Sand Lake

Lake Management Plan Update 2017

Submitted by:

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Lake Management Plan Update

Introduction

Characteristics of the Lake

Sand Lake is a 550-acre lake located in Cambridge & Franklin Townships, Lenawee County, Michigan. Public access to the lake is provided by a public boat launch, located on the east shore of the lake. Most of the shoreline has been developed, with the exception of small wetlands at the western end of the lake.

Observations made while working on the lake indicate that the lake is used for fishing, water skiing, jet-skiing, boating (power and non-power), and swimming.

Rooted vegetation covers a large amount of the littoral zone of the lake.

PLM's Integrated Plant Management Program

An Integrated Plant Management program should focus on preserving and protecting desirable plant life while controlling unwanted "weed" species through remediation services. In addition, these preventative programs should strive to keep the lake free of unwelcome plants that are known to be pests elsewhere in the region.

The first step of PLM's Integrated Plant Management Program is to *evaluate* and record current lake conditions and lake residents' goals. Next is to *prescribe* a lake specific management plan to control unwanted plant growth. *Implementation* of the agreed upon lake management plan is the final step of the program. After the program has been implemented, PLM will assess the results and use the information to modify and improve priorities, processes and plans – starting the cycle again. The key to a successful Plant Management Program is to minimize the total long term impacts of noxious aquatic vegetation while preventing new infestations and protecting the aquatic environment.

Why Do Aquatic Plants Become a Nuisance?

In moderation, aquatic plants are good for the lake, providing habitat for fish and other organisms and stabilizing bottom sediments. Plants get to be a problem when their growth becomes excessive and interferes with the use of the lake. At high levels, even native plants can disrupt the balance and be viewed as "invasive". A number of factors can result in excessive growth of aquatic plants. In many, or perhaps most cases, several factors have combined to result in the problem.

Exotic plant species cause many of the most serious weed problems. Exotic plants are plants that are not native to this area, which have been brought to the area and released.

Because they often have few natural enemies (their pests, pathogens, etc. may not have come over with them), they grow out of control. When exotic aquatic plants such as Eurasian watermilfoil and Starry

stonewort invade a lake, they often form extensive dense populations, crowd out native species and reduce the quality of habitat for other organisms.

Human activities also increase the input of nutrients and nutrient-rich sediments to the lake. Nutrients feed the growth of algae in the water and settle on the bottom, where they provide a rich substrate for aquatic plant growth. Nutrient inputs increase the overall growth of all aquatic plants (exotic and native) and algae. Preventing excess nutrients from entering your lake is much less expensive than trying to fix the problems they cause.

Eurasian watermilfoil

EWM, an exotic species, is an extremely aggressive submerged aquatic plant that has the abilities to form a monoculture among vegetation. EWM spreads by fragmentation (every inch of plant can sprout new growth) and has a very strong root system. EWM forms a canopy above native plants, choking out the competition. EWM also has the ability to overwinter underneath the ice, allowing it to be present throughout the winter. This gives the plant a head start in growing during the spring and chokes out native plants very quickly. EWM should be controlled as soon as it is found within a waterbody to prevent further infestation and loss of native plant diversity. NOTE: Once a native plant is lost in a lake, there is no guarantee it will return.

- Starry stonewort is in the same family as Muskgrass (Chara) but is considered to be an exotic invasive species. Starry stonewort, which looks very similar to the beneficial species Chara, is appearing in more and more lakes. Chara is a highly desired plant because it is typically low growing, keeps the water clear and can slow down the invasion of exotic weed species. Starry stonewort also forms dense mats, but unlike chara, it can grow from 5 to 7 feet tall. Starry stonewort can be very detrimental to a lake's ecosystem and has the ability to kill off native plants and have a negative impact on a lake's fisheries.

Management Goals for Sand Lake

- The primary goal of aquatic plant management in Sand Lake is the control of exotic aquatic plants, where found. The exotic plant species, Eurasian watermilfoil and Starry Stonewort should be controlled throughout Sand Lake, wherever they are found. The abundance of these species should be reduced to the maximum extent possible, and efforts should be made to reduce their recovery after treatment.
- Aquatic plant management should preserve species diversity and cover of native plants sufficient to provide habitat for fish and other aquatic organisms. Native plants should not be managed to encourage the growth of plants that support the Sand Lake fishery (by creating structure and habitat) provided that they do not excessively interfere with recreational uses of the lake (e.g., swimming and fishing) in high-use areas. Where they must be managed, management techniques that reduce the stature of native plants without killing them (e.g., harvesting, contact herbicides) should be used whenever possible. Specific areas should be set aside where native plants will not be managed, to provide habitat for fish and other aquatic organisms. Muskgrass (*Chara*) should be allowed to grow throughout the lake, except in where it grows so tall as to interfere with boating and swimming.

- Conditions in Sand Lake should not be allowed to deteriorate below present levels. Expansion of aquatic plant problems should trigger an adjustment in the aquatic vegetation management strategy. To support such responses, an annual record of vegetation and management should be maintained.
- Preventative measures that protect the lake from further nutrient enrichment should be identified and implemented.

Lake Management Activities

Aquatic Plant Testing

Due to variable treatment results and rapid regrowth of milfoil following treatment in previous years, genetic analysis was conducted to determine the genetic makeup of the milfoil in Sand Lake. Results confirmed the milfoil collected in several locations throughout the lake, is indeed a hybrid of Eurasian watermilfoil and native milfoil. In general, hybrid milfoils have a reduced response to aquatic herbicides and have quicker regrowth rates. Further testing was conducted on the Sand Lake milfoil to test rate specific responses to a variety of active ingredients. The results indicated very low susceptibility to 2,4-D, some susceptibility to Triclopyr and traditionally good response to Fluridone. Fluridone was recommended and implemented as the herbicide of choice for the 2017 treatment program.

Aquatic Plant Control

The Fluridone treatment program for the 2017 season consisted of several changes from the program implemented during the 2013 season. These changes were incorporated to address areas of concern that may have led to less than desired results during the 2013 season. PLM worked with the MDEQ under an Evaluation Permit to allow for non-standard Fluridone application techniques. Of these, the ability to use actual thermocline depth at time of treatment in calculating Fluridone amounts and revised lake size measurements were crucial for the success of the program.

The initial Fluridone treatment took place on May 15th. The target concentration was 6 ppb. Samples taken 48 hours after treatment indicated a lake wide concentration of 6.18 ppb. Samples taken 14 days post treatment indicated a lake wide concentration of 4.92 ppb, still well within the lethal threshold. Concentrations 30 days post treatment were at 2.8 ppb, below the target threshold of 3 ppb indicating a bump up treatment was warranted. A bump up Fluridone treatment was completed on June 19th to bring lake wide concentrations back to 6 ppb. Samples taken 60 days post initial treatment resulted in a lake wide concentration of 3.36 ppb, again above the threshold for lethal concentration and extended contact time. No further Fluridone treatments were required.

Vegetation Surveys

Planning/Evaluation

Vegetation surveys determine the locations of target and non-target plant species. The results of the surveys are used to determine the most appropriate management strategy. The vegetation surveys also document the success of the prescribed management program. An AVAS survey is the State of Michigan's method for conducting a complete aquatic vegetation survey. The Aquatic Vegetation Assessment Site (AVAS) survey divides the parts of the lake capable of growing plants (littoral zone) into subareas and records the cover of each aquatic plant found in each "site". This method of surveying takes into account not only the types of plant species present in the lake but also the densities of those species. AVAS surveys are also an excellent way to track plant species trends over time. A goal of invasive plant

management is to have native plants increase while exotic plants decrease over time. The success of this goal can be illustrated through the use of the AVAS data collected over several years.

Aquatic Vegetation Summary

A complete AVAS survey of Sand Lake to determine plant types, populations and aquatic problems was conducted September 18, 2017. Sand Lake supports a fairly diverse community of aquatic plants. Several species of aquatic plants were encountered in the September 2017 survey of the lake (Table 1). Rooted plant growth is moderate almost everywhere in the littoral zone (0 to 10 feet deep of the lake).

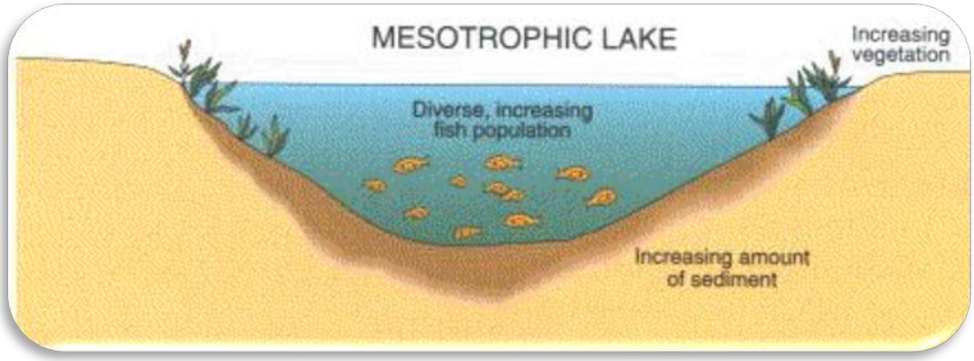
All of the plants listed in Table 1 are native North American species, except for Eurasian watermilfoil and Starry stonewort. These plants are non-indigenous aquatic nuisance species, i.e., plants from other places. These exotic plants cause considerably more problems than most native species. Eurasian watermilfoil is extremely invasive and can inhabit a variety of sediment types and water depths. Eurasian watermilfoil was found in only two of the survey sites during the September 2017 survey. Both of the sites containing EWM pieces were in deep water (approx. 20 feet) and collected on a rake toss. No visible milfoil was found in any area of the lake. Starry stonewort was found in one localized area, but given its invasive nature, it is also a species of great concern. Both of these species are known to out-compete native plant species, disrupt the ecological balance of lakes, and have negative recreational and aesthetic impacts to lakes they invade.

Common Plant Species Found in Sand Lake – September, 2017

AVAS Code	Common Name	Scientific Name	Cover
	Submerged- Exotic		
1	Eurasian watermilfoil (hybrid)	Myriophyllum spicatum X Myriophyllum Spp	0.03
29	Starry stonewort	Nitellopsis obtuse	0.15
	Submerged- Native		
3	Muskgrass	Chara	3.72
5	Flatstem pondweed	Potomageton spp.	1.28
6	Robbins pondweed	Potomageton spp.	2.22
7	Variable pondweed	Potomageton gramineus	0.69
10	Illinois pondweed	Potomageton illinoensis	1.97
11	Large leaf pondweed	Potomageton amplifolius	4.2
15	Wild Celery	Vallisneria americana	7.45
22	Bladderwort	Utricularia spp.	0.46
25	Naiad	Naiad spp.	0.62
27	Sago pondweed	Potomageton pectinatus	2.23
	Emergent- Native		
30	Water lily	Nymphaea odorata	7.8
32	Watershield	Brasenia schreberi	5.54
36	Arrowhead	Sagittaria latifolia	0.18

Water Quality Program

The water quality of the lake was tested in 2017. Overall the lake is in great, stable condition. The Carlson Index or Trophic classification for Sand Lake is Meso-Oligotrophic. Meso-Oligotrophic lakes have modest to low nutrient levels, clear water and moderate productivity. Rooted plants are commonly abundant and moderate dissolved oxygen in cooler waters allow for the survival of cold water fish.



Total phosphorus levels were low indicating no threat of serious eutrophication. Water clarity on the lake had remained similar from the previous year's readings. However, many factors can contribute to a change in water clarity including but not limited to turbidity from a rain event, algae bloom or poor weather conditions at the time of sampling.

E. Coli bacteria monitoring was also conducted during 2017. Coliform bacteria (E. Coli) are invisible. Contamination of surface water by *E. coli* and other bacteria poses a hazard to swimmers and to pets that drink the water. Contamination by fecal bacteria also indicates the potential for contamination by even more dangerous pathogens from animal digestive systems, including bacteria, protozoans (such as *Giardia* or *Cryptosporidium*) or viruses. Contamination can potentially be derived from a number of sources, including failed septic systems, agricultural runoff, or waterfowl or wildlife droppings. Sampling is best done in mid-summer when the water temperature is at its warmest and the bacteria have a perfect environment to populate. The site sampled had very low levels of E.Coli and was below safe swimming standards.

The correct balance of an aquatic ecosystem will result in great water quality, thriving fisheries, and a diverse native plant population. With the help of a proper lake management program, the benefits of a balanced ecosystem are evident in Sand Lake.

Sand Lake Management Program Results for 2017

Adjustments made to the Fluridone program for 2017 allowed for the appropriate concentration and contact time needed for an effective treatment program. The hybrid milfoil was significantly impacted lake wide as the year end survey results show. The 2016 fall survey resulted in a cover of 7.75 for milfoil whereas the 2017 fall survey only indicated a cover of 0.03. The milfoil that was found during the fall of 2017 were only parts of individual plants raked from bottom sediments in relatively deep water. The attached map shows the location of the EWM found during the 2017 survey.

Although overall plant density was reduced from the 2016 season, the native plant community was diverse and healthy. No negative impacts to the native plant community were observed.

Water quality parameters remained constant and no observable threats exist as water quality is well within acceptable levels.

Sand Lake Management Recommendations for 2018

Management options are dependent on many factors, including but not limited to, species abundance (density), species richness, species location and many lake characteristics. Whenever an exotic species is found within an aquatic environment, action needs to be taken to prevent long term ecological damage as well as recreational and aesthetic loss that will take place.

Submersed Aquatic Plants

Eurasian watermilfoil

During the 2018 season, monitoring and treatments should be conducted to control any hybrid milfoil that is found. Products to be applied and rates are yet to be determined as new options may be available for the 2018 season. PLM worked with the MDEQ and SePRO corporation during the 2017 season to evaluate a new active ingredient developed to control increasingly difficult hybrid milfoils. The results from these evaluations were positive and SePRO is moving this product through the EPA for registration. I will keep you posted on the progress of this active and will discuss with you the options available for 2018 if the need arises.

Starry stonewort

Starry stonewort appeared to be significantly reduced during the 2017 season. However, treatments with copper products to target Starry stonewort should be initiated once, and if the Starry stonewort is visible during the 2018 season. Treatment areas should be monitored and treatments scheduled as necessary to reduce the opportunity for recovery. Shoreline areas should be monitored regularly and any new infestations should be treated promptly.

Monitoring and Water Quality Testing

Aquatic vegetation will be monitored to document the condition of the lake and to provide warning of any changes in the condition of the lake that need to be addressed by additional lake management activities. Current water quality testing should continue to document overall health of the lake.