



Unsettling Discoveries: Invasive Mussels in the Apostle Islands

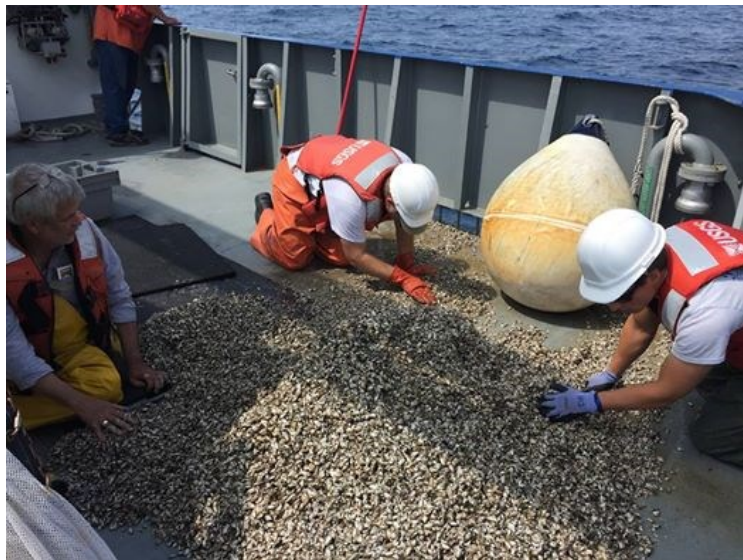
Zebra and quagga mussels are small, striped shellfish native to the Black and Caspian Seas of Eurasia. They typically measure less than 2 inches (50 mm) in length, but don't let their small stature fool you. These pint-sized mollusks are all muscle when it comes to invading and altering new territory. They have spread widely through Europe's canal systems and waterways, and were first detected in North America in 1988 following accidental introduction to the Great Lakes via transoceanic shipping. Zebra mussels attach to any solid substrate such as rocks, water pipes, or sunken shipwrecks, while quagga mussels can attach to soft surfaces such as sand. Both are prolific breeders, reaching enormous densities in favorable waters. Mussel colonies clog pipes in municipal and industrial water systems, costing millions of dollars annually to treat, and their voracious filter-feeding has resulted in competition with native plankton-eaters and unprecedented food web changes in the lower Great Lakes.

Disturbing New Detections

Neither of these mussels have established widespread populations in Lake Superior waters yet. Lake Superior's typically cold temperatures and low concentrations of nutrients and calcium were once thought to limit the spread of the mussels. But both zebra and quagga mussels have been documented in Duluth and Thunder Bay for decades, and recent detections in the Apostle Islands area suggest that they may be expanding. Since 2011, quagga mussels have periodically shown up on commercial fishing gear deployed near Madeline and Michigan Islands. In 2016, the U.S. Environmental Protection Agency found isolated quagga mussels in lake bottom samples from the same area. During 2015 and 2016, National Park Service divers came across zebra mussels on the wreck of the *Sevona* near Sand and York Islands and on the rocky lake bottom west of Sand Island.

Isolated Incidents or Canaries in the Coal Mine?

These detections in the Apostle Islands may be isolated occurrences, but they are worrisome because of what the tiny invaders can do to native ecosystems. At Sleeping Bear Dunes National Lakeshore on Lake Michigan, formerly productive spawning reefs for lake trout and whitefish have been rendered unrecognizable by the zebra and quagga mussel invasion. Broad, clean cobble shoals similar to many in the Apostles have become encrusted with zebra and quagga mussels. The mussel invasion there has paved the way for further invasions by the round goby, a bottom dwelling fish with an appetite for invasive mussels but also for native fish eggs and young. Additionally, the invasive mussel beds have concentrated nutrients near the lake bottom, fostering nuisance algal growth that washes up on beaches, smothers underwater habitats, and is linked to the production of botulism toxin and the deaths



Quagga mussels fill a trawling net used to sample fish populations in Lake Huron. U.S. GEOLOGICAL SURVEY PHOTO.



Zebra mussels taken from the wreck of the *Sevona* in the Apostle Islands. NPS PHOTO.

of thousands of migratory waterbirds. Such a scenario in the Apostle Islands, which supports a robust commercial fishery and is a critical destination for tourists and migratory birds alike, could be economically and ecologically devastating.

What Can Be Done?

The National Park Service is working with the Environmental Protection Agency to increase invasive mussel detection work in the Apostles, document the extent of the current invasion, and evaluate mitigation options. Although control of wild, established populations of invasive mussels is notoriously difficult, there may be hope for controlling small, pioneering populations in isolated areas such as docks or wrecks, thus preventing further spread. Additionally, the NPS and researchers from the University of Minnesota and Northland College are working to pinpoint likely sources of the invading mussels (using genetic sequencing) and to clarify potential threats to native mussel populations.

You have a role to play, too! Zebra and quagga mussels can't move around on their own, but they readily hitchhike with humans as both juveniles and adults. If you use your boat or kayak anywhere besides on Lake Superior, please remember to **CLEAN** your watercraft and equipment as soon as you take it out of the water, before leaving the area. **DRAIN** any water from the boat, bilge, motor, and live well. **DRY** everything for at least five days before going to other waters.

You can also report sightings of any aquatic invasive species in the Apostles to NPS natural resources staff at the headquarters building in Bayfield, or to Jeremy Bates of the Wisconsin Department of Natural Resources (Jeremy.Bates@wisconsin.gov).

For More Information

Great Lakes Aquatic Nonindigenous Species Information System

<https://nas.er.usgs.gov/queries/greatlakes/FactSheet.aspx?SpeciesID=5&Potential=N&Type=0>

Aquatic Nuisance Species Task Force

www.anstaskforce.gov/spoc/zebra_mussels.php

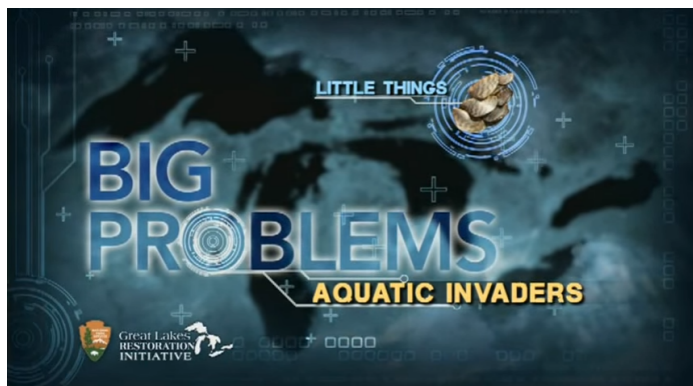
University of Wisconsin Sea Grant Institute

www.seagrant.wisc.edu/Home/Topics/InvasiveSpecies/Details.aspx?PostID=655

Stop Aquatic Hitchhikers!

<http://stopaquatichitchhikers.org/hitchhikers/mollusks-zebra-mussel/>

See what has happened at Sleeping Bear Dunes and what the National Park Service is doing about it in [Little Things, Big Problems: Aquatic Invaders](#) (YouTube)



The difference is in the mussels. Rocky lake bottom in Lake Superior at Apostle Islands National Lakeshore (*top*), showing bare rocks and cobble, and in Lake Michigan at Sleeping Bear Dunes National Lakeshore (*bottom*), showing rocks and cobble heavily encrusted with invasive mussels and nuisance algae. PHOTOS: NPS/BRENDA MORASKA LAFRANCOIS