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eDNA: Myths vs. Facts

In January 2011, David Lodge, Director of the Center for Aquatic Conservation at the University of Notre Dame, released a paper attempting to position a newly developed testing method – eDNA – as proof positive that Asian carp breached existing barriers in the Chicago Sanitary and Shipping Canal. Lodge's paper makes inaccurate and misleading statements to "prove" his point.

Myth: "Invasion fronts detected with eDNA surveillance suggest that both species of carps are north of electric barriers installed to prevent fish passage."

Fact: To date, the use of eDNA testing methods has produced inconclusive results. Scientific peer review does not necessarily translate into successful practical application in the field. To date, eDNA testing and positive samples has never correlated to discovery of actual fish – dead or alive. The Asian Carp Regional Coordinating Committee recently agreed with this statement when posting an eDNA update to their website highlighting once again that, "A positive eDNA hit does not necessarily indicate the presence of a live carp. At present, eDNA evidence cannot verify whether live Asian carp are present, whether the DNA may have come from a dead fish, or whether water containing Asian carp DNA may have been transported from other sources, such as bilge water. "

("Asian Carp Control: eDNA Update," Asian Carp Regional Coordinating Committee, http://asiancarp.org/edna-update/)

Myth: "On June 22, 2010, commercial fisherman caught an adult bighead carp within 13 km of Lake Michigan, only 4 km upstream of the nearest positive eDNA detection, further supporting what the eDNA evidence suggested 8 months ago."

Fact: The discovery of a lone fish, in no way validates Dr. Lodge's assessment that eDNA evidence demonstrates that fish have passed the barrier. Furthermore, the fact that only one fish has been found despite substantial reliance on eDNA hits to direct testing efforts and more than 9 "positive" detections above the electric barrier, should raise serious questions about the accuracy of this tool in the field.

Various sources, including Assistant Director of Illinois Department of Natural Resources John Rogner, have highlighted time and time again that the lone fish discovered in Lake Calumet was likely not the result of natural movement but the result of human introduction. According to the U.S. Fish and Wildlife Service, there are 21 pathways through which Asian carp could bypass the barriers or otherwise be introduced upriver, including accidental and deliberate unauthorized releases by individuals and incidental inclusion of Asian carp in domestic shipments of food fishes.

(August 5, 2010, "Press Release: Testing Complete on Bighead Asian Carp Found in Lake Calumet," The Illinois Department of Natural Resources, http://www.asiancarp.org/documents/LakeCalCarptestscomplete72710.pdf)

Myth: "Fish surveillance programs, for example, traditionally employ nets or electro fishing gear. Because these tools usually have low capture probabilities per target organism, they are reliable indicators of occurrence for only species present at moderate-to-high abundance."

Fact: While Lodge suggests these methods are ineffective for population evaluation; they are the source of the one lone discovery north of the barriers to date. Additionally far less sophisticated hook and line fisherman were responsible for the discoveries in Lake Erie.

Conversely, a massive fish kill based on Lodge's positive eDNA detection result turned up completely ineffective. In December 2009 the Illinois Department of Natural Resources engineered a massive fish kill in the canal, using a piscicide called rotenone. Typically used in the event that the barriers are shut down for maintenance, this method is useful in determining fish populations present in a waterway. Consequently, only one Asian carp was found in the treated area, despite killing more than 200,000 pounds of fish. The failure to find a sustainable amount of carp, despite this massive fish collection further demonstrates the lack of evidence of any sizable population north of the barriers.

(December 6, 2000, "Fish kill called necessary to save the Great Lakes," by Kari Lydersen and Peter Slevin, http://www.washingtonpost.com/wp-dyn/content/article/2009/12/05/AR2009120502591.html)

Myth: "If numbers sufficient to establish a self sustaining population access Lake Michigan, both species are likely to reproduce, spread, and have substantial negative impacts in portions of the Great Lakes and many of its tributaries."

Fact: Four isolated Asian carp have been discovered in Lake Erie dating back to 1995; no sustainable population has taken route because these isolated fish do not exist in sufficient quantities to establish a reproducing population. What's more, most of the scientific literature to date suggests that Asian carp will not successfully establish a reproductive population throughout Lake Michigan, due to the low levels of plankton in southern Lake Michigan and the carp inability to reproduce without long stretches of moving water found in rivers.

This literature includes a report by Dr. Lodge in 2002 titled, "Ecological Predictions and Risk Assessment for Alien Fishes in North America," where he states that Black and Silver carp "would nether spread quickly nor be perceived as a nuisance in the Great Lakes." He elaborates that these species exhibit characteristics that are non-threatening to the Great Lakes ecology.

It was not until after Dr. Lodge received funding and significant public attention for his research on eDNA that he appears to have publicly stated that he was concerned about the potential impact of Asian carp. His unexplained change in opinion and personal stake in the continued use and success of eDNA raises serious questions about Dr. Lodges objectivity on the ability of Asian carp to spread within the lakes.

(November 8, 2002, "Ecological Predictions and Risk Assessment for Alien Fishes in North America," by Dr. David Lodge, VOL 298, http://www.cnr.uidaho.edu/fish510/PDF/AlienSpeciesKolar1233.pdf)