Current tools for Asian Carp eDNA monitoring fall short, study shows

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Since 2010, detections of Asian Carp environmental DNA or "eDNA" have warned scientists, policymakers, and the public that these high-flying invaders are knocking on the Great Lakes' door. Scientists capture tiny DNA-containing bits from water and use genetic analysis to determine if any Asian Carp DNA is present. New research published by Notre Dame scientists shows that the tools currently used for Asian Carp eDNA monitoring often fail to detect the fish. By comparison, the new eDNA methods described in this study capture and detect Asian Carp eDNA more effectively.

The new study from the Notre Dame Environmental Change Initiative and freely available online in the journal *PLOS ONE*, compared performance between the current Asian Carp eDNA methods and new tools adapted from microbiology. Using an experimental pond containing Asian Carp the researchers found that current methods detected Asian Carp eDNA less than 5 percent of the time. In contrast, their new methods detected Asian Carp eDNA 95 percent of the time. The new, more sensitive toolkit for Asian Carp eDNA monitoring includes an updated DNA capture method and a new genetic test to both detect and quantify DNA. This quantification allowed the researchers to demonstrate that the new method captured five times more Asian Carp eDNA than the current method. Since the new method is also 40 times cheaper, they recommend the new toolkit to replace old methods in ongoing efforts for early detection of Asian Carp in the Great Lakes region and beyond.

"What this shows," says graduate student Cameron Turner, who led the research, "is that recent eDNA surveys for Asian Carp may have come back negative simply because they failed to detect eDNA that was actually there."

Advances in the sensitivity of detection methods are normal for any scientific field, and this study builds on previous eDNA research from Notre Dame. Combining greater sensitivity and lower cost is essential for eDNA monitoring of large areas such as the Great Lakes watershed.

"With greater sensitivity comes the need for stronger precautions and controls against contamination," undergraduate researcher Derryl Miller, also involved with the study, said. "Our development and testing of these new methods was only possible through increased vigilance for contaminating DNA."

Turner and his co-authors believe that their research will help prevent the spread and establishment of Asian Carp, and also provide guidance for eDNA monitoring of other invasive or endangered species. eDNA monitoring of rare species is growing rapidly worldwide and this study contributes new tools and knowledge to the field.

Provided by University of Notre Dame

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