmful algae bloom reports to better understand land use around bodies of water.

I’m loath to call him our “scum expert” but if you have questions or comments about cyanobacteria, I encourage you to call or email Minnesota Sea Grant’s new Inland Lakes Specialist, Chris Filstrup. Dr. Filstrup’s expertise covers phytoplankton ecology and factors promoting the development and toxicity of harmful algal blooms. You can reach Chris Filstrup at 218-726-6605 or by email at filstrup@d.umn.edu.

This episode of the Sea Grant Files was produced by Sharon Moen, Mariah Schumacher, Maija Jenson, KUMD, and me, Jesse Schomberg. To listen to more episodes of The Sea Grant Files and to subscribe to our podcast, visit the Minnesota Sea Grant website at www-dot-seagrant-dot-umn-dot-edu. You can also follow Minnesota Sea Grant on Facebook, Twitter and Instagram. Thanks for listening.