Asian carp could cause some Lake Erie fish to decline, others to increase

4 January 2016

If they successfully invade Lake Erie, Asian carp could eventually account for about a third of the total weight of fish in the lake and could cause declines in most fish species—including prized sport and commercial fish such as walleye, according to a new computer modeling study.

However, most of the expected declines in Lake Erie will not be as extreme as some experts have predicted, according to the food-web study by the University of Michigan's Hongyan Zhang and colleagues from other American and Canadian research institutions. A few fish species, including smallmouth bass, would likely increase.

The study is the first to use a food-web model to examine the likely impacts of bighead and silver carp in Lake Erie. These plankton-eating Asian carp are established in watersheds close to the Great Lakes but not in the lakes themselves.

The invasive carp would likely affect Lake Erie's food web in two main ways: They would likely compete with native fish by eating their food, and juvenile Asian carp would likely become food for fish-eating fish.

According to the study, walleye, rainbow trout, gizzard shad and emerald shiners could all decline, with declines in emerald shiner of up to 37 percent. Smallmouth bass stood to gain the most, with increases of up to 16 percent.

A paper summarizing the findings was published online Dec. 30, 2015 in the journal *Transactions of the American Fisheries Society*.

The model results suggest that Asian carp could eventually account for up to 34 percent of the total fish weight in the lake, said Zhang, assistant research scientist at U-M's Cooperative Institute for Limnology and Ecosystems Research in the School of Natural Resources and Environment.

"Fortunately, the percentage would not be as high as it is today in the Illinois River, where Asian carp have caused large changes in the ecosystem and have affected human use of the river," she said.

Previous predictions of Asian carp impacts in the Great Lakes have ranged widely. Some experts say Asian carp could decimate Great Lakes fisheries and food webs, while others suggest the effects would likely be minor because much of the Great Lakes is not a suitable habitat for Asian carp.

>Results of the new study fall somewhere between the two extremes.

"This study goes beyond previous efforts in two significant ways. It focuses on the food webs and—where model input data were not available—it includes uncertainty estimates from experts," said co-author Ed Rutherford, a fisheries biologist at the Great Lakes Environmental Research Laboratory (GLERL) in Ann Arbor, a U.S. National Oceanic and Atmospheric Administration facility.

To include uncertainty in model predictions, team members interviewed 11 leading experts on Asian carp biology and Great Lakes ecology and fisheries, then incorporated the experts' estimates into the model. The experts were also asked to indicate the level of uncertainty associated with each statement they provided.

"We don't know how these two Asian carp species are going to do in Lake Erie, so we have to incorporate that uncertainty into our model projections," said co-author Doran Mason, a research ecologist at GLERL. "It's like using computer models to predict a hurricane's path and intensity and including the margin of error in the forecast."

The team has shared its Lake Erie results with Great Lakes resource managers to help inform decisions related to Asian carp. Of the Great Lakes,

Erie may be most vulnerable to Asian carp invasion due to its proximity to waters where Asian carp exist, the presence of adequate food, and the availability of suitable spawning habitat.

The same research team is now working on modeling studies to predict Asian carp impacts in lakes Michigan, Huron and Ontario, as well as a study of the regional economic impacts associated with Asian carp in Lake Erie.

Provided by University of Michigan