Zebra mussels

FACT SHEET

Pennsylvania Sea Grant, as part of the National Sea Grant Program, promotes efforts to improve the environmental and economic health of Pennsylvania's coastlines.

Focusing on the Lake Erie and Delaware River watersheds, Pennsylvania Sea Grant works to increase public awareness of coastal environmental and economic issues through extension, communication, applied research, and education activities.

The National Oceanic and Atmospheric Administration (NOAA) administers the National Sea Grant College Program. Pennsylvania Sea Grant is also supported by the Pennsylvania State University and the Commonwealth of Pennsylvania.

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Background Zebra mussels (*Dreissena polymorpha*) are small, fingernail-sized mussels native to the Caspian Sea region of Asia (Figure 1). Zebra mussels were introduced to the Great Lakes by means of ballast water from transoceanic vessels discharged into Lake St. Clair, near Detroit, where the mussel was discovered in 1988. Since that time, they have spread rapidly to all of the Great Lakes including many inland lakes and waterways in over 20 states, as well as Ontario and Quebec (Figure 2).

Figure 1. Zebra Mussel: Photo Courtesy of Sea Grant Nonindigenous Species web site: http://www.sgnis.org/www/zebra.htm

Zebra mussels can be easily identified by the stripping on their shells. Zebra mussels attach to hard surfaces with sticky, secreted fibers called byssal threads. Zebra mussels

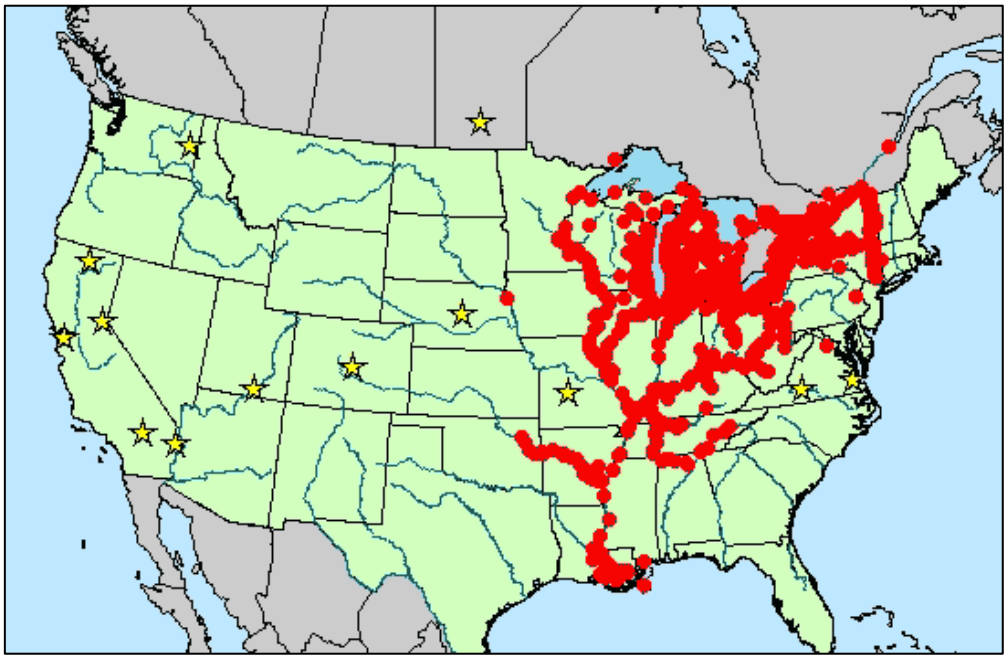

Figure 2. 2002 Distribution of Zebra Mussels: Courtesy of the U.S. Geological Survey http://www.fcsc.usgs.gov

- **Confirmed adult, juvenile, or veliger collection**

☆ **Discovery of the overland transport of zebra mussels on trailered boats.**

The zebra mussel has invaded over a 100 smaller inland lakes in states bordering the Great Lakes, including Edinboro Lake and Sandy Lake in northwest Pennsylvania. They have also colonized the lower portions of the Allegheny, Monongahela and the Ohio rivers. The transportation of veligers in downstream flow has enabled them to invade the entire stretch of the Mississippi River.

are bivalves and spawn in response to both environmental cues and internal chemical cues. Some of the cues that influence spawning include water temperature (~54°F), environmental chemicals (e.g., from phytoplankton), and chemical pheromones released with sperm and eggs when neighboring animals' spawn. These cues ensure that both sperm and eggs are present so that fertilization can occur, and that the temperature is appropriate and food is available for larval development. On average, 30,000 juvenile mussels develop from an adult female.

Figure 3. Zebra mussels attached to a stick: Photo Courtesy of Sea Grant Nonindigenous Species web site:

Impact By colonizing water intake pipes, zebra mussels restrict the flow of water through the pipe; thereby, disrupting supplies of drinking, cooling, processing, and irrigation water. The mussel also attaches to boat hulls, docks, locks, breakwaters, and navigation aids, increasing maintenance costs and impeding waterborne transport. Zebra and quagga mussels are the ONLY freshwater mollusk that can firmly attach itself to solid objects (Figure 3). Researchers have also found that zebra mussels even colonize the shells of freshwater clams and have almost extirpated these native mussel species from the Great Lakes. Zebra mussels are filter feeders capable of filtering a liter of water per day, removing almost every microscopic aquatic plant (phytoplankton or algae) and animal (zooplankton) within their size preference. Zebra mussel colonies in Lake Erie have reached surprising densities of up to 70,000 mussels per square meter, and experts estimate that Lake Erie's zebra mussel population filters the entire volume of the lake's western basin once a week.

Zebra mussels have increased Lake Erie's water clarity and reduced some forms of phytoplankton, the basis of the lake food web, by as much as 80 percent. The increased water clarity has allowed light to penetrate deeper into the water column, allowing rooted aquatic vegetation in near-shore areas to increase. Bottom-dwelling (benthic) forms of algae now appear to be increasing, as well as several forms of insect-like benthic organisms such as amphipods (*Gammarus fasciatus*), tanytarsine chironomids, hydrobiid snails, and flatworms. These organisms may have benefited from interstitial habitat and/or nourishment in the form of biodeposits (feces and pseudofeces) from clumped zebra mussels.

The potential for zebra mussels to significantly affect contaminant cycling is of great concern in the Great Lakes, where health advisories already exist for consumption of some species of fish. Because of the huge volumes of water they filter and their high body-fat content, zebra mussels accumulate about 10 times more PCBs and other toxic contaminants than native mussels. These contaminants are transferred up the food chain to waterfowl and fish that eat zebra mussels.

How to stop the spread Microscopic larvae (veligers) may be carried in live wells, bilge water, or bait buckets. They can easily attach themselves to boat hulls and trailers. Drain water from the motor, livewell, bilge and transom wells, and any other water from your boat and equipment while on land before leaving any water body. Zebra mussels also cling to vegetation, so great care should be taken to clean off all vegetation from the boat, trailer, and motor before transporting it to another body of water.

Information for this fact sheet was adapted from a variety of sources, including:

The Great Lakes Information Network - ***www.great-lakes.net***
Sea Grant Nonindigenous Species Site (SGNIS) - ***www.sgnis.org***
Great Lakes Sea Grant Network - ***www.uaf.edu/seagrant/private/SG-regional/greatlakes/index.html***

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