**Study: Lake Erie vulnerable to bacteria blooms**

**Deep phosphorus runoff cuts needed, but may not be enough**

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Climate change and invasive mussels may have made Lake Erie a more inviting host for toxic bacteria in recent years, suggesting that ambitious goals are needed for reducing phosphorus runoff that feeds large blooms like the one that forced a temporary tap water shutdown in and near Toledo, Ohio, scientists said today.

Ever-larger mats of cyanobacteria, commonly known as blue-green algae, have formed on Erie since the early 2000s. They produce microcystin, a toxin that has killed pets and livestock and causes liver damage in humans. The soupy green glop prompted do-not-drink orders for two days in August that affected about 400,000 residents of northwestern Ohio and southeastern Michigan.

Experts blame the outbreaks largely on phosphorus that washes into the lake from fertilized farmland and sewage treatment plants. But in a report published online in the journal Water Resources Research, scientists said computer models found that neither rising phosphorus levels nor warming water temperatures alone could explain why the lake was becoming more hospitable toward cyanobacteria.

Invasive zebra and quagga mussels may play a role by feeding on beneficial types of algae and phytoplankton at the base of aquatic food chains while rejecting cyanobacteria, the scientists wrote. Climate change also may be providing a competitive edge by lowering wind speeds and making the lake surface smoother.

“When you have these calmer weather conditions, the cyanobacteria can rise to the surface and create scum layers that shade out other species of algae, which makes cyanobacteria more dominant in the water,” said Daniel Obenour of North Carolina State University, the report’s lead author, who worked on the study while affiliated with the University of Michigan Water Center.

More research is needed to determine whether those theories are correct, he said, although little can be done in the short term about the mussels or the effects of climate change.

Phosphorus levels can be controlled, said Hugh McDiarmid Jr., spokesman for the International Joint Commission, a U.S.-Canadian agency. It called this year for steep cuts, including a 46 percent rollback in Lake Erie’s western and central basins and a 37 percent drop for the Maumee River, which drains croplands and flows into the lake at Toledo.

“While analyzing all of the factors involved in the algae threat is important, it is imperative to act now on the factors we can influence,” McDiarmid said.

Even those rollbacks, however difficult to achieve, may be insufficient as the lake becomes more vulnerable, said Don Scavia, a University of Michigan environmental engineer who contributed to Obenour’s report.

“The caution of this paper is that if there’s a continuing trend and if it gets more sensitive, loads may have to be reduced even more than we’re targeting now,” he said.