New technique shows 50-year history of toxic algae in Lake Wingra

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(PhysOrg.com) -- As public health officials worry about rising concentrations of cyanobacteria - often called blue-green algae - in lakes, scientists are concerned that a warming climate will stimulate the growth of cyanobacteria.

But few lakes have good records of cyanobacteria going back long enough to study the effect of climate. On Oct. 31, at the Geological Society of America meeting in Denver, Georgia Wolfe, a graduate student in environmental engineering at the University of Wisconsin-Madison, will describe her study of mud cores taken from Madison's Lake Wingra.

Cyanobacteria are more than a smelly nuisance along the lakeshore: Some species produce toxins that attack the nervous system or liver. Cyanobacteria are hard to predict but have been the cause of numerous swimming advisories. Last summer, cyanobacteria and other bacteria were the basis for a one-month closure at the public beach on Lake Wingra.

About one-quarter inch of mud accumulates on the bottom of Lake Wingra each year, says Wolfe, who studies with Katherine McMahon, an associate professor of civil and environmental engineering. To measure the annual load of cyanobacteria, she adapted a technique called quantitative polymerase chain reaction that counts the cyanobacteria DNA in each year's sample.

The study showed a link between warming lake water and increasing number of cyanobacteria, Wolfe says. In fact, about 10 times as much cyanobacteria was present in recent years compared to about 50 years ago.

Although the mud is shallow and oxygen is present, the DNA was preserved well enough to be counted, Wolfe says.

The cyanobacteria count was lower in years with a great deal of ice cover, Wolfe says, "and we know from Lake Wingra and Lake Mendota that ice coverage has been significantly decreasing, so we believe this is a response to global warming and climate change."

Having a reliable method for counting cyanobacteria could save a lot of effort, and allow many more lakes to be investigated, Wolfe says. "It can be difficult to get an accurate assessment of how frequent and severe blooms are. These cells can double in hours or days, so unless you have someone out there taking samples every day, you won't have complete picture of the algae in your lake."

Now, however, it may be possible to explore cyanobacteria around the world, Wolfe says, even in lakes that lack a good historical record.

Toxic cyanobacteria also occur in salt water, but they may be more dangerous in freshwater because they can render drinking water toxic, especially groundwater is depleted, increasing our reliance on surface water. One worrisome possibility is liver cancer, Wolfe says. "There is a fair amount of literature linking liver cancer clusters to surface water sources with high cyanobacteria counts."

Cyanobacteria also respond to high levels of nutrients in surface water, which are also rising, and many trends combine to make them look more dangerous, Wolfe says. "As temperature rises globally and surface water

temperature increases, we may see an increase in the frequency and severity of cyanobacteria blooms worldwide."

Provided by University of Wisconsin-Madison