



# 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.*

## Native & Introduced Ranges

Zebra and quagga mussels are 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 northwestern 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 in a diving quarry in Bethlehem. In addition, quagga mussels have been found in a diving quarry near Williamsburg.

## Spread

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.

## Impacts

### *Threat to Biodiversity*

Zebra and quagga mussels are efficient filter feeders, capable of straining one liter of water per day to consume the microscopic plants and animals, called plankton, found in it. This removal of plankton, in turn, reduces the amount of food available for other organisms. Zebra and quagga mussels prefer certain types of green and brown algae while they dislike blue green algae. Filtering by the mussels upsets the balance of algae communities and results in higher concentrations of blue green algae. Blue green algae can become toxic to aquatic life and cause taste and odor problems for drinking water supplies. Filter feeding by the mussels also clears the water, allowing sunlight to penetrate deeper, which can increase the growth of aquatic plants. Zebra mussels, which like to colonize on hard surfaces, can also kill native mussels and clams by using their tough byssal threads to build thick colonies over them, hindering their ability to feed.

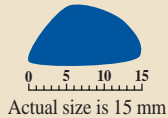
ZEBRA &  
QUAGGA  
MUSSELS

## 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

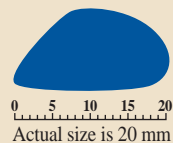


## Quagga Mussel (*Dreissena bugensis*)



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



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

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## Economic Costs

Zebra and quagga mussels attach themselves in large clumps on hard surfaces such as boat hulls, docks, and buoys. They can also clog water intake pipes for power and water facilities. Zebra and quagga mussels are 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 in their tissues. These chemical contaminants can then be passed up the food chain to the fish that feed on the mussels and then to larger fish. Scientists also suspect that they can concentrate harmful bacteria such as 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, drain all water from your boat, including bilges, live wells, bait buckets, and coolers. Since mussels can cling to vegetation, be sure to check your boat each time you take it out of the water and remove any plants. Thoroughly wash your boat and all equipment with hot water (140°F or above). 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.

## 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.

## Habitat & Biology

While zebra mussels are found mainly on hard substrates, such as rock, wood, concrete, and steel, quagga mussels can survive in soft sediment in the deep waters of Lake Erie and Ontario. The zebra and quagga mussel reproductive cycle is the key to their 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. Veligers can float freely in the water for three to four weeks before settling on a hard surface where it develops a shell and begins to colonize with other mussels.



## References:

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*Millbrook Quarry Zebra Mussel Eradication*. Virginia Department of Game and Inland Fisheries (VDGIF). 2006. <<http://www.dgif.virginia.gov/zebramussels/>> (Accessed November 13, 2006).