Invasive Species Management: Lake Minnetonka's Problem With Eurasian Watermilfoil

By: Daniel George

Advisors: Jean Lavigne and Troy Knight

Introduction

An Invasive species can pose a serious ecological and economic threat to any type of landscape that it has been introduced to, whether it be terrestrial or aquatic. An invasive species defined as, "a non-native, introduced species that can sustain populations and have large effects on communities" are able to enter a new ecosystem either naturally or with the help of humans, transporting them to a new place where they are able to invade. Threats posed by invasive species are many, but primarily invasive species disrupt communities by outcompeting native species for resources, effect ecosystem properties, and directly affect native populations by predation.

Lake Minnetonka Information

Lake Minnetonka is located in the southwestern part of the Minneapolis metropolitan area of situated in Carver and Hennepin County. It also is a popular recreation lake that hosts a great atmosphere for people who are looking to get a big lake experience in the metropolitan area. It is a highly populated lake because of the 11 high density cities that surround the lake.

Lake Minnetonka is approximately 14,000 acres in size with a maximum depth of 117 feet. It is an unusual lake for the area because of its characteristic of having 37 bays around the lake, some of which were originally separated lakes but have since been connected by a series of canals. Throughout the lake there is a system of basins with a range of fertility, bottom types, and depths which allows it to host a great diversity of fish, plant, and invertebrate species. From the 2012 Minnesota DNR fisheries report there are approximately 20 different species of fish.

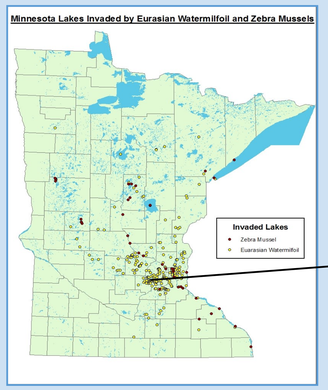

Figure 1. Map of MN lakes that have been successfully invaded by Eurasian Watermilfoil and Zebra mussels. Helps to show the spread of the species and helped determine how many lakes have been invaded by both species.

Created by Daniel George

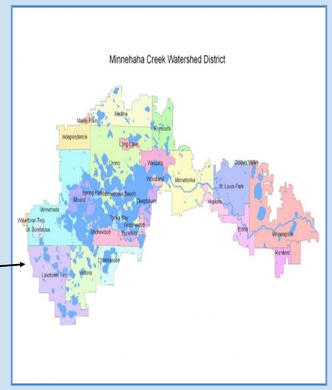

Figure 2. This is a map showing an outline of the Minnehaha Watershed District. Lake Minnetonka is the start of the Minnehaha stream which then connects to multiple lakes farther down stream.

COLLEGE OF Saint Benedict

Saint John's UNIVERSITY

Picture References

1. Cited in figure
2. http://www.minnehahacreek.org/
3. Cited in figure
4. http://www.mainevlmp.org/aquatic-invaders/
5. http://www.seagrant.umn.edu/ais/img/watermilfoil_id.gif
6. http://www.townoftrenton.info/wallace_lake/weed_harvester.jpg
7. https://encrypted-tbn1.gstatic.com/images?
8. https://encrypted-tbn2.gstatic.com/images?
9. https://encrypted-tbn2.gstatic.com/i66zd21d1mWri8M-
10. https://encrypted-tbn1.gstatic.com/images?q=tbn:ANd9GcSqCuzp8BnG8FXbvabBlpZap7o-rIDC8CRfmmY7_s-kZQ

Figure 3. This is an up close look at what a single stem of milfoil looks like when submerged. Pieces like this can fragment and start new communities.

http://blog.uvm.edu/tdavis5-104invasives/files/2014/11/

Figure 4. Displays a dense population of milfoil that has emerged from the surface of the water. This is a very common image to see on lakes that have been invaded by Eurasian Watermilfoil. It typically takes 2-3 years for milfoil to become the dominant species in a lake

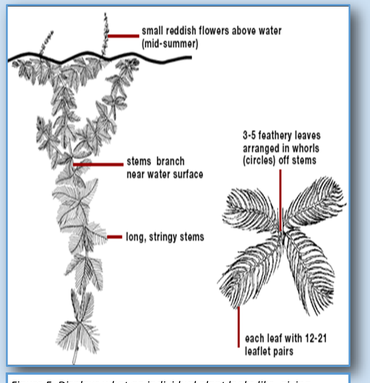

Figure 5. Displays what an individual plant looks like, giving certain characteristics that helps identify the plant.

Eurasian Watermilfoil

Background

- Discovered in U.S in 1940's and identified in MN in 1987
- Milfoil is a perennial, vascular plant that consists of long underwater stems that branch out and have compound leaves with emergent flowers.
- Found in water depth ranging from 3-12'
- Able to reproduce asexually though "Auto—Fragmentation" allowing it to spread easily.
-

Negative Impacts

- Dense populations create areas that inhibit recreational activities (fishing, boating, swimming).
- Becomes dominant plant species within 2-3 years.
- Once dominant species almost impossible to eradicate.
- Shades out native species altering community composition.
- Interferes with Largemouth bass spawning and feeding.

Management Techniques

Type	Description	Effects
1. Mechanical Harvesting	Conducted annual and only provides temporary solution. The harvester cuts the top 6 feet off of plants then contents get transported to land for composting. The main reason for this type of management is to "mow" the plants so boats don't get stuck in dense plant beds.	This type of harvesting is very expensive for what little it does in managing the milfoil. It also can contribute to the spread of the species by fragmenting individual plants. Also cuts any native species that are in the areas of cutting.
2. Suction Harvesting	Completely moves species from lake bottom by divers feeding plants through a suction tube which brings plants to a transport barge.	There have been instances where this has worked for eradication of small milfoil populations. It allows for divers to pick individual plants so less native species. are disrupted.
3. Benthic Barriers	A benthic barrier covers the sediment like a blanket, compressing aquatic plants while reducing or blocking light .	An effective way to reduce or eradicate for smaller areas. However it does cause the killing of native species that are located in application area due to the reduced light.
4. Biological Treatments	The Aquatic Water weevil has been identified as a recommendable management technique. The weevil feeds only on invasive milfoil through all of its life stages causing significant damage to communities.	There is still ongoing research being done by the DNR, but so far weevil populations have been identified as having significant effects in the decrease of milfoil populations. However the species is heavily preyed upon by fish populations
5. Herbicide Treatments	Can be applied in granual or liquid form. Herbicides can cause significant reduction rates on milfoil species and be applied to almost any type of lake.	Herbicides have been used for whole lake treatments and have shown to cause significant reduction in milfoil species. However, it also causes damage to all native species in the lake.

Zebra Mussel Effects

The Zebra Mussel has been identified as having mutualistic a relationship with aquatic plant species. This relationship is formed because the mussel filters water at high rates, increasing water quality. The increase in water quality allows for sunlight to reach higher depths. This allows for milfoil populations to grow at deeper depths allowing for a greater distribution in communities. Eurasian Watermilfoil provides nutrients for Zebra Mussels to feed upon.

Figure 5. Picture of a typical DNR poster that are displayed at boat landings. Since it is hard to eradicate populations from already Invaded lakes. Agencies are putting a lot of their effort into stopping the dispersion into new lakes.

Figure 6. Suction harvesting can reduce the amount of native species effected by removing only invasive milfoil plants. If done properly in can significantly reduce populations for 2-3 years at a time.

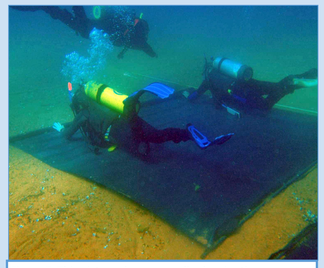

Figure 7. This picture shows a smaller barrier than ones that would be used on Lake Minnetonka. Materials such as burlap, plastics, perforated black Mylar, and woven synthetics can all be used as benthic barriers.

Figure 8.The aquatic weevil is a small black and yellow striped beetle which measures 2-3 mm in length. After the weevil burrows into the stem of the plant where they feed on the tissues, obstructing the plant's ability to transport food and nutrients.

Figure 9. Shows a liquid application of herbicides to a body of water. Herbicides such as 2, 4-D, Fluridone, and Triclopyr are applied to certain bays of lakes, which usually get blocked off during and after time of application.

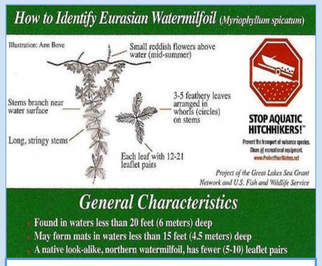

Figure 10. Images such as this one are usually displayed at boat landings to provide information to all people launching watercraft. Preventing the spread of the species is the main management technique being used by agencies.

Conclusion

In conclusion, I have a few suggested methods is the management of Eurasian Water Milfoil in Lake Minnetonka. First, I believe it would be beneficial and cost effective to reduce the use of mechanical harvesting and implement suction harvesting. I also believe more funding should be provided to research on biological treatments. Last, preventing the spread of milfoil to other lakes is should continue to be the most important management technique.