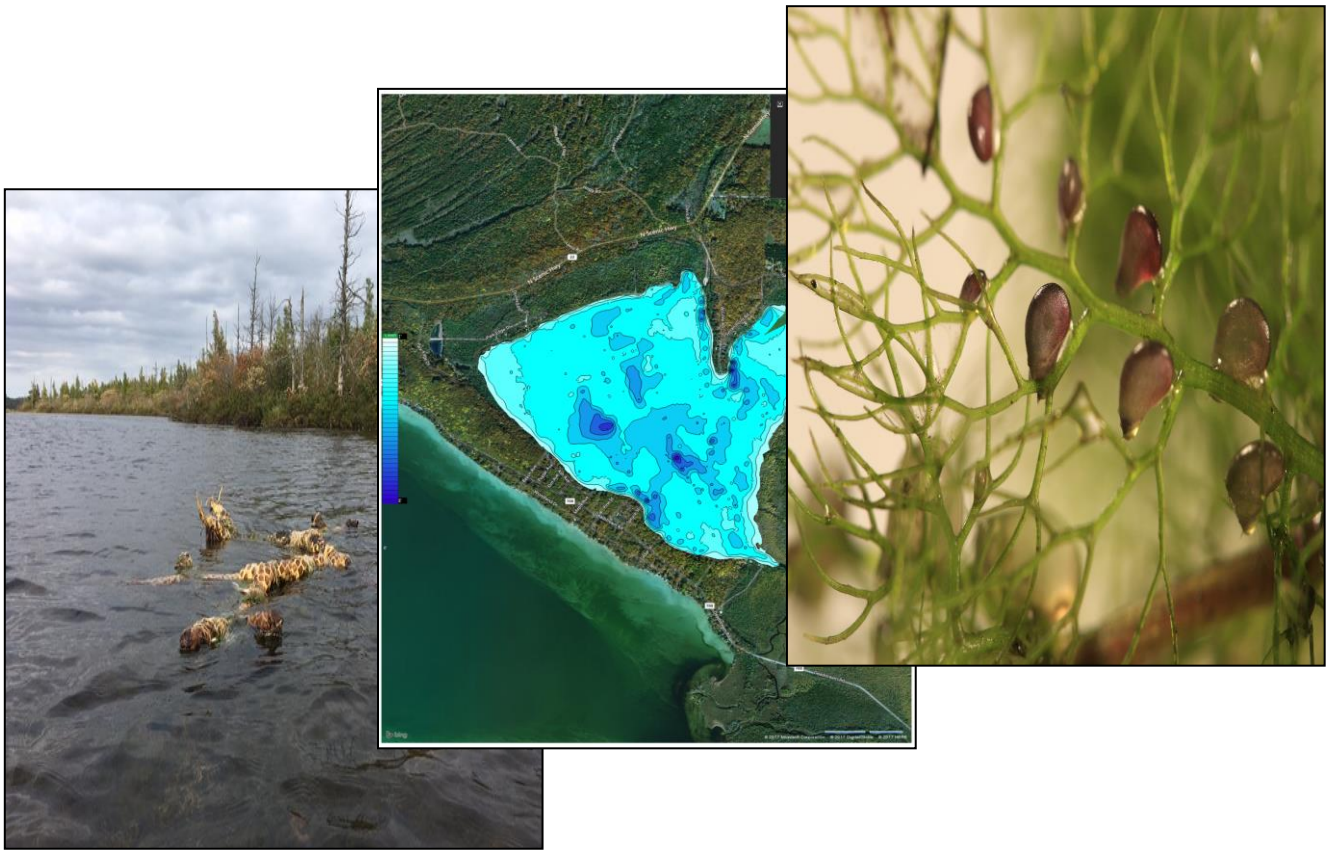
Restorative Lake Sciences™

AN ANNUAL ASSESSMENT OF AQUATIC VEGETATION IN LITTLE PLATTE LAKE BENZIE COUNTY, MICHIGAN



December, 2021

Prepared for: **Little Platte Lake Association**
C/O: Mr. Jerry Rupley

Prepared by: **Restorative Lake Sciences**
18406 West Spring Lake Road
Spring Lake, Michigan 49456
www.restorativelakesciences.com

TABLE OF CONTENTS

SECTION **PAGE**

FIGURES

TABLES

AN ANNUAL ASSESSMENT OF AQUATIC VEGETATION IN LITTLE PLATTE LAKE BENZIE COUNTY, MICHIGAN

December 2021

1.0 EXECUTIVE SUMMARY

This report describes the current distribution of native and exotic submersed, floating-leaved, and emergent aquatic plants, including the exotic species, Eurasian Watermilfoil (*Myriophyllum spicatum;* EWM) within Little Platte Lake, Benzie County, Michigan (Figure 1). Little Platte Lake is an 805-acre large, shallow inland lake with a healthy aquatic ecosystem. A whole lake grid survey utilizing 1,078 aquatic plant sampling sites and benthic scan conducted on June 22, 2021 revealed the following:

1. There are a total of 32 native aquatic plant species in Little Platte Lake which demonstrates a very high biodiversity of aquatic plants in the lake. This includes 22 submersed, 3 floating-leaved, and 7 emergent life forms of aquatic plants.
2. Prior to herbicide treatments in 2019, a June 20, 2019 survey determined that there were approximately 5.5 acres of invasive Eurasian Watermilfoil (EWM) in the lake which were widely scattered throughout the lake and were a threat to the biodiversity of the lake as this plant displaces favorable native aquatic plants. However, the June 22, 2021 survey determined that all EWM was effectively killed, with the exception of a small area near the access site.

3. There were approximately 2.5 acres of invasive Phragmites around the lake which were found in wetland areas surrounding the lake. This emergent invasive displaces native emergent aquatic plants and over time can form a monoculture. The June 22, 2021 survey determined that although the *Phragmites* were still present at the northeast corner, the previous treatments from the regional CISMA have been effective and the plants showed signs of continued senescence and damage with some green stolons noted that may require treatment in 2022.

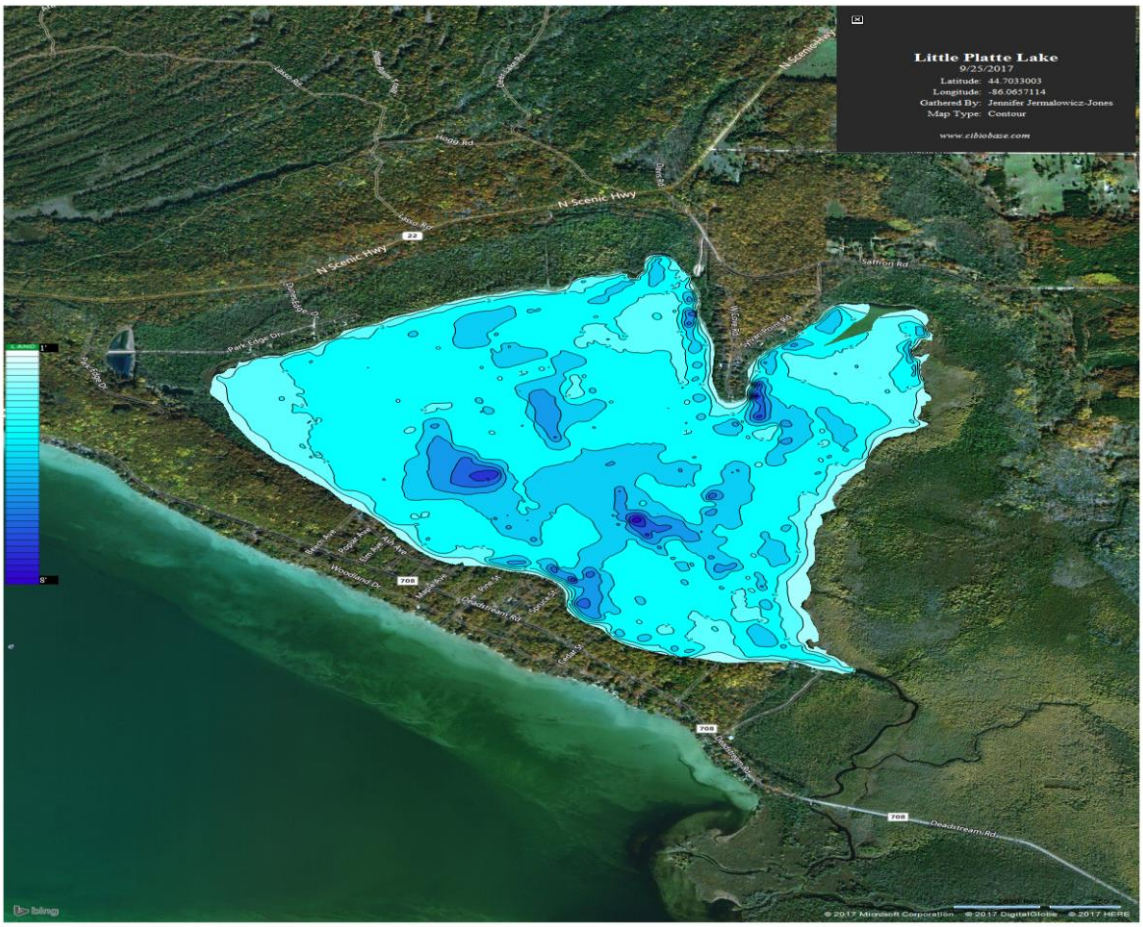


Figure 1. Depth contour map of Little Platte Lake, Benzie County, Michigan (RLS, 2017).

2.0 AQUATIC PLANT SURVEY METHODS

The aquatic plant sampling methods used for lake surveys of macrophyte communities commonly consist of shoreline surveys, visual abundance surveys, transect surveys, AVAS surveys, and Point-Intercept Grid surveys. The Michigan Department of Environmental Quality (MDEQ) prefers that an Aquatic Vegetation Assessment Site (AVAS) Survey, or a GPS Point-Intercept survey (or both) be conducted on most inland lakes following large-scale aquatic herbicide treatments to assess the changes in aquatic vegetation structure and to record the relative abundance and locations of native aquatic plant species. Due to the large size of Little Platte Lake, a bi-seasonal GPS Point-Intercept grid matrix survey is recommended to assess all aquatic species, including emergent and floating-leaved species within and around the lake.

2.1 The GPS Point-Intercept Survey Method

While the MDEQ AVAS protocol considers sampling vegetation using visual observations in areas around the littoral zone, the Point-Intercept Grid Survey method is meant to assess vegetation throughout the entire surface area of a lake (Madsen et *al*. 1994; 1996). This method involves conducting measurements at Global Positioning Systems (GPS)-defined locations that have been pre-selected on the computer to avoid sampling bias. The points should be placed together as closely and feasibly as possible to obtain adequate information of the aquatic vegetation communities throughout the entire lake. At each GPS Point location, two rake tosses are conducted, and the aquatic vegetation species presence and abundance are estimated. In between the GPS points, any additional species and their relative abundance are also recorded using visual techniques. This is especially important to add to the Point-Intercept method, since EWM and other

invasive plants may be present between GPS points but not necessarily at the pre-selected GPS points. Once the aquatic vegetation communities throughout the lake have been recorded using the GPS points, the data can be placed into a Geographic Information System (GIS) software package to create maps showing the distribution and relative abundance of particular species. The GPS Point- Intercept method is particularly useful for monitoring aquatic vegetation communities through time and for identification of nuisance species that could potentially spread to other previously uninhabited areas of the lake.

The GPS Point-Intercept method survey on June 22, 2021 consisted of 1,084 geo-referenced grid points on Little Platte Lake, using a Lowrance HDS 9 GPS WAAS-enabled unit (accuracy within 6 inches). A combination of rake tosses and visual data accounted for each point and the distance between points for the survey. Earlier surveys utilized many more points at the initiation of the project.

Figure 2. Aquatic vegetation GPS sampling location points on Little Platte Lake, Benzie County, Michigan (RLS, 2021).

3.0 AQUATIC PLANT SURVEY RESULTS FOR 2021

The June 22, 2021 aquatic vegetation survey of Little Platte Lake was necessary to record the relative abundance and locations of native aquatic plant species present and to record the current distribution of EWM within the lake and emergent invasives such as Phragmites around the lake. No treatments were needed in 2021.

3.1 Little Platte Lake Exotic Aquatic Plant Species

The June 22, 2021 survey found the presence of two invasive aquatic plant species which included the submersed exotic Eurasian Watermilfoil (*Myriophyllum spicatum*; Figure 3) and the emergent Phragmites (*Phragmites australis*; Figure 4). Exotic species found in Little Platte Lake during 2021 are listed below in Table 1. Figures 5a-b show the distribution of EWM and Phragmites in and around the lake. NOTE: All EWM in the lake appeared to be absent except for one small area near the access site where manual removal was recommended for 2021. Most of the previously treated Phragmites also showed signs of decay as they were treated in late-September 2019. However, some green stolons of new growth were noted in the treatment area and thus another treatment may be needed in 2022.

Table 1. Exotic aquatic plant species present within or around Little Platte Lake (June 22, 2021).

Macrophyte Species and Code	***Common Name***	***Plant Growth Form***	***# Acres Present in Little Platte Lake***
Myriophyllum spicatum	Eurasian Watermilfoil	Submersed; Rooted	<0.10
Phragmites australis	Giant Common Reed	Emergent	<0.3

Figure 3. Eurasian Watermilfoil with seed head and lateral branches. © *RLS*

Figure 4. Phragmites. © *RLS*

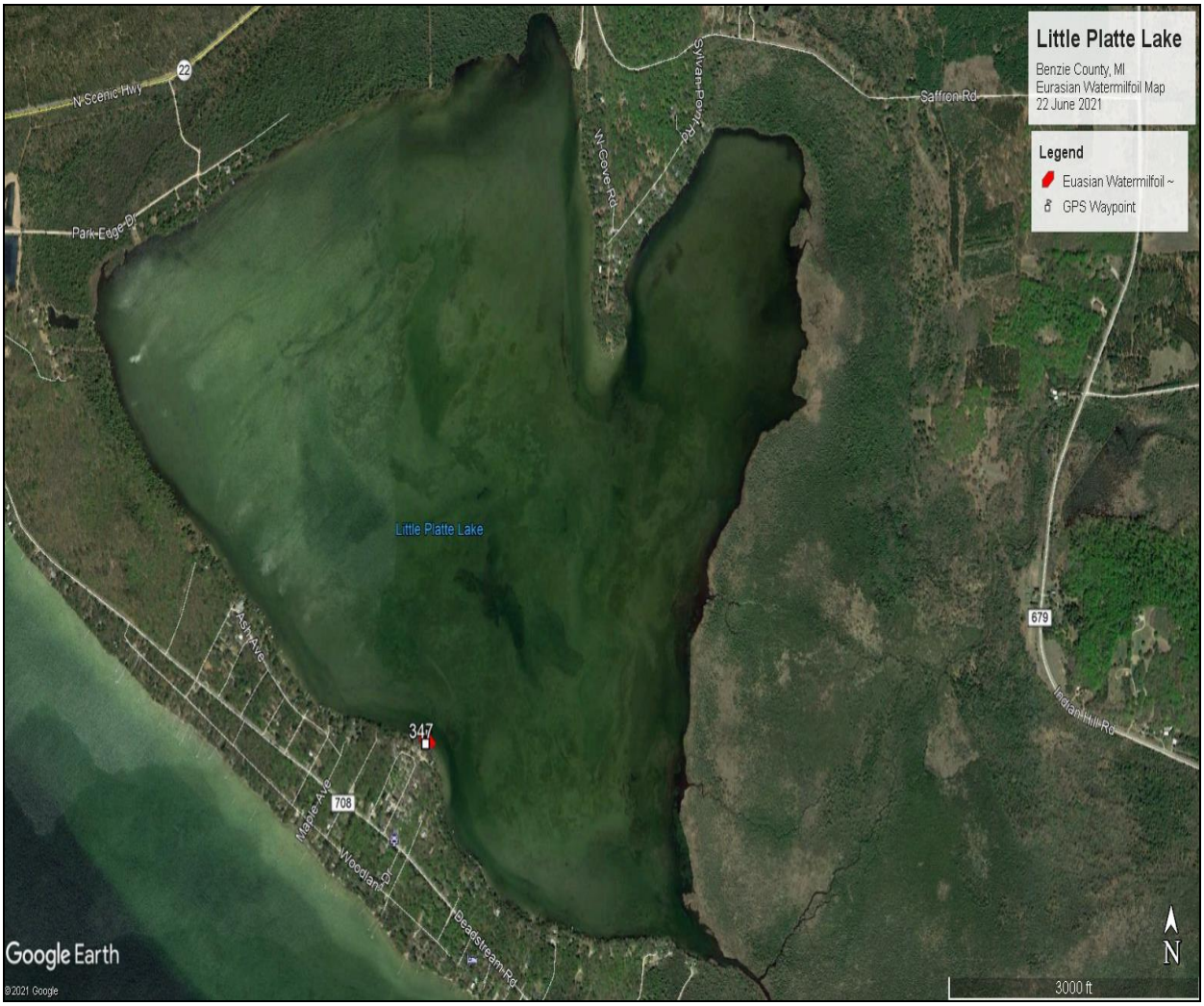


Figure 5a. Distribution and relative abundance of invasive EWM in Little Platte Lake, Benzie County, MI (June 22, 2021).

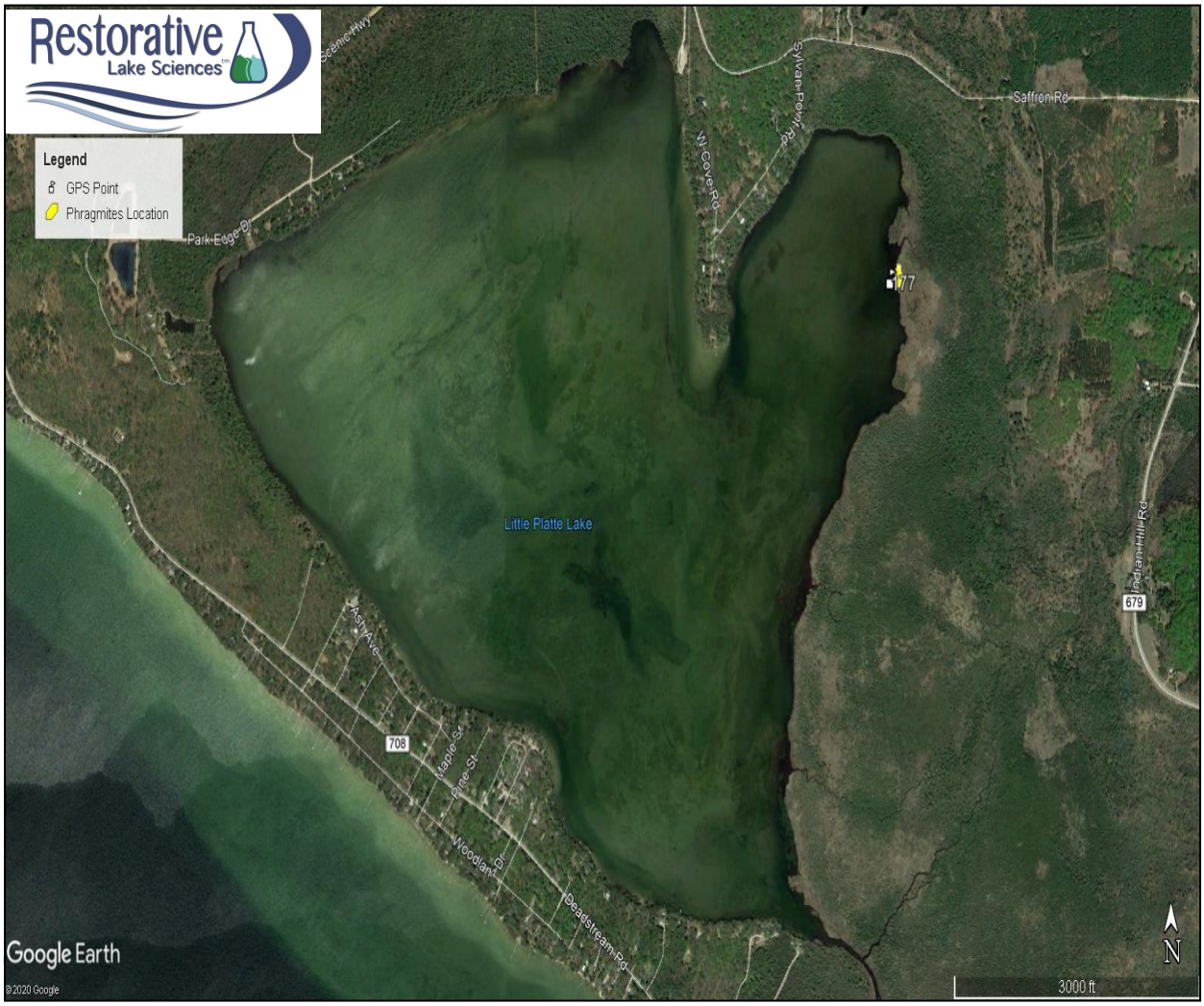


Figure 5b. Distribution and relative abundance of invasive Phragmites around Little Platte Lake, Benzie County, MI (June 22, 2021).

The June 22, 2021 survey located a total of 22 submersed, 3 floating-leaved, and 7 emergent native aquatic plant species throughout the lake. This represents a grand total of 32 species (Table 2), which indicates a very high biodiversity of aquatic vegetation in Little Platte Lake. Images of all aquatic plant species found in and around Little Platte Lake are shown below in Figures 6-36.

The most common native aquatic plant species include the Southern Naiad and Fern-leaf Pondweed. Both of these species are excellent fish cover and rarely cause problems with aquatic vegetation balance. Both species also do not tend to breach the surface or create dense canopies and are thus favorable for the lake ecology.

Table 2. Macrophyte Species	***Macrophyte Common Name***	***Macrophyte Growth Form***	***Relative Density***
Chara vulgaris	Muskgrass	Submersed; Rooted	9.5
Potamogeton gramineus	Variable-leaved Pondweed	Submersed; Rooted	4.2
Potamogeton pectinatus	Thin-leaf Pondweed	Submersed; Rooted	3.0
Potamogeton zosteriformis	Flat-stem Pondweed	Submersed; Rooted	0.7
Potamogeton illinoensis	Illinois Pondweed	Submersed; Rooted	9.2
Potamogeton richardsonii	Clasping-leaf Pondweed	Submersed; Rooted	0.6
Potamogeton amplifolius	Large-leaf Pondweed	Submersed; Rooted	5.5
Potamogeton robbinsii	Fernleaf Pondweed	Submersed; Rooted	11.6
Potamogeton natans	Floating-leaf Pondweed	Submersed; Rooted	0.1
Potamogeton pusillus	Small-leaf Pondweed	Submersed; Rooted	0.1
Stuckenia pectinatus	Sago Pondweed	Submersed; Rooted	3.0
Zosterella dubia	Water Stargrass	Submersed; Rooted	0.7
Vallisneria americana	Wild Celery	Submersed; Rooted	0.4
Myriophyllum sibiricum	Northern Watermilfoil	Submersed; Rooted	0.8
Myriophyllum verticillatum	Whorled Watermilfoil	Submersed; Rooted	0.8
Ceratophyllum demersum	Coontail	Submersed; Non-Rooted	0.1
Elodea canadensis	Common Waterweed	Submersed; Rooted	3.1
Utricularia vulgaris	Bladderwort	Submersed; Non-Rooted	7.8
Utricularia minor	Mini Bladderwort	Submersed; Non-Rooted	0.2
Najas guadalupensis	Southern Naiad	Submersed; Rooted	13.5
Nymphaea odorata	White Waterlily	Floating-Leaved	0.8
Nuphar variegata	Yellow Waterlily	Floating-Leaved	1.2
Brasenia schreberi	Watershield	Floating-Leaved	1.6
Sagittaria sp.	Arrowhead	Emergent	0.7
Pontedaria cordata	Pickerelweed	Emergent	1.8
Typha latifolia	Cattails	Emergent	2.1
Schoenoplectus acutus	Bulrushes	Emergent	1.8
Iris sp.	Iris	Emergent	0.6
Decodon verticillatus	Swamp Loosestrife	Emergent	1.7
Sagittaria sp.	Submersed Sagittaria	Submersed	1.6
Polygonum amphibium	Water Smartweed	Emergent	0.4
Scirpus subterminalis	Submersed Bulrush	Submersed	0.4

Table 2. A complete list of all native aquatic plants in Little Platte Lake (June 22, 2021).

Figure 6. A photograph of Chara (*Chara vulgaris*)

Figure 7. A photograph of Variable-leaf Pondweed (*Potamogeton gramineus*)

Figure 8. A photograph of Thin-leaf Pondweed (*Potamogeton pectinatus*)

Figure 9. A photograph of Flat-stem Pondweed (*Potamogeton zosteriformis*)

Figure 10. A photograph of Illinois Pondweed (*Potamogeton illinoensis*)

Figure 11. A photograph of Fern-leaf Pondweed (*Potamogeton robbinsii*)

Figure 12. A photograph of Large-leaf Pondweed (*Potamogeton amplifolius*)

Figure 13. A photograph of Clasping-leaf Pondweed (*Potamogeton richardsonii*)

Figure 14. A photograph of Floating-leaf Pondweed (*Potamogeton natans*)

Figure 15. A photograph of Small-leaf Pondweed (*Potamogeton pusillus*)

Figure 16. A photograph of Sago Pondweed (*Stuckenia sp.*)

Figure 17. A photograph of Water Stargrass (*Zosterella dubia*)

Figure 18. A photograph of Wild Celery (*Vallisneria americana*)

Figure 19. A photograph of Northern Watermilfoil (*Myriophyllum sibiricum*)

Figure 20. A photograph of Whorled Watermilfoil (*Myriophyllum verticillatum*)

Figure 21. A photograph of Coontail (*Ceratophyllum demersum*)

Figure 22. A photograph of Common Waterweed (*Elodea canadensis*)

Figure 23. A photograph of Bladderwort (*Utricularia vulgaris*)

Figure 24. A photograph of Mini Bladderwort (*Utricularia minor*)

Figure 25. A photograph of Southern Naiad (*Najas quadalupensis*)

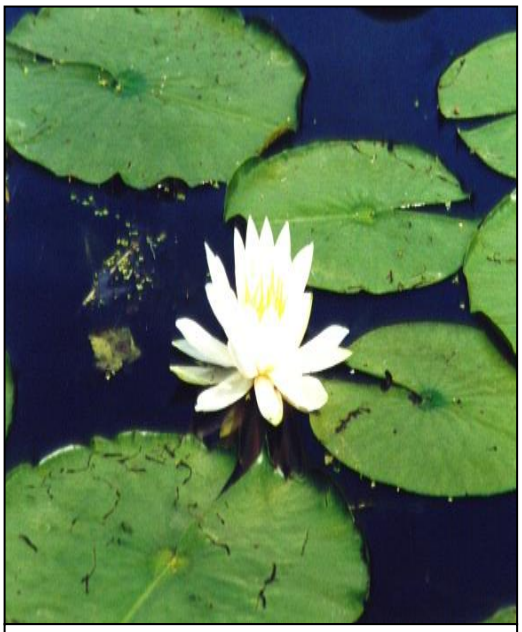


Figure 26. A photograph of White Waterlily (*Nymphaea odorata*)

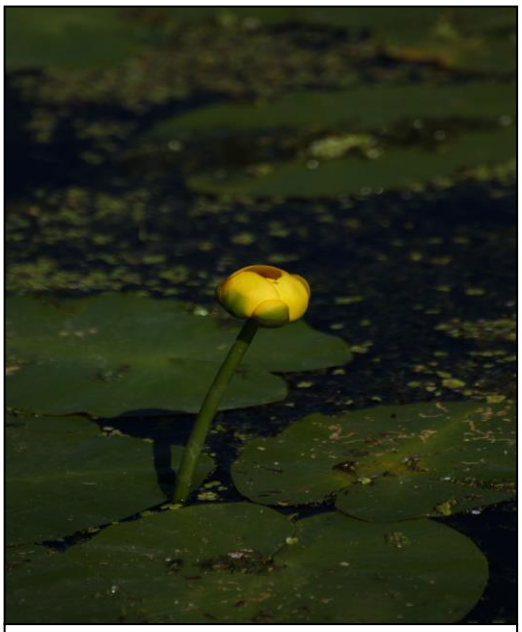


Figure 27. A photograph of Yellow Waterlily (*Nuphar variegata*)

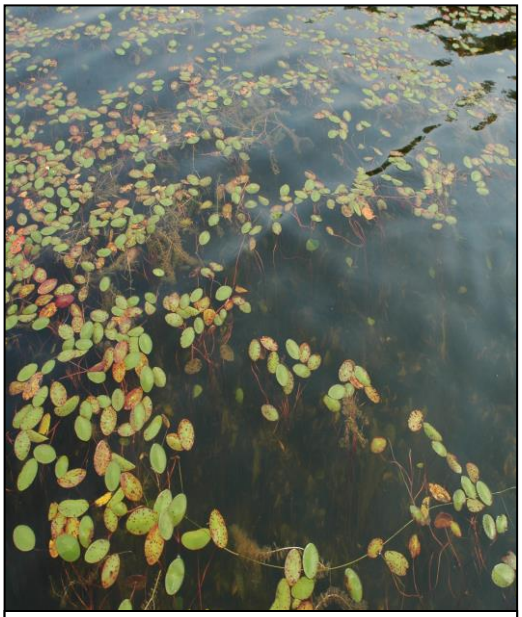


Figure 28. A photograph of Watershield (*Brasenia schreberi*.)

Figure 29. A photograph of Arrowhead (*Sagittaria sp.*)

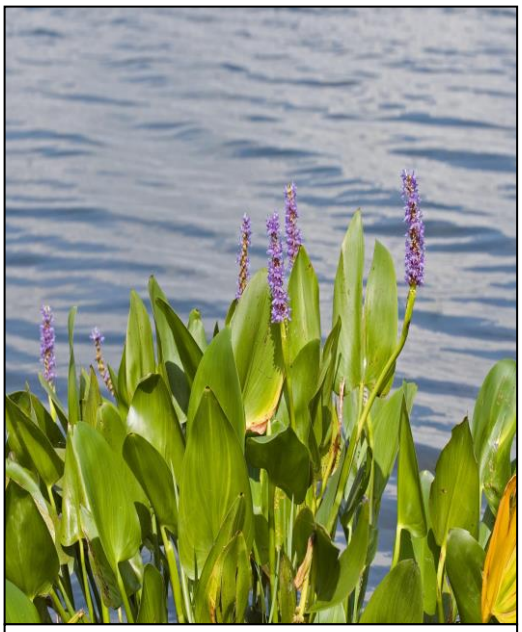


Figure 30. A photograph of Pickerelweed (*Pontedaria cordata*)

Figure 31. A photograph of Cattails (*Typha latifolia*)

Figure 32. A photograph of Bulrushes (*Schoenoplectus acutus*)

Figure 33. A photograph of Yellow Iris (*Iris pseudacorus*)

Figure 34. A photograph of Swamp Loosestrife (*Decodon verticillatus*)

Figure 35. A photograph of Submersed Sagittaria (*Sagittaria sp.*)

Figure 36. A photograph of Water Smartweed (*Polygonum amphibium*)

4.0 LITTLE PLATTE LAKE 2022 MANAGEMENT RECOMMENDATIONS

The use aquatic chemical herbicide is regulated by the MDEQ under Part 33 (Aquatic Nuisance) of the Natural Resources and Environmental Protection Act, P.A. 451 of 1994, and requires a permit. The permit contains a list of approved herbicides for a particular body of water, as well as dosage rates, treatment areas, and water use restrictions. Wherever possible, it is preferred to use a systemic aquatic herbicide for longer-lasting plant control. There are often restrictions with usage of some systemic herbicides around shoreline areas that contain shallow drinking wells (such as with 2,4-D). Systemic herbicides such as Triclopyr should be used to control EWM in Little Platte Lake and continued spot-treatments with this herbicide would be recommended for any EWM that may return. A DASH boat could also be used to remove the EWM without the use of herbicides in the future or very small patches such as those observed in 2021, could be manually removed by SCUBA divers or snorkelers.

Invasive emergent Phragmites were treated by the local CISMA in late September 2019 with great success and this will be evaluated again in future years if requested. There were new stolons arising in the treatment areas and thus more treatment may be needed in 2022.

A proposed budget for the invasive aquatic plant species in and around Little Platte Lake is shown below in Table 3. Note that these numbers may change if the invasives increase/decrease in cover and may also vary among aquatic herbicide applicator vendors. A 50% return rate of EWM is not expected but should be budgeted to yield a conservative treatment plan. RLS will be back on the lake in 2022 as requested to conduct another early season survey and will recommend immediate treatment of any new EWM found.

Table 3. Proposed budget for continued Little Platte Lake Aquatic Invasive Plant Management Program (2022).

Proposed Little Platte Lake Improvement Item	***Estimated 2022 Cost***
Herbicides for *M. spicatum* for 1.0 acres@ $690 per acre	$690
Herbicides for Phragmites for 2.0 acres@$350 per acre	$700
EGLE herbicide treatment permit	$300
Professional Services (limnologist survey; *if treatment surveys, additional $600 for follow-up areas)	$2,500*
Contingency	$419
TOTAL ANNUAL ESTIMATED COST	$4,609

5.0 LITERATURE CITED

Madsen, J.D., J.A. Bloomfield, J.W. Sutherland, L.W. Eichler, and C.W. Boylen. 1996. The aquatic macrophyte community of Onondaga Lake: Field survey and plant growth bioassays of lake sediments, *Lake and Reservoir Management* 12:73-79.

Madsen, J.D. G.O. Dick, D. Honnell, J. Schearer, and R.M. Smart. 1994. Ecological assessment of Kirk Pond, Miscellaneous Paper A-94-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.