



Zebra/Quagga Mussels - A Small Lake's Most Devastating Enemy

Introduction and Background

Zebra and Quagga mussels are an invasive species native to eastern Europe and Western Asia. They were accidentally introduced to North America in the 1980s by seagoing ships dumping ballast water containing their larvae into Great Lakes ports. Due to their reproductive proficiency, a single female zebra mussel can produce up to 1 million eggs a year. With limited predators in North America, larvae and adults can take-over an aquatic community in a relatively short period of time causing severe ecological damage. They filter huge amounts of water removing algae and plankton which is critical for the development of native fish fry and invertebrates, completely disrupting the food chain.

Biology and How They Spread

Zebra mussels reproduce at an age of about one year. Breeding occurs from May through October in this part of the country. Each female can produce 30,000 to 1 million eggs per year. Males and females release sperm and eggs into the water. Fertilized eggs then develop into microscopic larvae that float and swim in the water column and can be transported in watercraft bilges, live wells, ballasts and any other equipment that holds water. After 10-15 days they develop shells, settle on the bottom and look to attach themselves to any hard substrate. The juvenile and adult mussels secrete byssal threads (small fibers) to attach themselves to substrates such as rocks, docks, boat lifts, boat hulls/engines, trailers and seawalls. They are usually spread between bodies of water by watercraft, especially when protected in crevices of trim tabs, keels, engines, propellers and anchors. Adult mussels are hardy and can survive out of water for up to 5 days in warm, dry weather and up to 30 days in cool, moist weather.

Ecological Impacts

Zebra and Quagga mussels are two of the most devastating non-native invasive aquatic species that could invade a lake, especially smaller lakes. The presence of these mussels in an environment can completely disrupt the food chain and out-compete other native species.

Given their ability to filter large volumes of water, in combination with their high densities, they significantly reduce the phytoplankton and zooplankton populations (building blocks of the food chain) in the water body. As a result, there simply isn't enough food to support the diet of young foraging spawn and fry. The food chain totally collapses because there are simply no longer the organisms present to sustain it (little fish eat the algae and plankton, big fish eat the little fish).....transforming a water body into an ecological desert from a fishing standpoint. In addition, increased water clarity (due to their filtering characteristics) also allows for greater light penetration, resulting in increased aquatic vegetation growth. After they die, the byssal threads which previously held them to whatever hard surface they were attached to release. This leads to many mussel shells washing ashore, not only detracting from the natural beauty of the shoreline but become dangerous as well, as the shells are sharp enough to cut your feet.

Prevention, Outreach and Education

Prevention remains the most cost-effective and ecologically protective approach to managing a possible infestation. Prevention activities include education, rule enforcement, watercraft inspection, decontamination and cleaning. Lack of awareness is a major impediment to preventing the spread and minimizing impacts from invasive mussels. Support and conformance from Members of the Association who transport their watercraft between different water bodies (other than Lake Summerset) or purchase watercraft that have been used in other bodies of water play critical roles in the prevention (or possible introduction of) these invasive species into Lake Summerset. If people do not understand the ecological impacts that invasive mussels would have on Lake Summerset, it will be difficult to gain their support in prevention. As such, education and awareness become critical. Specifically in nearby surrounding counties, the U.S. Geological Survey (USGS) has confirmed established zebra mussels colonies in the Rock River by the Burpee Museum of Natural History, the Byron Nuclear Center, the Rt. 75 Bridge and In Lake Pierce (Rock Cut State Park). See links below:

<https://nas.er.usgs.gov/queries/SpecimenViewer.aspx?SpecimenID=1320598>

<https://nas.er.usgs.gov/queries/SpecimenViewer.aspx?SpecimenID=118236>

<https://nas.er.usgs.gov/queries/SpecimenViewer.aspx?SpecimenID=1320022>

<https://nas.er.usgs.gov/queries/SpecimenViewer.aspx?SpecimenID=1322466>

For complete infestation profiles for the state of Illinois and Wisconsin, see links below:

<https://nas.er.usgs.gov/queries/CollectionInfo.aspx?SpeciesID=5&State=IL>

<https://nas.er.usgs.gov/queries/CollectionInfo.aspx?SpeciesID=5&State=WI>

A Boat Cleaning Station has been established at the Main Office Building that includes cleaning instructions. Guidelines on the prevention of transporting invasive species are published in the monthly LSA paper. Members are encouraged to be aware of and follow these guidelines. The LSA Board of Directors has recently adopted a rule change that prohibits the use of guest boats on Lake Summerset, as these vessels represent a pathway and mechanism for non-native invasive species transport between water bodies.

Early Detection Monitoring

Early detection monitoring is critical to identify new infestations prompting a quick response necessary to prevent further spread and impact by maximizing the opportunity for controlling an invasion at its earliest stage. Members and Marine Service providers should inspect the boats, boat lifts and docks after removal in the fall for any attached mussels. In addition, any boat, boat lift or dock being put into the lake for the first time should go through a comprehensive visual inspection and cleaning as well. If anything abnormal or questionable is observed, the LSA office should be contacted for further assistance immediately.

Rapid Response

In the event that prevention efforts are absent or fail, a rapid response may stop or limit the impacts by providing for immediate containment. Members of the LSA Fish Conservation Committee (FCC), Lake Planning Committee (LPC), as well as the General Manager are chartered to take action if infestations are determined. A variety of management techniques are possible including mechanical removal and biological control introduction.

Predation

Unfortunately, zebra mussels do not have many natural predators in North America. However, it has been documented that several fish species (Redear and Pumpkin Seed Sunfish) have been known to consume zebra mussels, as well as smallmouth bass and crayfish. Common Carp (which are present in Lake Summerset), as well as several other rough species of fish (which are not present in Lake Summerset) will also consume zebra mussels when another preferred prey isn't available. In addition, certain species of diving ducks have been known to consume zebra mussels as well. However, predation by native species as a biological control method is usually limited in its effectiveness due to the rapid rate these mussels reproduce. Furthermore, because these mussels are filter feeders, they accumulate pollutants in their tissues and then pass those pollutants on through the food chain to their predators. Therefore (to be safe) it's not recommended for humans to eat these mussels or the fish that may have consumed them.

Conclusion

The impacts associated with the introduction and spread of zebra and quagga mussels (if left unchecked) would be severe to our lake's aquatic ecosystems. The longer it takes to put in place effective preventative measures (along with association member partnership and compliance) could result in irreparable long-term ecological damage to our lake. We're fortunate that we still have time to take appropriate actions (through membership awareness and cooperation) to prevent the introduction of these invasive enemies and protect the most valuable asset of our community.....the lake!

Submitted by the LSA FCC