

Selected highlights of the 2012 analysis of environmental DNA of Asian Carps in samples collected from selected locations in the St. Croix River and in the Mississippi River

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Invasive bighead and silver carp have been moving up the Mississippi River since their introduction in Arkansas in the 1970s, and recent incidental captures in Minnesota suggest they now threaten the state's ecosystems. In 2011 a variant of a technique that measures environmental DNA (eDNA)—fragments of DNA strands in the water—was deployed in Minnesota to evaluate this threat. It measured evidence of silver (jumping) eDNA carp at nearly half of all sites sampled in both the St. Croix and Mississippi rivers, sparking interest and concern. This particular analysis did not, however, employ sequencing (a definitive technique that describes precise matches), and recent reports that fish-eating birds can convey fish DNA has added to the uncertainty.

To address these concerns and provide more definitive information on the usefulness of the eDNA technique and the possible presence of bighead and silver carp in Minnesota, another eDNA experiment was conducted in 2012. It used a more rigorous set of eDNA analysis techniques that included sequencing and followed procedures developed by the U.S. Army Corps of Engineers for use in the Great Lakes. It was conducted as a collaboration between the USGS, MN DNR and the University of Minnesota under the auspices of the new Minnesota Aquatic Invasive Species Center. Fifty water samples from 8 sites were collected along with numerous controls.

Results of the 2012 study are described in detail in the USGS report (Amberg *et al.* Open File report of the USGS 2013-1080). Some highlights include:

1. There is presently no evidence of high silver carp density in either the St. Croix or Mississippi rivers. The 2011 results were not replicated and might be questioned for many reasons, including the different technique employed in 2011.
2. There is presently no data on possible bighead carp abundance because its eDNA was not measured in either 2011 or 2012 at any river location.
3. The US Army Corps of Engineers QAPP technique presently appears to be of limited utility in our region as a management monitoring tool because while it produced a modest 68% detection rate for silver carp eDNA in Iowa (where silver carp is abundant), and it did not produce known false positives, it was unable to detect bighead carp in Iowa where this species is abundant. Nevertheless, the promise of eDNA is great so continued research such as that being conducted as part of ECALS is merited.
4. The continuing capture of Asian carps in Minnesota and their large size and mobility speaks to the need to take all possible measures to develop better measurement tools (such as eDNA and enhanced netting) and to delay their movement, while developing control techniques.

*This document reflects the opinions of Dr. Sorensen only and is not a summary of the 2012 USGS Data report.
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