



## Great Lakes Fishery Commission

ESTABLISHED BY CONVENTION BETWEEN CANADA AND THE UNITED STATES TO IMPROVE AND PERPETUATE FISHERY RESOURCES

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### **PRESERVED FISH AND STABLE ISOTOPES HELP RECONSTRUCT HISTORICAL GREAT LAKES FOOD WEBS**

**ANN ARBOR, MI**—Using stable isotope analysis and museum-preserved fish, scientists at the University of Wisconsin - Madison have completed a study on the historical food webs of the Great Lakes and unraveled important historical information about the ecology of a diverse and highly threatened group of fishes called the deepwater ciscoes. The study, supported by the Great Lakes Fishery Commission and Wisconsin Sea Grant, may provide useful information to fisheries managers interested in restoring and rehabilitating these Great Lakes fishes.

Prior to their decline in the mid 20th century, the deepwater ciscoes were an ecologically important forage fish. By supporting the top predator, lake trout, the deepwater ciscoes linked this top predator to the bottom of the food chain. Due to pressure from overfishing and introduction of the invasive sea lamprey in the 1940's and 1950's, deepwater cisco populations in many of the Great Lakes were extirpated and two species became globally extinct. Lake Superior is the only lake that maintains a semblance of this unique fish community. Lake Nipigon, located north of Lake Superior in Ontario, also contains some of the deepwater deepwater ciscoes historically found in the Great Lakes.

With the deepwater species found in Lakes Superior and Nipigon, there is a possibility to use these lakes as a reintroduction source for deepwater coregonids in other Great Lakes, such as Michigan, Huron, and Ontario. However, the complex and difficult taxonomy of this set of species has made it difficult to identify and distinguish species among and within the lakes. Additionally, knowledge of the historical ecology of these species in the lakes remains limited. In order to evaluate the likelihood of a successful reintroduction, knowledge about the historical ecological roles of these fish is needed.

Jake Vander Zanden, the lead researcher on this project, and graduate student Stephanie Schmidt conducted stable isotope analysis of museum-preserved fish. Stable isotope values of carbon and nitrogen provide information about the feeding ecology of an organism and are used to piece together and describe food webs. Museum specimens dated as far back as the early 1900's.

“The results of our research show that the historical ecological diversity of deepwater ciscoes was consistent across all lakes,” said Vander Zanden. “This is important because, previously our understanding of the deepwater ciscoes was based on morphological differences.”

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The work by Vander Zanden and Schmidt demonstrates the potential to unravel the historical ecology of these species, information that may have important implications for efforts aimed at reintroduction and rehabilitation of fish stocks. Vander Zanden continued: “Even though the morphology of a species such as the shortjaw cisco may vary slightly from lake to lake, the results of this study suggest that they have a comparable ecological role in different lakes. Understanding the ecological roles played by each species may be useful for managers interested in restoring a diverse and ecosystem. Given this historical perspective, maintaining and even reestablishing the ecological diversity of deepwater coregonines could contribute to ongoing food web rehabilitation efforts in the Laurentian Great Lakes.”

Information about this and other research completion reports is available online at [www.glfrc.org/pubs\\_out/communi.php](http://www.glfrc.org/pubs_out/communi.php).

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*The Great Lakes Fishery Commission is an international organization established by the United States and Canada through the 1954 Convention on Great Lakes Fisheries. The commission has the responsibility to support fisheries research, control the invasive sea lamprey in the Great Lakes, and facilitate implementation of A Joint Strategic Plan for Management of Great Lakes Fisheries, a provincial, state, and tribal fisheries management agreement. WWW.GLFC.ORG*