Facts and Figures

Native Range and Invasion History

- The Zebra mussel, Dreissena polymorpha, and the quagga mussel, Dreissena bugensis are bivalves native to the Ponto-Caspian region (Black, Azov, Caspian Seas) in eastern Europe. Collectively these two species are referred to as dreissenids.
- The zebra mussel spread throughout Europe by the middle of the 19th century, while the quagga mussel is still expanding its range in Europe.
- Deep draft ocean going commercial vessels was granted access to the Great Lakes in 1959 when the St. Lawrence Seaway opened.
- Zebra mussels were first detected in 1988 in Lake St. Clair, and quagga mussels were first detected in eastern Lake Erie in 1989.
- The introduction of both dreissenids is normally attributed to the discharge of ballast water from ocean-going commercial vessels entering the Great Lakes via the St. Lawrence Seaway.
- Adult dreissneids can survive for days or weeks out of water or in salty conditions by sealing their shells. Hulls, and anchor/chain lockers may have hosted adult mussels that could have been introduced upon arrival to the Great Lakes.
- Scientists predict at least 3 dozen additional species not native to the Great Lakes could become established in the region if adequate controls are not placed onboard ocean-going commercial vessels.
- In less than 10 years after their introduction into North America, dreissneids have spread to all five Great Lakes and into the St. Lawrence, Mississippi, Tennessee, Hudson, and Ohio River Basins.
- In less than 20 years after their introduction into North America, the quagga mussel has become established west of the continental divide despite an extensive binational effort to prevent a westward expansion (called the 100th Meridian Initiative)

Biology and Ecological Impacts

- Dreissenids are usually about the size of a fingernail, but can grow to a maximum length of about one and a half inches. They can live up to 4 -- 5 years and quagga mussels can inhabit fresh water to depths of over 400 feet.
- Unlike native mussels, dreissenids are extremely prolific. An adult female can produce between 30,000 to 1 million eggs per year. About two percent of dreissneids typically reach adulthood.
- Dreissneids attach to boats, pilings, water-intake pipes, and other hard surfaces, as well as to crayfish, turtles, other

mussels, and native mollusks.

- Dreissenids permanently alter ecosystems, threaten native wildlife and cause extensive damage to various structures.

- Scientists say the introduction of AIS is expected to be the leading cause of change in lake ecosystems during the 21st century.

- Dreissenids have eliminated many species of native mussels from areas of the Great Lakes where they have invaded. Dreissenids attach and build colonies on the clams, reducing their ability to move, feed, and breed, eventually leading to the death of the native mussels within a couple of years.

- Dreissenids are voracious filter-feeding organisms. An adult dreissenid filters up to a quart of water per day, which multiplied by millions of mussels means that, for example, mussels can potentially filter all the water in Lake Erie in two days. They remove particles from the water column, which has increased water clarity.

- As the lakes clear, increased light levels cause aquatic plants to increase in number and size. This increased plant growth can be beneficial to some fish such as northern pike and to yellow perch. However, the greater abundance of plants also causes problems for recreational boaters and swimming beaches, increase taste-and-odor problems in drinking water supplies, and can block water-intake pipes during storm events.

- Dreissenids are selective filter feeders, consuming harmless algae in the water but rejecting certain species of harmful algae. By killing off the only the harmless algae and processing them into excreted nutrients, dreissenids have promoted blooms of the toxic blue-green algae Microcystis.

- Dreissenid filter feeding reduces food for Diporeia, a native deep-water macro-invertebrate. Diporeia populations have declined dramatically since dreissenids became established. Abundances have declined from 1,000s of animals per square meter to zero in many locations in Lakes Michigan, Huron, Erie and Ontario.

- Dreissenids are causing disruptions throughout the food web. For example, declines in the body condition of lake whitefish are linked to the decline of Diporeia (the primary food source for lake whitefish). Lake whitefish, a native, commercially valuable fish species, are becoming thinner and less marketable. Food web disruptions also impact the ability of the Great Lakes to support the total fish community. For example, dreissenids are decreasing the amount of energy making its way up the food web to support the recreational fisheries.

- Scientists are attributing outbreaks of deadly avian botulism since the 1990's to the extensive ecological changes that dreissenid mussels s are causing in the Great Lakes. Mussel interactions with another ballast-mediated invader from the Ponto-Caspian, the round goby, is the probable cause of Type E botulism outbreaks. Mussels improve water clarity which allows sunlight to penetrate and accelerate the growth of aquatic plants. Botulism flourishes in oxygen-deprived environments created by decaying plant matter. The botulism is then being concentrated within the mussels as they filter feed and then passed up the food chain when mussels are eaten by the round goby.

- The Lake Erie "dead zone" is a massive plume of oxygen-depleted water in the center of the lake. The recent increase in the areal extent of the plume is suspected to be a result of dreissenid filtering activity. Scientists believe mussels create favorable conditions for algal blooms. When algae die and decompose, they fall to the lake bottom, decay and deplete oxygen from the water.

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