Scientists Use 5,000-Year-Old Sediments to Uncover New Insights About Lake Erie's Environment

12:00 pm, Tue September 29, 2026 – In a news research project funded by Ohio Sea Grant, researchers gathered useful data from cylindrical sediment "cores" extracted from bottom of Lake Erie

Layers of sediment have accumulated at the bottom of Lake Erie over thousands of years, from the end of the last Ice Age through the Great Lakes region's industrial era. These ancient deposits, scientists found, can tell us a story about the lake's past and offer insights into its environmental conditions today.

To unlock the information preserved in these layers, a team of researchers led by Dr. Beverly Saylor of Case Western Reserve University recently reconstructed a history of sedimentation in Lake Erie's Central Basin. In the Ohio Sea Grant-funded study, the team analyzed deep sediment "cores" extracted from the lake bottom, yielding findings that can inform monitoring, management, and policy.

"Sediment records spanning thousands of years provide context for human impacts," said Saylor, a professor in Case Western's Department of Earth, Environmental, and Planetary Sciences. "They provide information on how the lake has responded to environmental change and are important for mapping out where sediment deposition and erosion are occurring today."



Sediment cores – cylindrical samples of mud, sand, and organic matter deposited over time – can offer insights into Lake Erie's environmental conditions, researchers found.

Why is this significant? Sediments function as "sinks" for nutrients and contaminants such as phosphorus and heavy metals by absorbing and storing them on the lake floor. They can also become sources of these pollutants by releasing them into the environment, influencing low-oxygen conditions, harmful algal blooms, and water quality in ways that are often hard to predict.

To better understand these processes, Saylor's team collected sediment cores from across the bottom of Lake Erie and used them as a record of lake conditions across the Central Basin over the past 5,000 years or longer.

"This is the first study to document all of these different components in the same sediment cores and at different locations across the Central Basin, allowing us to compare changes over space and time," Saylor said.

The large-scale project was made possible through a collaboration among scientists at multiple universities, including Dr. Onema Adojoh of Northwest Missouri State University, Dr. Joseph Ortiz of Kent State University, Dr. John Peck of the University of Akron, Dr. Mohamed Zobaa of the University of Texas Permian Basin, along with a total of 11 students. Dr. Gerald Matisoff, a professor emeritus at Case Western, also assisted from retirement.

To collect the cores, the team joined ongoing monitoring and research efforts aboard the U.S. Environmental Protection Agency's Research Vessel (R/V) Lake Guardian. The team split the cores lengthwise, scanned them for their magnetic properties and elemental composition, and sampled them further. They dated the cores using different methods that work best for certain time periods, including carbon dating, Lead-210 and Cesium-137 dating, and pollen analysis.

Together, these analyses allow researchers to observe how sediments have changed over time and space across the lake.

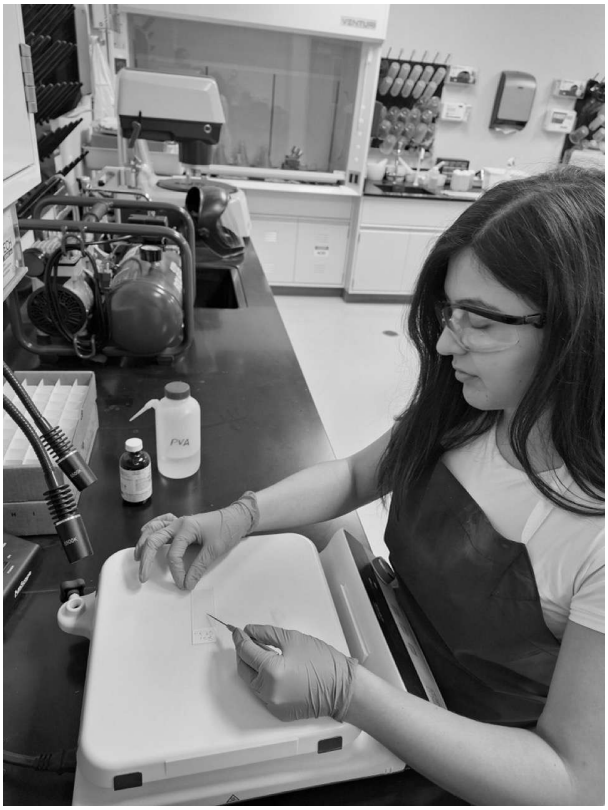
"For example, our data show lead, mercury, and organic matter increasing upward through the cores, along with two peaks in pollen from ragweed," Saylor said. "These changes record increased pollution and nutrients flowing into the lake, as well as increased land disturbance in its watershed during Cleveland's industrial period."

Farther up, the cores show a decrease or "leveling off" of these components, reflecting the lake's resilience after policies were put into place to improve water quality, Saylor said.



The large-scale study, led by Dr. Beverly Saylor of Case Western Reserve University, pictured here holding a sediment core on a research vessel, was a collaboration among researchers from five universities.

The team also used a technique called reflectance spectroscopy – which analyzes the interaction of light within a sample – to look for signatures of harmful algal blooms in the sediment to better understand what controls them.



Researchers analyzed the sediment cores in laboratory settings, using techniques like carbon dating, Lead-210 and Cesium-137 dating, and pollen analysis, in order to learn how sediments changed over time and space.

"The reflectance signatures provide information about cyanobacteria and diatoms," said Dr. Ortiz, an earth sciences professor at Kent State. "As the water quality in the central basin of Lake Erie has improved into the post-industrial era with stronger water quality regulations, we observe a decrease in cyanobacteria in the Central Basin and an increase in diatoms."

The team also recovered cores from the eastern part of the Central Basin, where sediment hasn't accumulated since the end of the Ice Age. At other locations, researchers found that sediment stopped accumulating about 3,500 years ago and then resumed accumulating again after zebra mussels colonized the lake floor in the late 1980s, Saylor said.

Notably, the project was able to confirm the presence of microplastics in the samples, providing definitive evidence of human impact on the environment, said Dr. Zobaa, an associate professor of geosciences at UT Permian Basin. The data also showed that over time, pine trees were gradually replaced by oak, demonstrating how people historically cleared pine forests for residential and industrial use, he said.

Results from the study can help inform managers taking steps to reduce nutrient loading into Lake Erie, Saylor said, and can explain how regional environmental change will impact future sediment movement and accumulation.

"This project holds the promise of improved modeling and monitoring of sediment accumulation in Lake Erie's central basin and can help practitioners and policymakers to better understand one of the factors that may contribute to hypoxia and anoxia (low and no oxygen conditions)," Saylor said.

Moving forward, the team is finalizing its radiometric dating of sediment cores, which will help narrow down the age range of the samples, Saylor said. This information is critical for testing hypotheses about how sedimentation and carbon and nutrient recycling vary across the lake.

Students were a crucial part of the team's work, Saylor added, including contributions from two Ohio Sea Grant summer interns (https://ohioseagrant.osu.edu/news/2026/q7y5h/osg-internship-program-cultivates-future-lake-erie-leaders) : Case Western undergraduate students Jingning Zhu and Ren Harris. The students participated in research and also worked with Dr. Scott Hardy, Ohio Sea Grant Extension Specialist, on public outreach and efforts to frame research for decision makers.

"The students were eager to learn new methods and excited about the work they were doing," Ortiz said. "It's great to help train the next generation of environmental scientists."

Ohio Sea Grant is supported by The Ohio State University College of Food, Agricultural, and Environmental Sciences (http://cfaes.osu.edu/) (CFAES) School of Environment and Natural Resources (http://senr.osu.edu/) , Ohio State University Extension (https://extension.osu.edu/) , and NOAA Sea Grant (https://seagrant.noaa.gov/) , a network of 34 Sea Grant programs nation-wide dedicated to the protection and sustainable use of marine and Great Lakes resources. Stone Laboratory is Ohio State's island campus on Lake Erie and is the research, education, and outreach facility of Ohio Sea Grant and part of CFAES School of Environment and Natural Resources.



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