



# FISHERIES

Great Lakes fisheries are a fixture of Michigan lore and history, from fishing trips “up north” to dining on whitefish at your favorite local restaurant. Michiganders love the Great Lakes—and none more so than those who depend on these fisheries for their livelihood: commercial fishers, tribal fishers, charter boat captains, sport fishers, residents of coastal communities and the agencies charged with managing the lakes.

Now, the Great Lakes we love are threatened by loss—and we are working together to turn that story around.

## A “FISHY” STORY

The abundance of the Great Lakes depends on a thriving “food web”—the species that inhabit the lakes and the predator-prey relationships and nutrient cycles that sustain them. This abundance is undermined by habitat degradation, the proliferation of invasive species and historical overfishing, which have contributed to the decline of key fish species like lake whitefish. This creates significant challenges for fisheries managers and puts the health and resilience of the world’s largest freshwater ecosystem at risk.

## TURNING THE TIDE

In Michigan, The Nature Conservancy (TNC) is working to help state and tribal fisheries managers experiment with new approaches to rebuild Great Lakes fisheries—particularly native species such as cisco, kiyi and lake whitefish, which provide an important source of food for predators like the lake trout. Through a collaborative, ecosystem-based fisheries management approach, we can protect the integrity of the Great Lakes food web, along with the \$7 billion commercial and recreational fishing industry and the vibrant coastal communities these fisheries support.

COVER: School of cisco swimming along a rocky freshwater reef. © Paul Vecsei; RIGHT: Lake Superior fisherman with WHS Fishery. © Jason Whalen/Fauna Creative



## GOAL

We aim to help increase the diversity, resilience and abundance of Great Lakes fisheries through the rehabilitation of self-sustaining populations of key species including lake whitefish, cisco and kiyi.



## OUR STRATEGIES

### HABITAT RESTORATION

TNC partners with state, provincial, tribal and federal agencies across the Great Lakes to identify and restore spawning and nursery habitat for species including lake whitefish and cisco. This includes collaborating with agencies to develop new, impactful restoration and management techniques, such as an innovative reef restoration on one of Lake Michigan’s best-known reef complexes (see page 4).

### SCIENCE

We are working with our partners to address data and information gaps in our understanding of target fish populations (e.g., status, life history, genetic structure), and to identify the factors that limit their populations. Filling these gaps provides critical information to fisheries managers to help inform management actions—such as stocking, reef restoration or invasive species control.

### PARTNERSHIP

The issues we face in our Great Lakes fisheries are complex and require that everyone with a vested interest in healthy fisheries works collaboratively to find solutions. TNC leverages our unique position as a global nonprofit organization to support state, provincial and tribal fisheries management authorities and partners in securing resources, researching new ideas and approaches and developing policy solutions, as we all work together to place the management and restoration of our fisheries front and center.

### INVASIVE SPECIES MANAGEMENT

Aquatic invasive species (AIS) are a significant threat to Great Lakes fisheries. One example of TNC’s work to address this threat is a binational AIS surveillance framework that we helped develop for the entire Great Lakes, to better coordinate detection and response efforts. We are also working with the Michigan Department of Natural Resources (MDNR) to test control techniques for established invasive species—round goby and rusty crayfish—that prey on native fish eggs on Lake Michigan reefs.

ABOVE: Lake trout (*Salvelinus namaycush*). © Paul Vecsei



Addressing the threat of AIS in the Great Lakes requires working at the intersection of policy and science. One critical passage point for AIS is the Chicago Area Waterways System (CAWS), where Asian carp threaten to reach the Great Lakes from the Mississippi River. To address this threat, TNC is contributing our experience in policy and technical solutions to help the U.S. Army Corps of Engineers and Congress prevent the passage of AIS through the CAWS.

ABOVE: Asian carp jump out of the water in a Michigan river. © Great Lakes Fishery Commission

## KEY PROJECTS

### Mapping Great Lakes Habitat

Suitable spawning and nursery areas are vital for robust, thriving populations of native fish like cisco and lake trout. TNC scientists are developing models, both lake-wide and site-specific, that use data from 19th century navigation maps to compare historic spawning and nursery areas with current conditions (map, above). This will help us determine where cisco and other fish are—or could be—thriving.

### Whitefish Restoration

Lake whitefish once spawned in Great Lakes tributaries as well as the lakes, but we lost these river runs during the logging boom in the late 1800s. Now, restoring these historical river runs may represent a solution to recent declines in whitefish reproductive success. We are working with the Sault Ste. Marie Tribe of Chippewa Indians (Sault Tribe), Little Traverse Bay Bands of Odawa Indians (LTBB) and MDNR to better document the status of lake whitefish in Lake Michigan tributaries and begin developing potential restoration approaches.

### Kiyi Research in Lake Superior

TNC is working with the U.S. Geological Survey, Sault Tribe and LTBB to study the spawning habits of the kiyi—a challenge, given that they spawn in the middle of winter 700 feet below the surface in freezing Lake Superior waters. The research aims to establish whether they can be collected during spawning to enable potential restocking efforts in Lake Michigan or Lake Huron, where the kiyi once thrived (photo, top right).

CLOCKWISE FROM TOP LEFT: Partners at the DNR pull a rusty crayfish trap out of the water in Grand Traverse Bay. © Jason Whalen/Fauna Creative; Commercial fishing boat on Lake Superior. © Jason Whalen/Fauna Creative; Map of cisco spawning habitat. © Gust Annis/TNC

### GREAT LAKES SPECIES:

**Cisco:** Cisco (*Coregonus artedii*) is also known as the lake herring. As a “forage” fish, it provides an important food source for larger fish like lake trout. “Ciscos” is also sometimes used to refer collectively to members of the *Coregonus* genus, which includes some of the species listed below.

**Kiyi:** This deepwater fish, *Coregonus kiyi*, was once prevalent in the Great Lakes but now only persists in Lake Superior. Kiyi are also an important prey fish for top predators such as lake trout.

**Bloater:** *Coregonus hoyi* is similar to the kiyi. Once in decline due to impacts from invasive species and pollution, it appears to be making a comeback in Lake Huron and restoration efforts are underway in Lake Ontario.

**Lake Whitefish:** *Coregonus clupeaformis* is a favorite with diners, and therefore the most important commercial fishery in the Great Lakes.

**Lake Trout:** *Salvelinus namaycush* is the largest of the char fishes and popular as both a game and food fish.



## SUCCESS STORY: Grand Traverse Bay Reef Restoration

In 2015, MDNR and Central Michigan University scientists were studying lake trout, cisco and lake whitefish on rocky reefs in Grand Traverse Bay—the only documented spawning location of cisco in Lake Michigan. They observed that while two of the three reefs were in good condition, the third was badly degraded and overrun by invasive predators. TNC joined these partners to design and conduct an ambitious reef restoration effort, rebuilding the damaged reef with a thick layer of limestone rocks—the first underwater restoration project in our chapter’s history.

After five years of monitoring, the rebuilt reef is showing significantly improved protection to fish eggs from predation and the relentless action of waves, indicating that more of these fish are likely to survive to adulthood. The success of this project has helped to build momentum for reef restoration and is inspiring similar restorations in several other parts of the Great Lakes.

ABOVE: Native fish reef restoration in Grand Traverse Bay. © Jason Whalen/Big Foot Media



## GLOBAL CONNECTION

Fisheries are a living indication of the health and resilience of their freshwater and ocean systems, and an important food resource in a time of increasing global need. However, many fisheries around the world have been drastically altered by habitat loss, overfishing and the rapid rise of invasive species. Today, about 90% of global fisheries are overfished or fully fished (at their biological limit).

Given societal demands and how quickly freshwater and ocean ecosystems are changing, business-as-usual management is not enough to sustain our planet’s fisheries. TNC is working with fishing communities around the world to demonstrate how cooperative management paired with technological innovation, including data-driven tools like TNC’s FishPath ([www.fishpath.org](http://www.fishpath.org)), can put fisheries on the path to recovery.

LEFT: A scuba diver dives deep into the heart of a school of sardines off of Isla Cerralvo in Mexico’s Gulf of California. TNC is working in the Baja region to protect wildlife and fisheries habitat and strengthen a network of marine protected areas. © Carlos Aguilera Calderón



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