

Aquatic Invasive Species in the Great Lakes



Round Goby and zebra mussels are examples of ballast water introductions.



Common Carp were intentionally stocked in the U.S. in the 1800s.

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Aquatic invasive species (or AIS) are organisms that live in the water most or all of their life, are found outside of their native range and become harmful to their new ecosystem. AIS can reduce the abundance of native species, take over the food supply and impact recreational and commercial activities. They are a worldwide problem, and as of early 2015 there were a recorded 194 aquatic non-native species in the Great Lakes ecosystem, many of which are invasive and can be found in Lake Erie. There are a wide array of invasive organisms ranging from animals such as fish and invertebrates, to plants, to microscopic plankton, bacteria and viruses. Each species can have a unique impact based on where it fits into its new environment. There are usually negative economic and recreational impacts associated with AIS as well.

WHERE DO THEY COME FROM AND HOW DO THEY GET HERE?

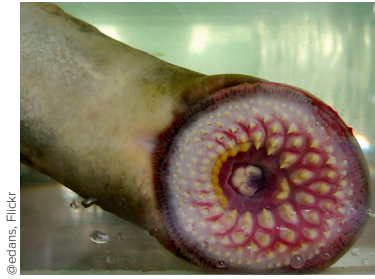
AIS can get to Lake Erie from just about anywhere in the world. In the Great Lakes, there are invasive species from many different regions, including zebra mussels from Eurasia and common reed from Europe. Regardless of where they originate, humans are almost always involved in introducing a non-native species to a new environment. AIS are generally more likely to become invasive in that new environment when conditions such as habitat type, temperature and climate are similar to their native range, although that is not necessarily a requirement for their success.

Several common pathways are known to have spread AIS into the Lake Erie ecosystem. One example is ballast water on international shipping vessels, where certain species may be able to survive long enough to be released at the final destination port. Stricter regulations have been enforced in recent years, and no new ballast water introductions have been detected since 2006.

The removal of natural barriers has allowed multiple AIS into Lake Erie. For example, the Welland and Erie Canals are human-made waterways designed so that ships could travel from Lake Ontario to Lake Erie around barriers like Niagara Falls. These shipping canals were essential to the westward expansion of the United States, but they also connected distinct watersheds and allowed some AIS to reach new aquatic ecosystems. This is currently an issue in Chicago, where the Chicago Area Waterway System has connected the separate watersheds of the Great Lakes Basin and the Mississippi River Basin. Electric barriers and other methods are being used to try to keep invasive species from moving into new areas in connected watersheds.

Stocking, whether intentional or accidental, has also been responsible for multiple AIS introductions that have caused profound impacts on the ecosystem. Intentional stocking is when a desired species is

introduced to a body of water, but can also include the release of aquarium pets into the wild. Accidental stocking occurs when a species escapes from an aquaculture facility, if AIS get mixed in with desired species or when unused fishing bait is dumped into the wild.



Sea Lamprey and White Perch are examples of introductions through human-made canals.



John Lyons

Some AIS prey directly on sport fish and can alter fisheries management. Sea Lamprey are parasitic fish that feed on the body fluids of species like Lake Trout, Lake Whitefish and Walleye, often killing them in the process. Round Goby will feed on Smallmouth Bass eggs

WHAT PROBLEMS CAN AIS CAUSE?

Ecosystem Impacts: AIS can cause a variety of ecological problems, and in a water body the size of Lake Erie it is difficult to pinpoint the impacts caused by a single species. A common AIS impact is competition with native species for resources like food and habitat. Invasive species can outcompete native species and either lower the population of a native species or replace it altogether. This reduces species diversity and can make the ecosystem more susceptible to environmental changes. AIS can also alter the natural food web, pass toxins through the food web, prey directly on native species, damage native habitat and quickly overpopulate an area since they often do not have natural predators in their new ecosystems.

Recreational Impacts: People who fish, boat or enjoy other recreational activities on Lake Erie have all been affected by AIS. Some invasives, such as zebra and quagga mussels, filter feed on the phytoplankton that makes up the base of the Lake Erie food web. This reduces available prey for other organisms, including important recreational sport fish. It has also made Lake Erie water more clear, and clearer water allows sunlight to reach deeper into the water column. In shallow water, this allows more aquatic plants to grow. In some cases, plants and algae can grow to nuisance levels and pile up on beaches. Additionally, the invasive mussel shells are sharp, so swimmers need to wear shoes to protect themselves from injury.

Invasive plants and algae can form floating mats. These mats can block sunlight from reaching deep enough to allow phytoplankton growth, limiting food availability. Some invasive aquatic plants can reach such high densities that they are of little use to native organisms and can make water access difficult for boaters, anglers and swimmers. Microscopic AIS like the spiny water flea can foul fishing gear and outcompete larval fish for food. Invasive bacteria and viruses can cause fish diseases resulting in die offs that pollute beaches and reduce food availability for predator species.



Hydrilla was likely released via improper disposal from aquaria.

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and young; this has led to a change in Ohio fishing regulations to allow Smallmouth Bass to protect their nest during the spawning season. The Round Goby is also a prey item for many sport fish and, because of its diet, can cause toxin accumulation in game species like Smallmouth Bass, Walleye and Yellow Perch.

Economic Impacts: Tourism is a major economic driver for Ohio's coastal communities. When AIS cause fish die offs or rotting algal mats, beaches and other recreational locations become unusable and tourism-related businesses suffer. When AIS affect the behaviors, populations or management of fisheries, opportunities for anglers decrease. Fewer opportunities lead to fewer visitors, and local charter captains, restaurants, hotels and other businesses see decreased revenue. Some AIS have direct financial impacts; for instance, they can clog pumps on boat motors or water intake pipes, which then need to be cleaned, removed or replaced.

HOW CAN YOU HELP?

Once they are established in an area, AIS are nearly impossible to eradicate. Control is possible in some instances, but usually comes at a major cost. The best strategy is to prevent new AIS from spreading. To help prevent the spread of AIS, anglers, boaters and other recreationists should:

- learn to recognize AIS
- inspect equipment and remove all aquatic plants, animals and mud from boat, motor, trailer and equipment before leaving water access
- drain water from motor, bilge, live well and other containers before leaving access areas
- dispose of unwanted bait, worms and fish parts in the trash
- clean boating equipment with high-pressure or heated water
- allow boats and equipment to dry for at least five days before transporting them between bodies of water
- never dump live fishes, bait or other organisms from one water body into another

For more information about aquatic invasive species in the Great Lakes, contact Ohio Sea Grant. Information is also available through the "Stop Aquatic Hitchhikers!" campaign at protectyourwaters.net, and the "Habitattitude" campaign at habitattitude.net.