Lake Fenton

Lake Management Plan Update 2016

Submitted By:

Steve Hanson, MS Fisheries Biologist

PLM Lake & Land Management Corp.

PO Box 132 · Caledonia, Michigan 49316
phone 616.891.1294 · fax 616.891.0371
www.plmcorp.net

Lake Management Plan Update

Introduction

Purpose of the Update

This management plan updates and documents management activities during 2016, examines current conditions in the lake, and provides management recommendations for 2017. The plan will detail an integrated approach to lake management including but not limited to exotic weed control, water quality monitoring and aquatic vegetation surveying.

Characteristics of the lake

Lake Fenton is an 877-acre lake located in Fenton Township, Genesee County, Michigan. There is a Public Access Site located off Grove Park Road near the southwest end of the lake. Much of the shoreline has been developed for single family, seasonal and year-round homes.

Rooted vegetation is moderate in a majority of the shoreline areas although some pockets of dense near shore vegetation exist. The majority of the aquatic vegetation is located along drop off areas and shallow flats. The lake has a history of aquatic plant problems, especially since the introduction of the exotic invasive species, Eurasian watermilfoil, curly leaf pondweed and Starry stonewort.

Management Goals for Lake Fenton

- The primary goal of aquatic plant management in Lake Fenton is the control of exotic aquatic plants. The exotic plant species, Eurasian watermilfoil, curly leaf pondweed and starry stonewort, should be controlled throughout Lake Fenton. 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 be managed to encourage the growth of plants that support the Lake Fenton 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.

Starry stonewort

- The species Starry stonewort should be aggressively controlled and managed. 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.

- The invasive terrestrial plants, Purple loosestrife and Phragmities should be controlled along the shoreline and adjacent wetlands where present. Both species are exotic and have the ability to displace beneficial native vegetation. Purple loosestrife grows 2 -4 feet tall and is a vibrant magenta color. It is very aggressive and can quickly become the dominant wetland vegetaion. Phragmites (common reed) is a wetland grass that ranges in height from 6 to 15 feet tall. "Phrag" quickly becomes the dominant feature in aquatic ecosystems, aggressively invading shorelines, wetlands, and ditches. This plant creates dense "strands" - walls of weeds crowding out beneficial native wetland vegetation and indigenous waterfowl habitats. Spreading by fragmentation and an extensive root system, Phragmites ultimately out-competes native plant life for sun, water and nutrients.

Phragmites

- Conditions in Lake Fenton 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 Conducted in 2016

Water Quality

Water quality in the lake was evaluated in the spring and fall of 2016. On each occasion, a depth profile of water temperature and dissolved oxygen concentrations was measured at one-meter (approximately three foot) intervals and the Secchi disk depth was measured in the deepest part of the lake (Deep Hole Site). LakeCheck™ analysis was collected from the deep part of the lake. LakeCheck measures conductivity, total dissolved solids, pH, alkalinity, total phosphorus, soluble reactive phosphorus, nitrates and ammonia. A complete water quality report will be is attached.

Planning/Evaluation

A complete survey of the aquatic vegetation of the lake was conducted in September, 2016. Brief checks of the lake were made throughout the spring and summer months.

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.

Since different native plants grow at varying times throughout the season it is important to evaluate the lake multiple times to account for *all* species in the lake. The first evaluation is conducted in the spring and is used to determine areas that will require treatment or management. The final survey is conducted in late summer or fall and is used to determine management success.

Table 1: Plant Species Found in Lake Fenton – September 2016

Plant Name	Coverage
Eurasian watermilfoil	0.51
Chara	15.16
Thinleaf pondweed	0.11
Flatstem pondweed	0.50
Variable pondweed	0.01
Illinois pondweed	22.68
Large leaf pondweed	3.27
Water stargrass	0.99
Wild celery	7.63
Northern watermilfoil	0.21
Coontail	0.12
Elodea	0.01
Bladderwort	0.20
Naiad	4.55
Sago Pondweed	0.50
Starry stonewort	3.93
Water Lily	2.46
Spatterdock	0.89
Arrowhead	0.33
Cattail	0.12
American Lotus	0.01
Total Coverage	**64.18**

Current Conditions in the Lake

Aquatic Vegetation

Lake Fenton supports a relatively high diversity of native aquatic plants. Nineteen native species of aquatic plants were encountered in the September 2016 survey of the lake (Table 1). Rooted plant growth is moderate in most shoreline areas as the survey results show.

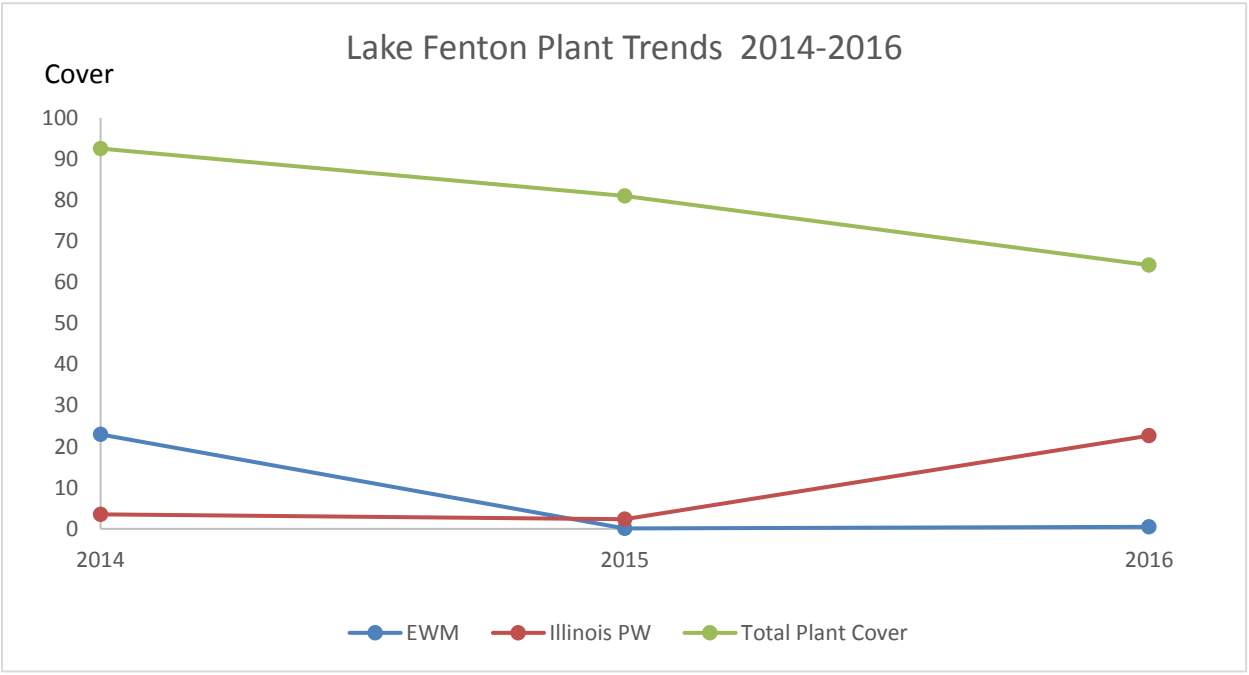
All of the plants listed in Table 1 are native North American species, except Eurasian watermilfoil and Starry stonewort. Eurasian watermilfoil was found at a very low density during the September survey. Starry stonewort was confined mainly to canals and channels, but has been found in a few spots along the main lake body.

The native plant species in Lake Fenton benefit the lake, performing such functions as stabilizing sediments and providing habitat for fish and other aquatic organisms. In general, native species cause few problems, compared with those caused by exotic plants. Three species commonly found in higher densities on Lake Fenton are Chara, Illinois pondweed and Wild celery.

Chara

Illinois pondweed

Wild celery



Aquatic Plant Trends

The above chart highlights the key trends that have occurred within the aquatic plant community of lake Fenton over the past few years. The primary target of the management program, Eurasian watermilfoil (EWM) has been successfully controlled during the 2015 and 2016 seasons. Initial cover during the 2014 fall survey was 22.98. Following the Fluridone treatment in 2015, the fall survey indicated a level of cover at 0.10. The fall, 2016 survey found levels at 0.51. Total aquatic plant cover has fallen from the 2014 level of 92.55 to 81.00 in 2015 and 64.88 in 2016. During the late summer of 2016, Illinois pondweed capitalized on a warm dry summer and had a significant increase from that of 2014 & 2015. Cover levels of Illinois pondweed were 3.54, 2.35 and 22.68 respectively.

Aquatic Plant Control

Curly leaf pondweed and Starry stonewort were found in moderate densities in the canals and channels the spring and early season surveys. Curlyleaf pondweed beds also established in many of the bays and drop off areas early in the season posing recreational problems. These areas were treated on May 24th,

2016. A total of 25 acres of curly leaf pondweed was treated using Diquat. In addition, 18 acres of Starry stonewort was treated in canal areas.

Follow up surveys indicated delayed growth of Curlyleaf pondweed was establishing in other off shore and drop off areas. These areas were treated on May 26th (20 acres), and June 14th (15 acres) totaling 35 acres for Curly leaf and some mixed Eurasian watermilfoil. Canals were also treated on June 16th for Starry stonewort totaling 20 acres.

The July treatment consisted of treatment for scattered Eurasian watermilfoil in canals totaling 15 acres and Starry stonewort totaling 20 acres. The July treatment was completed on July 27, 2016.

August saw a large increase in the amount of Illinois pondweed in many shoreline areas. On August 12th, as survey was completed to identify areas where the pondweed was at the surface and causing recreational problems near docks and residential areas. Approximately 19 acres were identified and treated on August 17th. A follow up survey indicated that other areas had developed shoreline issues as well with Illinois pondweed during the mid-part of August. A decision was made to not treat the additional areas as the end of the season was approaching and it became a cost/benefit question.

Water Quality Monitoring

Water quality monitoring is a critical part of lake management. Water quality monitoring provides an ongoing record of conditions in a water body. Changes in water quality can indicate threats from sources such as failed or inadequate septic systems, agricultural and lawn runoff, burgeoning development and erosion from construction site. Prompt identification of threats to water quality makes it possible to remedy them before irreversible harm has been done. Riparian's enjoyment of the water resource and the value of their property depend on maintaining water quality.

(Detailed water quality results are attached.)

Temperature and Dissolved Oxygen Profiles

Depth profiles of temperature and dissolved oxygen indicate that on April 1, the lake was not thermally stratified. The lake was well oxygenated, with an oxygen concentration in the Deep Hole Site of 13.2 mg/L (110% saturation) at the surface and 12.6 mg/L (104% saturation at 10 meters).

On August 24th, the lake was thermally stratified at 3.5.5 meters. Dissolved oxygen was adequate from the surface to 5 meters. August dissolved oxygen concentrations at the surface were 7.8mg/L (95 % saturation), and the concentration at 6 meters depth was only 0.2 mg/L (2 % saturation).

Conductivity Total Dissolved Solids, pH and Alkalinity

Conductivity and Total Dissolved Solids (TDS) measure the total concentration of dissolved salts in the water. Values for Lake Fenton indicate low concentrations of dissolved materials. Alkalinity and pH measure the amount of dissolved bases and the balance of acids and bases in the water. Alkalinity and pH values were within normal ranges for a soft water lake.

Secchi Disk Depths

The Secchi disk depth is a measure of water clarity, determined by measuring the depth to which a black and white disk can be seen from the surface. (Larger numbers represent greater water clarity.) In April, the Secchi disk depth was 5 meters. The August Secchi disk depth was slightly less at 4 meters.

Total Phosphorus

Total phosphorus measures the total amount of phosphorus in the water. Phosphorus is an important plant nutrient (i.e., fertilizer) and the nutrient most likely to limit algal growth. Elevated phosphorus inputs to lakes caused by human activities are a

major cause of cultural eutrophication. The total phosphorus concentration at the surface in the Deep Hole in April was 10 μg P/L. By August, the lake was stratified. The deep hole had a concentration of 10 μg P/L.

The concentration of phosphorus encountered in Lake Fenton during 2016 indicates low to moderate phosphorus concentration of the lake. Overall, the phosphorus concentrations observed during the 2016 season are similar to other lakes in the area with similar physical characteristics.

Nitrates

Nitrates measure the total amount of in-organic nitrogen in the water. Nitrogen is an important plant nutrient (i.e., fertilizer) and the nutrient most likely to limit the growth of rooted plants. Overall, nitrate concentrations in the lake were moderate to low. In April, nitrate concentrations in the deep hole site was 230 μg N/L at the surface. In August, nitrate concentrations were stable at 230 μg N/L. Nitrates values observed during the 2016 season continue to indicate low to moderate levels in the lake.

Evaluation of Trophic Status

Carlson's Trophic State Index (TSI) calculated from Secchi disk depth total phosphorus and chlorophyll measurements made in April and August yielded values between 44 and 33 (see Table 2). These values overall rate Lake Fenton as meso-oligotrophic to mesotrophic.

Table 2. Trophic State Index (TSI) Values

Site: Deep Hole	TSI from Secchi Disk	TSI from Total Phosphorus	TSI from Chlorophyll
April	37	33	NA
August	44	33	NA

Management Recommendations for 2017

Management options are dependent on many factors, including but not limited too, 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

Conventional Herbicide treatments

The 2017 aquatic plant management program should detect and treat any areas where Eurasian watermilfoil or Starry stoneworts are detected. In addition, spring growth of Curlyleaf pondweed should be treated where it has the potential to cause recreational problems. If native plants become sufficiently dense to interfere with recreation, harvesting or chemical treatments may be recommended.

Areas of Eurasian watermilfoil should be promptly treated using herbicides. Treatments with the herbicides, Triclopyr and/or 2,4-D, in localized treatment areas to slow the spread of Eurasian watermilfoil, when found should be conducted. The herbicides Triclopyr and 2,4-D, control Eurasian watermilfoil with little or no impact on most native plant species. Since they are selective, systemic herbicides, can actually kill the entire Eurasian watermilfoil plant. Under ideal conditions, several consecutive annual applications of Renovate or 2,4-D can reduce Eurasian watermilfoil to a maintenance (low) abundance. For this strategy to succeed, it is necessary to treat all the Eurasian watermilfoil in the lake each time they are applied.

Triclopyr is a systemic herbicide with selectivity very similar to 2,4-D. Triclopyr is not subject to the well setback restrictions that currently affect 2,4-D. Therefore, triclopyr can be used to control Eurasian

watermilfoil in near shore areas. A combination of both systemic herbicides in Lake Fenton could greatly reduce the spread of Eurasian watermilfoil.

Several contact herbicides, including diquat, can also provide short-term control of Eurasian watermilfoil. These herbicides kill only the shoots of the plant, and plants regrow relatively rapidly from their unaffected parts.

Starry stonewort is best controlled with copper based products. Typically, several treatments during the season are required to keep areas of Starry stonewort under control and reduce the chance of spreading to other parts of the lake.

Nuisance native plant management can also be incorporated into a lake management program with conventional herbicide treatments or mechanical harvesting if needed. Native plant treatments are completed using only contact herbicides in shoreline residential areas.

Monitoring

Aquatic vegetation and water quality 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.

The Recommended Management Schedule for 2017:

- A spring vegetation survey (to evaluate conditions in the lake and direct management efforts)
- Water quality evaluation should continue
- Early summer herbicide treatment (to control any Eurasian watermilfoil, Curly leaf pondweed and Starry stonewort
- 3-4 week starry stonewort treatments if required
- Mid summer herbicide treatment, if required
- Mid-summer water quality sampling
- Late summer herbicide treatment, if required
- A fall vegetation survey
- Fall water quality sampling