

# Protecting streams that feed Lake Erie will take much work, study finds

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Credit: The Ohio State University

While current efforts to curtail agricultural runoff will improve the health of Lake Erie, much more work will be needed to protect the streams that feed the lake, new research shows.

A study of the western Lake Erie [watershed](#) found that increased conservation efforts will be needed on most of the farms in the watershed in order to protect arterial streams in Ohio, Michigan and Indiana.

The project, led by researchers at The Ohio State University and The Nature Conservancy, used computer modeling to get a handle on the impact of various conservation efforts in the western Lake Erie watershed. The area includes about 5.5 million acres of cropland, making it the most intensely farmed watershed feeding into the Great Lakes.

In light of [harmful algal blooms](#), conservationists, scientists and farmers are looking for ways to maintain robust agricultural production without causing damage to the surrounding ecosystem, said Stuart Ludsin, an associate professor of evolution, ecology and organismal biology and co-director of Ohio State's Aquatic Ecology Laboratory.

The bulk of that work has focused on reducing phosphorous in western Lake Erie by 40 percent. While that's an important goal, it doesn't address the harms from sediment and nitrogen runoff, Ludsin said. Nor does it focus on the health of streams throughout the watershed – waters that supply drinking water, provide habitat for fish and serve as a playground for anglers, kayakers and others, he said.

"Until our study, nobody has taken a hard look at how agricultural conservation practices aimed at protecting Lake Erie could influence the health of streams in the watershed. We're asking what happens to water quality and fish communities if we implement conservation measures," Ludsin said.

"It's important to not just focus on the lake, but to consider the arteries that feed it. Our streams are as degraded as the lake."

The study shows that both the streams and the lake will benefit if appropriate conservation efforts are implemented, he said. Conservation efforts include erosion control and nutrient management, including being selective about how much fertilizer is used and when it is applied.

The report includes predictions about the effects of a variety of conservation scenarios to give stakeholders information on which to base plans going forward, he said.

"Our models tell us what sort of difference it would make to streams if we reduced the amount of nutrients and sediments in [agricultural runoff](#) and leaching by 20, 40, or 60 percent," Ludsin said.

In embarking on this work, Ohio State and partners including The Nature Conservancy, the U.S. Department of Agriculture, Ohio Sea Grant and Texas A&M University aimed to provide information that could optimize efforts to protect waters and the species that live within them from runoff, while maintaining the profitability of farms.

They also sought to determine what kind of financial investment will be necessary to achieve meaningful environmental benefits, both under current environmental conditions and taking into account the pressure of continued climate change.

The results highlight the role various farming practices could have in improving water quality in streams and in Lake Erie. To view the full report, go to [www.lakeerieceap.com](http://www.lakeerieceap.com) .

Agricultural runoff threatens fish in the majority of the western Lake Erie watershed, Ludsin said.

Through computer modeling, researchers found that stream health could improve with a modest increase in conservation efforts at farms in about

8 percent of the watershed. "But there's going to still be a huge part of the watershed where water quality is a concern," Keitzer said. Analysis of state monitoring data has shown that current [conservation efforts](#) have improved fish community health, but more work is needed to control erosion and fertilizer runoff into streams, said Conor Keitzer, a former Ohio State postdoctoral fellow who is now an assistant professor at Tusculum College in Tennessee.

Nearly half of the farmland in the watershed would need improved runoff controls for widespread benefit for the fish that live in the streams, the analysis found. The research team used available observational data from the streams and fish populations to create a watershed-wide model to estimate how water quality impacts fish populations.

"We can make a big difference, but it's going to take a lot of work and a lot of cooperation," said Keitzer.

Erosion control and nutrient management in high- and moderate-need acres identified in the report could mean cleaner water and healthier fish communities in about half the streams in the watershed, they found.

This assessment points to the need to look not only at phosphorous, but at nitrogen and sediment in streams, the researchers said. Each of the three threatens fish in those waters.

Based on established thresholds for North American streams, the researchers found that a majority of streams in the watershed had phosphorous and nitrogen concentrations that could lead to algal blooms, which compromise drinking water and kill fish. Almost half of the streams had sediment concentrations that could harm fish.

"Results of our project clearly show that we can achieve significant

improvements in both the streams and the lake, but it is going to take a lot of work," said Scott Sowa, director of science at The Nature Conservancy in Michigan.

"It also shows that we can't just focus on a single problem or stressor, like phosphorous. We are dealing with a multifaceted problem that will require a variety of practices and innovative collaborative solutions," he said.

The researchers estimated it could cost nearly \$150 million annually to treat farm acres deemed "high and moderate needs" based on their predicted contribution of nutrients and sediments to surface waters. Keitzer stressed that the figure was a rough estimate, but one that illustrates that large investments are needed.

"Continued interaction among agencies and stakeholders regarding appropriate management and conservation targets in relation to monetary costs seems prudent," the researchers wrote in the report.

They also pointed out that farms aren't the sole contributor to problems in the [lake](#) and the watershed. Municipal waste systems, rural septic systems and point sources also contribute.

"I think people forget the importance of these [streams](#), to both fish and people. This project will help us identify win-win solutions that benefit Lake Erie and the thousands of stream miles in its watershed," Keitzer said.

Provided by The Ohio State University

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