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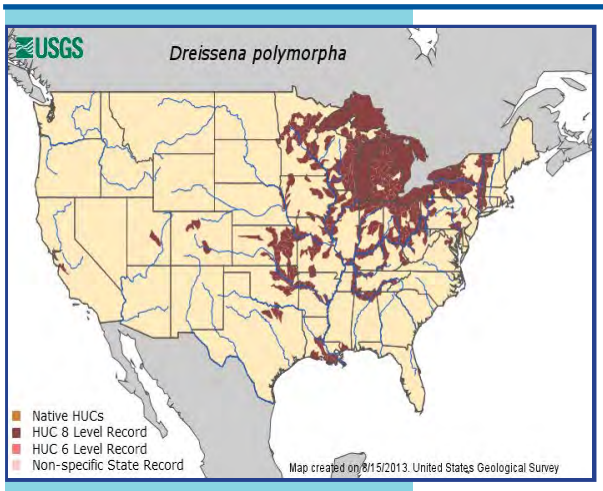
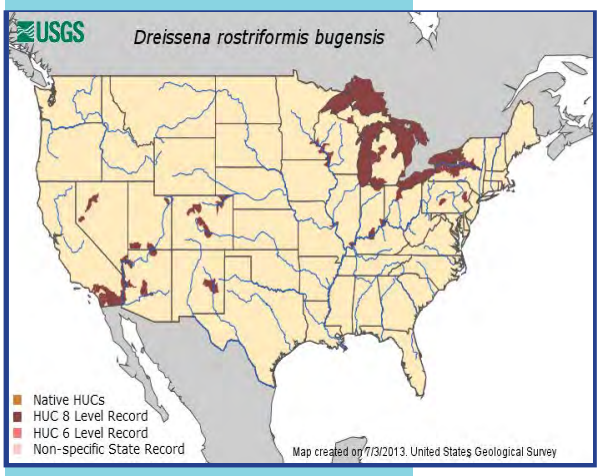
Zebra Mussel & Quagga Mussel

Dreissena polymorpha & Dreissena rostriformis bugensis





Zebra and quagga mussels are fingernail-sized freshwater mollusks that attach to objects and other organisms. Since their discovery in the Great Lakes region, zebra and quagga mussels quickly spread to become the most intrusive, prolific, and costly aquatic invaders in North America.

Species Description

Zebra and quagga mussel shells generally have alternating light and dark bands, but may be entirely light or dark. Zebra mussels have a "D" shaped shell which allows them to sit flat on their sides. They are rarely found at depths greater than 50 feet. Quagga mussels are rounder in shape, and may topple over if placed on their sides. Compared to zebra mussels, quagga mussel populations can tolerate cooler water temperatures, lower dissolved oxygen content, and are commonly found as deep as 100 feet or more; however, they are not limited to deep water habitats.

Native & Introduced Ranges

Native to eastern Europe and western Asia in the Black, Azov, and Caspian Sea drainages, zebra mussels first appeared in the Great Lakes in Lake St. Clair in 1988, and quagga mussels were discovered in Lake Erie in 1989. Both species were likely transported to the Great Lakes in the ballast water of ships.

In Pennsylvania, zebra and quagga mussels have been found in Lake Erie, as well as several inland lakes and rivers in Pennsylvania including Edinboro and Sandy lakes; Conneauttee, Conewango, and French creeks; and the upper Allegheny River. Zebra mussels have also been found in the lower Allegheny and Monongahela rivers, the upper Ohio River, and the upper and lower reaches of the Susquehanna River. In addition, quagga mussels have been found in diving quarries in Bethlehem and near Williamsburg, PA.

ZEBRA AND QUAGGA MUSSELS

Biology & Spread

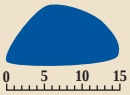
The reproductive cycles of these invasive mussels allow for successful and rapid infestation. Fertilization takes place externally and one female can produce up to one million eggs. Each fertilized egg develops into a free-swimming veliger, which can float in the water column for three to four weeks before settling on a hard surface where it develops a shell and begins to colonize with other mussels. Both mussels can survive out of water for up to five days, making it easy for them to be carried from lake to lake on recreational boating and fishing gear. Adult mussels can attach to boat hulls, trailers, motors, vegetation, and equipment using sticky fibers called byssal threads. Immature mussels, called veligers, are microscopic larvae that can float undetected in the water of bait buckets, live wells, and bilges.

Photo courtesy of S. van Mechelen.

Zebra Mussel *(Dreissena polymorpha)*

Photo courtesy of U.S. Geological Survey.

- D-shaped shell
- Sits flat on its ventral side
- Color patterns vary, but it has obvious striping



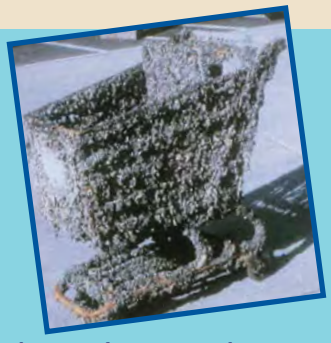
Actual size is 15 mm

Quagga Mussel *(Dreissena bugensis)*

Photo courtesy of U.S. Geological Survey.

- Rounder in shape
- Does not sit flat on its ventral side
- Usually has dark, concentric rings
- Paler in color near the hinge

Actual size is 20 mm



Zebra mussels covering a shopping cart.
Photo courtesy of U.S. Geological Survey.

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
COASTAL RESOURCES MANAGEMENT PROGRAM

U.S. Fish & Wildlife Service
Great Lakes RESTORATION

Funded in part by PA DEP Coastal Resources Management Program, The U.S. Fish and Wildlife Service, and the Great Lakes Restoration Initiative

Habitat

While zebra mussels are found mainly on hard substrates such as rock, wood, concrete, and steel, quagga mussels can survive on both hard and soft sediment in the deep waters of Lake Erie and Ontario.

Impacts

Threat to Biodiversity

Efficient filter feeders, zebra and quagga mussels are capable of straining one liter of water per day to consume the microscopic plants and animals, called plankton, found in it. The removal of plankton, in turn, reduces the amount of food available for other organisms. Zebra and quagga mussels selectively filter for certain types of green and brown algae, while they reject blue-green algae. This results in higher concentrations of blue-green algae in the algal community, which can become toxic to aquatic life and cause taste and odor problems for drinking water supplies. Filtering of the water also allows sunlight to penetrate deeper into the water column, causing an overgrowth of aquatic plants. Native species of mussels and clams are also impacted as invasive mussels form colonies on their shells, hindering their ability to feed and breathe.

Economic Costs

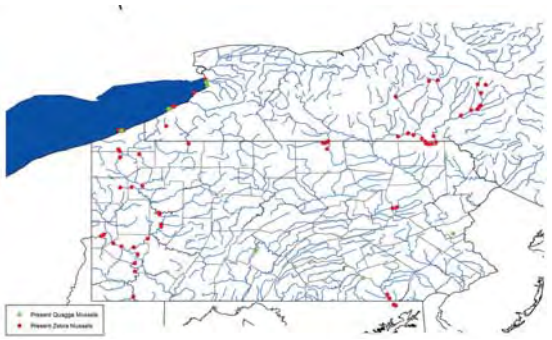
Zebra and quagga mussels attach themselves in large clumps on hard surfaces such as boat hulls, docks, and buoys. They foul water intake pipes for waterside industries such as power and water facilities, and are very expensive to remove and control. Each year the economic impact to the United States and Canada is about $140 million in damage and control costs.

Health Risks

Because they are filter feeders, zebra and quagga mussels can build up contaminants such as PCBs, heavy metals, and toxins in their tissues. These chemical contaminants can then be passed up the food chain into larger fish and birds. Scientists also suspect they can concentrate harmful bacteria, including the species that causes Type E Botulism, a disease that has caused large die-offs of birds and fish in the Great Lakes.

Prevention & Control

To prevent the spread of zebra and quagga mussels to new locations, check for and remove any plants, mud, and aquatic life from your boat and equipment before transporting to a new area. Drain all water from your boat, including bilges, live wells, bait buckets, and coolers. Thoroughly wash boats and all equipment with hot water (140°F or above), or if washing is not possible, boats and trailers should be dried for five days before moving to a new water body. Once established in a water body, control of zebra mussels is difficult. Chemical control has only been feasible in isolated ponds and lakes where there is no discharge to nearby streams. In Pennsylvania, it is unlawful to possess, sell, purchase or transport zebra and quagga mussels.



Zebra and Quagga mussel sightings in Pennsylvania (2012 and earlier)

References:

Benson, A., and Raikow, D. 2006. *Dreissena polymorpha*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. <http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=5>.

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