



Lake Summerset Association (LSA) Zebra/Quagga Mussel Rapid Response and Control Management Guide

Created by the LSA Fish Conservation Committee (FCC)

1.0 Purpose

This guide is intended to serve as a resource for mitigating and managing the presence of zebra and/or quagga mussels in Lake Summerset. It intends to present knowledge and options available for strategy management based on early detection protocols.

2.0 Introduction

Lake Summerset is a 275-acre man-made lake with a shoreline of approximately 5 miles. Its greatest length is 1 3/4 miles and it lies within a 1,550-acre recreational community located across the Winnebago and Stephenson County line in Illinois. It was completed in 1969 by Boise Cascade Recreation Communities, a Division of Boise Cascade Home and Land Corporation and subsequently turned over to the Lake Summerset Association, Inc (a non-profit corporation representing the owners of residential lots). The Association's responsibilities include ongoing property management including the lake, streets, common real estate areas and amenities. Water and sewer utility service is provided by the Otter Creek Lake Utility District (OCLUD) of Winnebago County. The lake reached full pool in 1972 having a maximum depth of 35 feet with water flowing into the dam spillway as designed.

3.0 Lake Protection and Management

3.0.1 Program Goals

- Provide water quality that allows for many diverse forms of recreation that the lake supports, including swimming, boating, and fishing.

- Maintain a healthy ecosystem within the lake, which includes aquatic plants and the microorganisms that support the extended food web.
- Minimize the introduction of invasive plant and animal species to the lake while working to control the invasive species already present.
- Ensure that, when conditions require corrective action to improve water quality, they shall be completed by appropriate professionals.
- Ensure that both established and emerging technologies will be considered for managing the ecosystem.

4.0 Zebra and Quagga Mussel Effects and Necessary Actions

4.0.1 Ecological, Economic and Membership Impacts

4.0.1.1 Ecological Impact.

Zebra and Quagga mussels are freshwater bivalve mollusks which can have multiple impacts on water bodies. They are extremely efficient filter feeders, depleting resources at the base of the aquatic food web and thereby limiting the food supply available to other animals including fish and native mussels. They filter particles from large amounts of lake water thus increasing water clarity. Their efficient filtration can decrease nutrient levels in the water column and, because of water clarity, can also result in the subsequent emergence of blue-green algae blooms and excessive growth of aquatic weeds. Some particles filtered by the mussels are eaten and some are rejected, packed, and ejected as pseudo feces which can build up to create mucky bottom conditions in lakes. In conditions of low dissolved oxygen, nutrients can be released from the pseudo feces and cause algae to bloom.

Zebra mussels feed on phytoplankton and zooplankton which result in the reduction of these organisms in the lake. Phytoplankton is a food source for zooplankton and zooplankton are the primary food source for larval fish. Reducing zooplankton can interrupt the growth process associated with fish spawn, negatively impact the fish populations in a lake.

Zebra mussels compete with native mussels for food and interfere with their movement, respiration, and reproduction by attaching to their shells. Native mussel shells can become habitat for zebra mussels resulting in shell densities high enough to kill the native mussel by suffocation.

Zebra mussels mature more rapidly than native mussels and, unlike native mussels, zebra mussels do not need a host during their juvenile stage. These characteristics help allow zebra mussels to become the dominant mussel population in a lake.

4.0.1.2 Economic Impact

The most significant economic impact of zebra mussels on a national level is related to damage done to water pipes clogged with mussels and a resulting shutdown of power plants due to insufficient water flow. It is estimated that zebra and quagga mussels cause over \$300 million annually in damage to power plants, water systems and industrial water intakes.

At Lake Summerset, direct economic impact for members is the potential damage to boats, propellers, motors, hulls, docks/boatlifts, coupled with the clean-up costs. For LSA the primary impact would be the cost of mitigation following an infestation. These costs not only include collection materials and chemicals, but also time spent by staff associated with performing the mitigation and abatement effort. Blockage of the water draw-down and discharge piping system at the Dam is a direct possibility. Impact on dues is inevitable.

4.0.1.3 Membership Impact.

Zebra mussels can interfere with recreational use of Lake Summerset through their impact on fish populations and on public and private beaches used for swimming.

Zebra mussel shells are very sharp and can cut bare feet in wading areas. Without proper protection, the shells can also cut the hands of individuals handling pier posts, propellers, boat hulls and many other items routinely found along the lake shore. Shells from dead mussels can wash up onto shore at levels where they must be groomed from beaches. Piles of dead mussels can rot on shore and create nuisance sight and odor issues. This may not only discourage amenity use, but potentially affect property values as well.

4.0.2 Prevention

Proactively preventing the introduction and spread of invasive mussels is the first line of defense against invasion. Keeping zebra mussels out of Lake Summerset is essential in protecting the lakes' native ecosystems, maintaining water quality, preserve biodiversity, and sustain the economic and recreational activities that depend on a healthy lake environment. Prevention and early detection measures are crucial to mitigate the potential impacts of zebra mussels.

4.0.2.1 Education and Awareness.

Zebra and Quagga mussels are two of the most devastating invasive species to invade a lake. When they become established, they alter the food web and change the water chemistry and harm native fish populations, plants, and other aquatic life. A single female mussel can produce anywhere from 30K to 1M eggs per year. Fertilized eggs develop into larvae (veliger) that float and swim in the water column. Juvenile and adult mussels attach themselves in high densities to hard surfaces such as rocks, docks, boat lifts, boat hulls, engines, trailers, lake buoys and

steel seawalls. Mussels can also be transported from one body of water to another in or on boats, bait buckets, oars, paddles, anchors, skis, tubes, tow ropes, life jackets, and other recreational equipment in a boat. Although not easily observed, veliger can be transported in live wells and boat ballast. In addition, mussels can be attached to vegetation/debris stuck on boats, trailers, or gear.

Educational efforts describing the damage that mussels can cause, and the actions required to prevent the spread of zebra and quagga mussels into Lake Summerset are ongoing. Articles have been and will continue to be posted in the Lake Summerset News to inform membership about the impact of Aquatic Invasive Species (AIS) on our lake and about efforts being taken to prevent transportation of AIS into the community. LSA frequently reinforces these messages through e-mail blasts to the membership. In addition, LSA has made available online an informative “Aquatic Invasive Species and Awareness Course” that is available on the LSA website under the Lake Health section after logging in as a member.

Multiple resources are available to the membership. Brochures titled “Protect Our Waters” from Wildlife Forever and “Be a Hero, Transport Zero” from the Illinois DNR are available to membership at the LSA Main Office Building. In addition, signage to reinforce the “Clean, Drain and Dry” initiative is present at our Marina Boat Ramps.

4.0.2.2 Water Vessel Cleaning Best Practice

A boat washing station has been established near the main entrance to the Lake to help ensure that watercraft which have been exposed to waterways other than Lake Summerset can be effectively cleaned prior to being used in Lake Summerset. Watercraft includes motorized and non-motorized boats, canoes, and kayaks. Other bodies of water include lakes, ponds, rivers, and streams. Boat owners using the washing station are encouraged to inspect their boats and clean off visible aquatic plants, animals and mud from the boat, trailer and any other equipment used in a foreign water body. High pressure hoses are provided for rinsing boats, motor, trailer, live well and transom/bilge well. Boats and equipment cleaned and rinsed should be dried prior to use in Lake Summerset when possible.

Support and compliance 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 invasive species into Lake Summerset.

4.0.3 Early Detection Monitoring

Consistent monitoring practices are an integral component of prevention planning for invasive mussels. Early detection is key for preventing establishment of new populations and presents the best opportunity for effective treatment and possible eradication.

4.0.3.1 Detection of Infestation.

Early detection efforts at Lake Summerset include utilizing the placement of 11 mussel detector devices placed in strategic shoreline locations around the lake. These devices are monitored approximately every two weeks by volunteers coordinated by the Fish Conservation Committee.

Additional early detection efforts include annual inspection of LSA piers and diving platforms removed from the lake by the LSA Maintenance Staff. Members and Marine Service Providers should be proactively inspecting the boats, boat lifts and docks after removal in the fall for any attached mussel. In addition, any boat, boat lift, or dock being put in the water for the first time should go through a comprehensive visual inspection and cleaning by the member or Marine Service Provider, especially if they are coming from or have been used in a different waterway other than Lake Summerset. Lakefront property owners should conduct periodic lake inspections to look for evidence of mussel presence on their pier posts, boats, sea walls, pier ladders, and lake bottom.

If an infestation is suspected, diver surveys will be conducted via snorkel or scuba in areas where local introduction is suspected. Diver surveys can provide immediate survey results with minimal sampling time.

Detection will result in completion of a data fact sheet found in Appendix 1.

4.0.3.2 Invasive Species Confirmation

Invasive Species confirmation in Lake Summerset would be carried out by the LSA Operations Manager. The Illinois DNR would be notified and requested to confirm our observation.

4.0.4 Rapid Response

Responding to a mussel invasion immediately following detection greatly increases the likelihood that the population can be controlled. Having a rapid response plan in place prior to invasion is the best way to stop mussels from spreading and to minimize negative impacts following detection. That is the intent of this document.

4.0.4.1 Quantifying Extent of Infestation

Upon verified discovery of Zebra/Quagga mussels in Lake Summerset, broader inspections for mussels, including underwater observations, will be carried out under the direction of the Lake

Operations Manager working with the LSA Fish Conservation Committee (FCC). An e-mail blast from the General Manager will alert property owners to the discovery and will request cooperation, providing directions for identifying sites of infestation. A data collection and tracking effort will be established through the FCC to complete an initial assessment and determine the extent of infestation.

4.0.4.2 Containment and Control Protocols

Containment and control protocols fall into three categories: physical, chemical, and biological. Under direction from the LSA Board of Directors, physical protocols will be established to manage boat movement and reinforce boater education, boat inspections and decontamination.

Chemical control is carried out with commercial products such as Biobullets (potassium chloride), Zequanox (killed cells of *Pseudomonas fluorescens*), and EarthTec QZ 9 (ionic copper). The use of these chemicals in Lake Summerset would require consultation with the IDNR and from the LSA Board of Directors.

Biological control consists of fish species that eat zebra and quagga mussels. The redear and pumpkin seed sunfish are potential mussel predators and have been studied in the western United States for mussel control. Smallmouth bass, crayfish and carp have also been reported to feed on zebra mussels when other preferred prey is not available. However, predation by species as a biological control method is usually limited in its effectiveness due to the rapid rate at which these mussels reproduce.

4.0.5 Action Plan/ Initial Response

Upon confirmation of infestation and establishment of location and initial spread of the mussels, an action plan described in Appendix 2 will be implemented. The plan has been created with input from the Fish Conservation Committee, the Lake Planning Committee, Lake Summerset Operations Department and approved by the LSA Board of Directors.

In addition to actions specific to control of the infestation, the plan includes actions related to enhanced education, increased inspection, and acceptable treatments going forward.

4.0.5.1 Extended Response

The extended response consists of actions to be implemented in the weeks or months after the initial response. The extended response would be overseen by a Sub-Committee appointed by the LSA Board of Directors.

The extended response would evaluate and identify actions to be taken related to:

1. The effectiveness of interactions (internal and external) which occurred during the initial response.
2. The effectiveness of any treatments which were utilized to control the infestation.
3. The effectiveness of measures to improve member education and watercraft decontamination and reducing the risk of future infestations.

4.0.5.2 Long-term Response

The long-term response after a zebra mussel infestation would primarily focus on evaluation and modification of this Management Guide. This would include assessment of the financial impact of the infestation and how this impact could be incorporated in the budgeting process going forward (e.g., a yearly line item vs. a yearly accrual for future expenditures). Changes to the Association Redbook Rules and Regulation should also be evaluated.

5.0 Summary

This Management Guide is written to provide guidance and an action plan associated with a zebra mussels infestation in Lake Summerset and includes a description of actions to be considered to mitigate the impacts caused by the infestation. The Guide describes continuing actions designed to help prevent the entry of zebra mussels into the lake and suggests options for control once an infestation is discovered.

The overarching priorities required to assure a successful response include continued education with a commitment to increase the understanding of potential treatments available, effective interactions within the LSA community along with other Lake Management Professionals in our region.

6.0 References

1. Consultation with the Illinois Department of Natural Resources – Brennan Caputo, Regional Natural Resources Specialist
2. Consultation with the Iowa Department of Natural Resources – Adam Schnieders, Water Quality Resource Coordinator
3. Quagga-Zebra Mussels Management Plan – Western Regional Panel on Aquatic Nuisance Species, February 2010.
4. Watercraft Inspection Manual – Minnesota Department of Natural Resources, Aquatic Invasive Species and the Watercraft Inspection Program, 2017.
5. USDA National Invasive Species Information Center - Aquatic Invasives website.

6. U.S. Fish & Wildlife Services – Aquatic Invasive Species website.
7. National Park Service – Aquatic Invasive Species website.
8. Invasive Species Management - A Handbook of Principles and Techniques, Mick N. Clout, Peter A. Williams, Oxford University Press, 2009.
9. Invasive Mussel Collaborative – (U.S. Geological Survey, Great Lakes Commission, National Oceanic and Atmospheric Administration and Great Lakes Fishery Commission) April, 2020
10. National Park Service, Quagga/Zebra Mussel Infestation Prevention and Planning Guide, May, 2007.
11. Minneapolis Park and Recreation Board, Zebra Mussel Action Plan, Prepared December, 2010, Updated 2019
12. Illinois/ Indiana Sea Grant, Lake Notes, Zebra Mussels, 2004
13. Wisconsin Aquatic Invasive Species Management Plan, Wisconsin DNR, July 2018
14. “Enumeration of Potential Economic Costs of Dreissenid Mussels Infestation in Montana” , Montana Invasive Species Council, January, 2019
15. “Zebra Mussel Control With Low Dose Copper”, Minnesota Aquatic Invasive Species Research Center (MAISRC), 2019-2021 Project Update
16. “Assessment of Open Water Zequanox Applications for Controlling Dreissenid Mussels within an Inland Lake”, Upper Midwest Environmental Sciences Center, U.S. Geological Center, Invasive Species Program, LaCrosse, WI , February, 2018
17. “Zequanox: A Potential Solution to Zebra Mussels” by Bailey Murawski, Aisthesis Volume 7, pp29-33, 2016
18. “Oregon Dreissenid Mussel Rapid Response Plan”, Oregon State Marine Board, October 2013
- 19 “ Zebra Mussels Eradicated from Lake Waco in Central Texas” from News and Media News releases, January 21, 2021.

Appendix 1.

Lake Summerset Zebra/Quagga Mussel Report Form

(Submit to LSA Office Upon Completion)

Date and Time of Sighting:

Member Reporting:

Lot Number:

Phone Number:

E-mail Address:

Location of sighting: (Lot number, marina, beach, etc.)

Is location marked?

Estimated number of mussels seen (clusters):

At what depth were the mussels seen?

Are photographs available? (if yes, please submit with this form.)

Are samples available? (Hold in source water; freeze)

Who has been contacted?

Has any other action been taken?

Comments:

For office only: Date report received: _____ Received by: _____

Appendix 2

Initial Response Action Plan

Upon the receipt of a report of a zebra/quagga mussel sighting in Lake Summerset, the Manager of Lake Operations, General Manager and Chairman of the FCC will be notified, and the finding will be verified. Upon verification, the Lake Operations Manager will report the finding to the Illinois Department of Natural Resources and to the LSA Board of Directors. The Lake Operations Manager, in collaboration with the General Manager and the Chairman of the FCC will work with the Board to form a subcommittee to manage the response to the infestation.

The sub-committee will be tasked with completing an initial assessment to determine the extent of infestation. If possible, the source will be identified and removed from the lake. The degree of spread will be determined, and an effort will be made to isolate the area.

The sub-committee will investigate mitigation options through interactions with other lake management teams in the area and with representatives from companies offering commercial treatments. An action plan complete with objectives, timeline and budget will be prepared for management and the LSA Board of Directors review.

The LSA community will be notified by e-mail blasts and LSA News articles from the General Manager. Community support will be sought in monitoring sites for possible spread, e.g., sea walls and lake front rock borders, boats, boat lifts, marina slips, LS fishing piers, homeowner piers, pier ladders, trailers, kayaks, canoes, paddles, and buoys.

In addition to the action plan aimed at mussel eradication, the sub- committee will reinforce prevention and detection measures through educational efforts throughout the Association Membership. Special attention will be given to boater education, boat inspection and decontamination protocols. A determination will be made regarding the necessity to make Redbook Rule changes.

