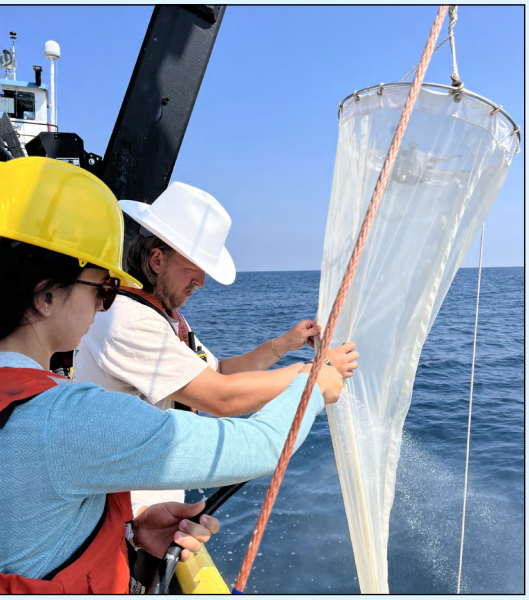
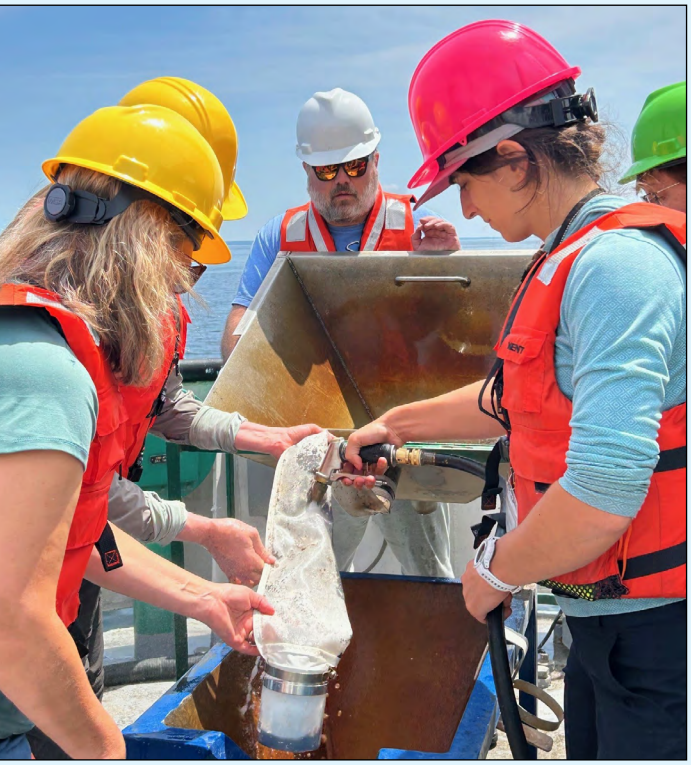
# Scientists and educators investigate Lake Michigan biological hotspots





Top: Several educators try out a plankton net to sample from Lake Michigan waters. (Photo courtesy of Amy Truemper) Bottom: Paris Collingsworth, center, is assisted by a group of educators as they process samples on deck of the Lake Guardian.

EVERY YEAR, when a group of Great Lakes educators spend 6–7 days aboard the *Lake Guardian* as part of the Shipboard Science Immersion, they work side-by-side with scientists engaging in real monitoring work. This year, the experience on Lake Michigan was no exception.

Illinois-Indiana Sea Grant's Great Lakes ecosystem specialist Paris Collingsworth, along with Anna Hill, his Purdue University graduate student, led 15 educators in a project to sample organisms in what are considered two of Lake Michigan biological "hotspots," Green Bay and the mouth of the St. Joseph River. Conditions are suitable at these two nearshore locations such that nutrients become concentrated and therefore, biological productivity increases.

The scientists and educators collected organisms at the bottom of the food web—zooplankton, benthic invertebrates and larval fish—in nearshore waters, and incrementally, out to open waters. Ultimately, the goal of the project is to assess whether these sites are having an effect on larval fish populations in Lake Michigan, especially alewife, which are important to the salmon diet.

Throughout much of the lake in recent years, large populations of quagga mussels have filtered out phytoplankton, leaving less food for larval fish, who depend on these resources.

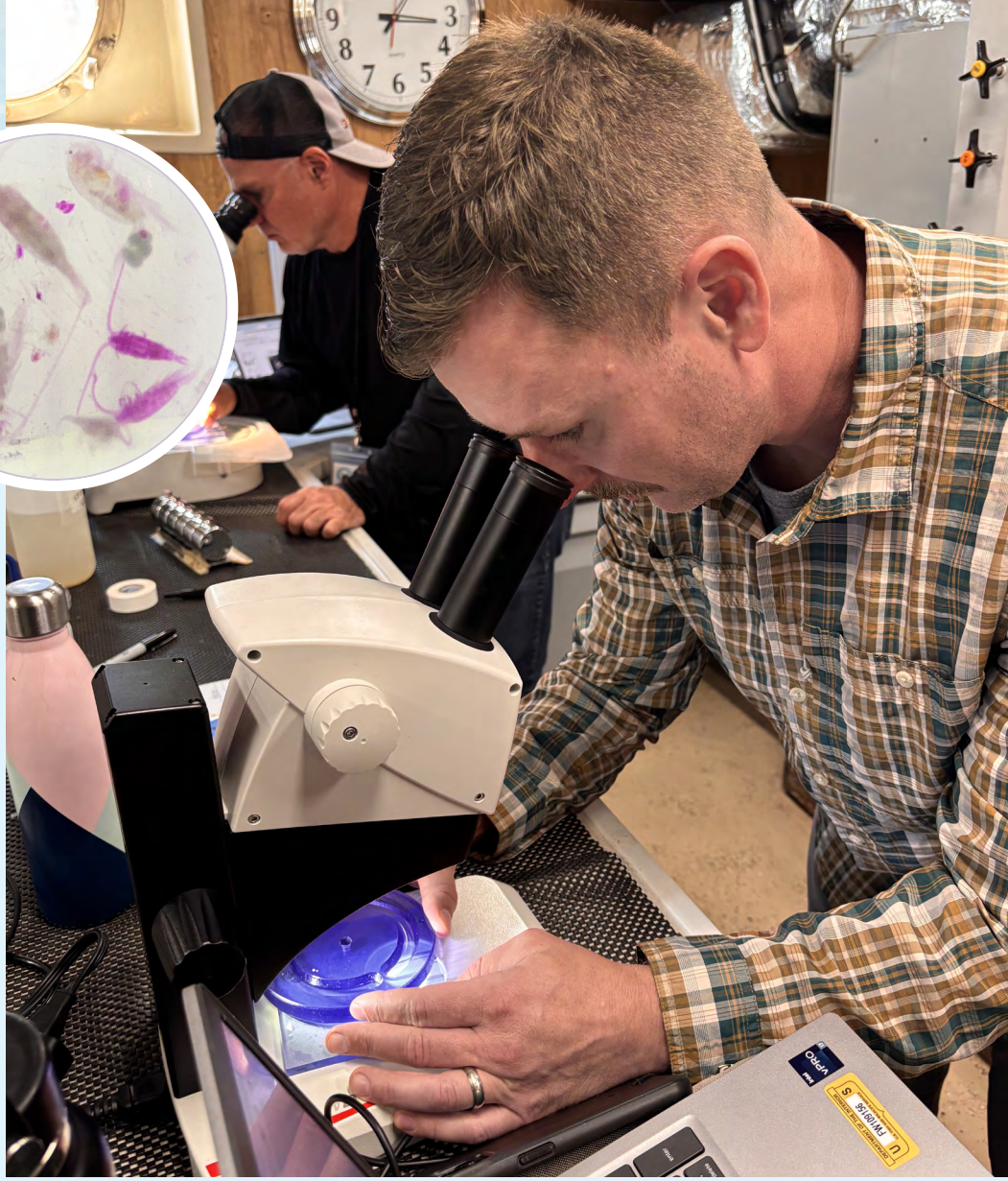
"One hypothesis for why the alewife population hasn't totally collapsed is there are sites in the lake that are consistently producing new alewife every year," said Collingsworth.

Aboard the ship, he led the field collection efforts on deck, managing the nets and overseeing sample collection, while Hill led the charge in the laboratory where organisms needed to be identified. They trained the educators to take on these tasks, finding their 'assistants' to be hardworking, enthusiastic, and inquisitive.

**"We were trying to show the educators what exactly goes into doing the science that they might read about," said Hill. "In the beginning it was a little like, oh my gosh, we have a lot of work to do, but it became very obvious that it wasn't an issue. It was work that needed to get done, and they were going to get it done."**

On deck, Collingsworth was also impressed by the educators' desire to learn more.

**“The teachers were very inquisitive,” he said. “I felt like I talked a lot because they had so many good questions. They asked why we care about alewives and we talked about salmon and the history of these fishes in the Great Lakes.”**



Educators in the lab learn to identify life near the bottom of the food chain. (Photo courtesy of Andrew Larsen) Inset: Tiny crustaceans called copepods are among the organisms identified from sample collections. (Photo by Amy Truemper)

None of this was lost on Ryan Johnson, a Chicago middle school science teacher. “Working with Dr. Paris Collingsworth and his research assistant Anna Hill on the larval fish study was one of the most memorable and engaging experiences I’ve had as an educator.

“We investigated the distribution of larval fish in southern Lake Michigan and correlated it with zooplankton density and biomass. I learned to use specialized nets and filtration systems to collect plankton and larval samples, process them in the onboard lab, and work as a team to begin to try and see how this data fit into the greater conversation of ecology.”

Preliminary results from the Green Bay and St. Joseph River mouth study sites revealed, as expected, that a gradient in terms of biological productivity does exist in samples taken as they moved from the nearshore into open waters. And zooplankton production was higher overall in Green Bay than in the St. Joe sites. Hence, the researchers were surprised that they found significantly more larval fish in St. Joe waters than in Green Bay.

“Where the St. Joe River flows into Lake Michigan is farther south than Green Bay, and the water was 5 degrees warmer, so this might explain the difference,” said Collingsworth. “The timing for when eggs hatch is related to water temperature.”

As they were sampling in Green Bay, the scientists also brought up in their nets large numbers of *Bythotrephes*, or spiny water flea, an invasive predatory zooplankton. “Their populations usually peak in the fall, and they were just everywhere—I have never seen them in that high a density,” said Collingsworth.

Further work on the collected samples and the data will take place at Purdue over the next semester or more.

Hill is wrapping up her master’s degree and will transition to find a job, potentially in communication. She cherished the experience of talking to the educators, especially the non-formal educators who opened her eyes to new possibilities and uplifting attitudes.

“The conversations that I had and the passion that I saw, not just for the science, but when I talked to them about their students, and all the programs that they have at their schools, it was inspiring for me,” said Hill.

And the inspiration went both ways. “I learned so much from Paris and Anna and the other teachers on board who were part of my direct team that I’m now going to be able to transfer to my students,” said Gerald Kovach, another Chicago middle school science teacher. “The fact that I can identify and then teach kids to identify the biodiversity of zooplankton is going to take it to a whole new level of excitement.”