Glass Lake Aquatic Macrophyte Inventory Report

590 Lake Street
Shrewsbury, MA 01545
Phone: 888-480-5253

www.solitudelakemanagement.com

Table of Contents

2022 Aquatic Macrophyte Inventory Report

Introduction

Glass Lake is a 126 acre lake located in Sand Lake, Rensselaer County, New York, surrounded by residences, forests, and inflowing wetlands and springs. SŌLitude Lake Management was hired to conduct vegetation monitoring in September 2022 to meet the obligations of Article 24 Freshwater Wetlands Permit #DEC #4-3840-00166, issued as part of the 2021 application of ProcellaCOR EC to control invasive eurasian watermilfoil in Glass Lake. These survey results can be used to track changes in the vegetation community, and also to determine future management methods within the waterbody.

The following report will discuss: methodology, results & analysis, and summary of findings. Associated raw data and distribution maps can be found in Appendices A and B, respectively.

Methodology

During the survey, each predetermined GPS survey point was accessed by boat in a feasible locational order. At each point, a single rake toss was executed to determine the present macrophyte species. The following data was collected for each rake toss: water depth, aquatic vegetation composition, including species identification and dominant species, coverage and density information for each species, and percentage of cover of floating-leaf species. No emergent/wetland vegetation was recorded unless the data point was directly within that habitat zone. The surveyed data points are displayed in Figure 1, attached in Appendix B.

Species Identification

The rake toss method, based on protocols developed by Cornell University, was used to retrieve submersed aquatic vegetation from either side of the survey vessel. Each species found on the rake will be identified and recorded. Plant species observed in the immediate area, but not found on either rake toss, were also recorded. Any species not readily identified *in situ* was placed into a plastic bag labeled with the data point number and preserved for further analysis. Once all species were recorded, the most prevalent species was noted as dominant for later use in presence/absence maps. Native species maps are attached in Appendix B as Figure 6a-c.

Relative Abundance

The abundance scale, developed by the US Army Corps of Engineers and modified by Cornell, was used to categorize total growth. It is described as follows:

Notation	Description
Z	*Zero*: no plants on rake
T	*Trace*: fingerful on rake
S	*Sparse*: handful on rake
M	*Moderate*: rakeful of plants
D	*Dense*: difficult to bring into boat

Overall Cover (%)

Overall cover is defined as the percentage of bottom sediments obscured by vegetation. In general, an area in which no sediments are visible was classified at 100% cover; at times however bottom sediments are not visible due to water clarity or depth, regardless of vegetative growth. At these points, the overall cover was estimated by the amount of plants collected on the throw-rake. This number was recorded for both submersed species and floating-leaf species at each survey point. Overall cover is displayed on an attached map (Figure 3).

Biovolume Index

A map displaying the biovolume of each data point is attached (Figure 2). The biovolume for each data point was recorded on a scale from zero to four:

0	No biovolume	No plants
1	Low biovolume	Very low growth
2	Moderate biovolume	Growth extending up into water column
3	High biovolume	Growth in water column and possibly to surface, may be considered a recreational or habitat nuisance
4	Very high biovolume	Growth filling the water column and covering the surface

Management Program

ProcellaCOR EC at 3.86 parts per billion (ppb) was applied on August 11, 2021. No other treatments were conducted from 2019-2022. Figure 8, attached, displays the treatment areas during the 2021 ProcellaCOR treatment. All treatment activities were completed in accordance with local regulations, notifications were posted before treatment, and no adverse effects were noted on the wildlife and non-target vegetation species within the area.

Results & Analysis

Macrophyte Abundance

A total of 46 sites were surveyed on September 19, 2022 (Figure 1 in Appendix B), where seventeen (17) aquatic macrophytes and macroalgae were identified during the survey (Table 1, below). The weather was overcast on the day of the survey, and approximately 75 degrees Fahrenheit. Raw data and macrophyte distribution maps can be found in Appendices A and B, respectively.

A macrophyte library is included in Table 1 below. The Frequency of Occurrence (%FOO) value is calculated using the number of species observances divided by the number of survey sites. This calculation can help display the overall macrophyte assemblage and their corresponding frequencies. A comparison between the %FOO from 2019 and from 2022 is shown, as well as the amount of change over the years studied. During the 2019 survey, species density was not recorded, and observations were only noted as present or absent.

Table 1: Aquatic macrophytes observed in 2019 and 2022 at Glass Lake and their Frequency of Occurrence (%FOO), as well as the change between %FOO from 2019 to 2022.

Common name	Scientific name	2019 Frequency of Occurrence (%FOO)	2022 Frequency of Occurrence (%FOO)	Change in %FOO
Eurasian watermilfoil	*Myriophyllum spicatum*	30%	7%	-23%
Common bladderwort	*Utricularia vulgaris*	4%	2%	-2%
Robbins' pondweed	*Potamogeton robbinsii*	76%	78%	+2%
White water lily	*Nymphaea odorata*	4%	11%	+7%
Yellow water lily	*Nuphar variegata*	4%	2%	-2%
Arrowhead	*Sagittaria spp.*	0%	2%	+2%
Spiny hornwort	*Ceratophyllum echinatum*	0%	2%	+2%
Rush	*Juncus spp.*	0%	2%	+2%
Ribbon-leaf pondweed	*Potamogeton epihydrus*	11%	7%	-4%

Common waterweed	*Elodea canadensis*	59%	17%	-42%
Coontail	*Ceratophyllum demersum*	4%	7%	+3%
Variable-leaf pondweed	*Potamogeton gramineus*	30%	28%	-2%
Blunt-leaved pondweed	*Potamogeton obtusifolius*	0%	30%	+30%
Tapegrass	*Vallisneria americana*	13%	4%	-9%
Macroalgae	*Nitella/Chara spp.*	2%	9%	+7%
Filamentous algae	Various spp.	0%	2%	+2%
Aquatic moss	*Fontinalis spp.*	0%	2%	+2%
Nodding naiad	*Najas flexilis*	7%	0%	-7%
Big-leaf pondweed	*Potamogeton amplifolius*	2%	0%	-2%
Watershield	*Brasenia schreberi*	4%	0%	-4%

Red indicates an invasive species

Overall, aquatic macrophytes were observed at all but nine survey sites (80%), at which the depth of the water was greater than ten feet. The macrophyte community was dominated by Robbins' pondweed (*Potamogeton robbinsii*), which was present at 78% of sites in varying densities. Eurasian watermilfoil (*Myriophyllum spicatum)* was present at only 7% of sites (3), and was found at trace to sparse density.

Additional vegetation species including blunt-leaved pondweed (*Potamogeton obtusifolius*) and variable-leaf pondweed *(Potamogeton gramineus)* were found at 30% and 28% of sites, respectively. Figures 6a-c display the distribution of native aquatic vegetation species.

The average overall percent (%) cover of vegetation at the survey data points was 49%. This percentage includes any submersed aquatic vegetation species. The overall cover of floating-leaf species at the data survey points was 4%, and consisted of white and yellow water-lilies. Figure 4 displays the floating-leaf species and their abundance among the survey sites.

Only a few small patches of Eurasian watermilfoil were observed at the survey points (7%) and can be visualized on the map in Appendix B (Figure 5: Relative Abundance of Eurasian Watermilfoil). Each patch was observed at trace to sparse density in 2022. Attached Figure 7 shows the locations of Eurasian watermilfoil during the 2019 pre-treatment survey.

Glass Lake supports a diverse and healthy aquatic vegetation assemblage with the exception of one invasive, non-native species (Eurasian watermilfoil). Taking note of all species at survey sites helps track the appearance of new species and the overall biodiversity of the lake.

Comparing the observations from this year to the 2019 survey, there is a dramatic decrease in abundance of Eurasian watermilfoil, suggesting that the treatments over the past few years were very successful. The overall species richness of the survey points and the dominant species type have remained relatively the same. These observations suggest that the ProcellaCOR treatments in recent years have decreased the abundance of Eurasian watermilfoil while not negatively impacting the native vegetation within the lake.

Therefore, no treatment to control Eurasian watermilfoil is recommended in 2023 in Glass Lake. It is recommended to continue with yearly monitoring surveys to observe any changes to the invasive and native diversity within the Lake.

Summary of Findings

- A total of seventeen native species and one invasive, non-native species were observed.
- The most commonly observed native species in 2022 was Robbins' pondweed at 78% of survey sites, similar to 76% occurrence of Robbins Pondweed in the 2019 plant survey.
- Eurasian watermilfoil was only observed at 7% of survey sites in 2022, a decrease from the widespread distribution documented in the 2019 plant survey, and the included map from this survey.
- With such low abundance of eurasian watermilfoil found in 2022, no additional herbicide application for this species is warranted in 2023.

If you have any questions or concerns regarding this report, please do not hesitate to contact the office. Thank you for your collaboration this year, and we look forward to working again with you next season.

Appendix A: Raw Data

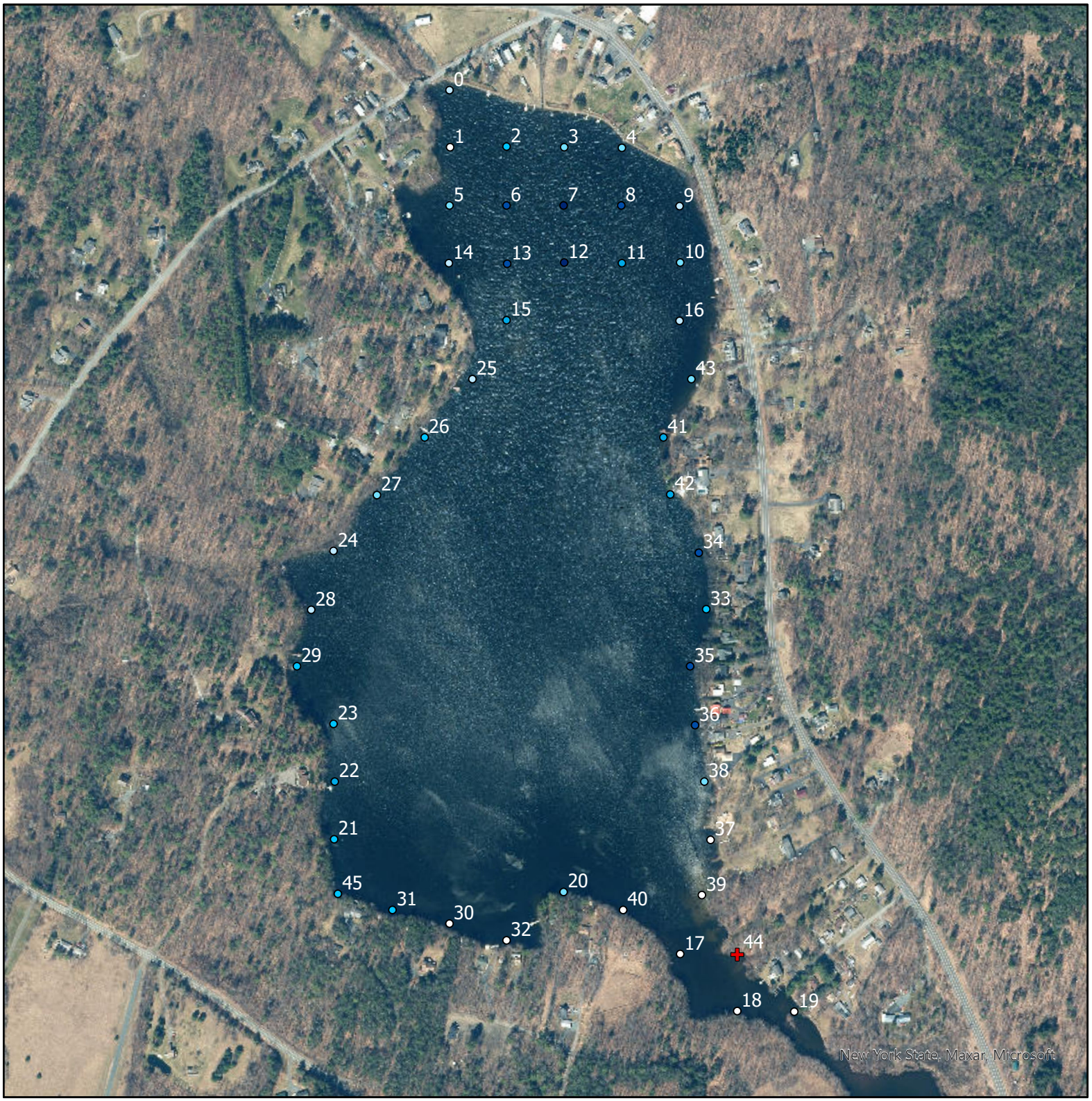
Id	Biomass	Ms	Bs	Cd	Ec	Ni	Nf	No	Nv	Pa	Pepi	Pgram	Prob	Uv	Va
1	2	T			X							X	X		X
2	1												X		
3	2	T			X								X		
4	1				X							X	X		
5	1				X								X		
6	1												X		
7	0														
8	0														
9	1										X				
10	1												X		
11	1				X								X		
12	0														
13	0														
14	3	T									X	X			
15	1												X		X
16	0														
17	1				X								X		
18	3	S			X							X	X	X	X
19	4	T	X	X	X			X	X				X	X	
20															
21	3	S											X		
22	1				X							X	X		
23	1				X								X		
24	1				X						X		X		
25	3	S			X							X	X		
26	1				X							X	X		
27	0														
28	1				X								X		
29	3				X	X	X			X		X	X		
30	1												X		
31	1				X		X						X		X
32	1				X							X	X		
33	2				X		X						X		X
34	1				X								X		
35	1				X							X	X		
36	3	T			X							X	X		
37	1											X	X		
38	2	T			X						X		X		
39	2	S			X								X		
40	0														
41	3	S											X		
42	1				X							X	X		
43	0														
44	2	S			X						X	X	X		X
45	4	T	X	X	X			X					X		
46	1	T			X								X		

Point	LAT	LONG	Y	X	Depth	BMI	% Cvr Sub	% Cvr Flt	MS	UVUL	PROB	NODO	NVAR	SAG	CECH	JUNCU	PEPI	ECAN	CDEM	PGRAM	POBT	VAME	MACRO	FA	AQMOSS
19	42.61847845	-73.52744018	1380413.569	753885.6934	1	4	100	80	S	S	M	D		S	S	S	S	S						X	X
18	42.61849341	-73.52834604	1380416.22	753641.8215	3	4	90	65	T		D	T	S				M	M	T	T					
17	42.61917021	-73.52924161	1380660.091	753397.9495	3	3	90	15			D	T					S	S							
40	42.61969426	-73.53013958	1380848.297	753154.0776	4	2	100	0			D							S			T				
20	42.61991318	-73.53108169	1380925.17	752899.6025	7.4	1	15	0			T														
32	42.61935354	-73.53199647	1380718.409	752655.7305	3.5	2	65	5	T		M	T													
30	42.61955757	-73.53289941	1380789.98	752411.8586	3.5	3	70	0			M									S	S				
31	42.61972522	-73.53380292	1380848.297	752167.9867	8.6	4	60	0			M										T				
45	42.61992162	-73.5346666	1380917.217	751934.7178	8.8	4	70	0			M									S	M				
21	42.62056215	-73.5347158	1381150.486	751918.8131	9.8	1	10	0			T														
22	42.62123845	-73.5346955	1381397.009	751921.4639	12	1	60	0			M									T	S				
23	42.62191501	-73.53470475	1381643.532	751916.1624	9.4	1	35	0			S														
29	42.6225963	-73.53527534	1381890.054	751759.7662	8.9	2	20	0			T														
28	42.62325623	-73.53503861	1382131.275	751820.7342	5.3	2	70	0			M										S				
24	42.62394418	-73.53467340	1382383.100	751916.1624	5.0	3.0	70	0			M							S		M	S				
27	42.62459294	-73.53397389	1382621.670	752101.7171	7.4	2	70	0			M										S				
26	42.62526294	-73.53320509	1382868.193	752305.8273	9.9	2	60	0			M										S				
25	42.6259402	-73.53243616	1383117.366	752509.9375	5.3	2	65	0			M														
15	42.62662656	-73.53188378	1383369.191	752655.7305	11.9	1	5	0															X		
14	42.62730341	-73.53278936	1383613.063	752409.2078	5	2	60	0			M									S	S				
13	42.62728832	-73.53186367	1383610.412	752658.3813	12.6	0	0	0															X		
12	42.6272952	-73.53095735	1383615.713	752902.2533	21.8	0	0	0																	
11	42.62728018	-73.53004152	1383613.063	753148.7760	11.2	0	0	0															X		
8	42.62795665	-73.53004086	1383859.585	753146.1252	13.1	1	35	0			S								T				X		
9	42.62794153	-73.52911517	1383856.935	753395.2987	5.8	2	70	0			M									S					
10	42.62727961	-73.52911561	1383615.713	753397.9495	6.5	2	75	0			M							T		T					
7	42.6279644	-73.53095682	1383859.585	752899.6025	18.9	0	0	0																	
6	42.62797206	-73.53186293	1383859.585	752655.7305	14	0	0	0																	
5	42.62797972	-73.53276904	1383859.585	752411.8586	6.2	2	65	0			M									S					
1	42.62866329	-73.5327486	1384108.759	752414.5094	3.2	3	65	0			M									S	T				
0	42.62933249	-73.53274809	1384352.631	752411.8586	4.5	2	70	0			M							T	T			S			
2	42.628663	-73.53185222	1384111.41	752655.7305	8.6	1	60	0			M														
3	42.62864798	-73.53093636	1384108.759	752902.2533	7.4	2	70	0			M									S					
4	42.62863295	-73.53002051	1384106.108	753148.776	7.2	2	55	0			M									T					
16	42.62659603	-73.52913608	1383366.54	753395.2987	5.9	1	75	0			M														
43	42.62591078	-73.52895958	1383117.366	753445.6636	6.4	1	75	0			M														
41	42.62523087	-73.52941339	1382868.193	753326.3784	10.5	0	0	0																	
42	42.62456084	-73.52931545	1382624.321	753355.537	11.3	2	45	0			S							T							
34	42.62387334	-73.52887305	1382375.147	753477.473	13.7	0	0	0																	
33	42.62321049	-73.52876516	1382133.926	753509.2824	9.5	2	15	0			T										T				
35	42.62254355	-73.52903161	1381890.054	753440.362	12.9	2	30	0			S														
36	42.62185194	-73.52896357	1381638.23	753461.5683	14.1	0	0	0																	
38	42.62118885	-73.52882613	1381397.009	753501.33	7.9	2	70	0			M										M				
37	42.62050435	-73.52873828	1381147.835	753527.8378	4	3	100	0			D									S	S				
39	42.61985822	-73.52888621	1380911.916	753490.7269	3	2	30	5			S	T										S			
44	42.61915525	-73.52833575	1380657.441	753641.8215	n/a																				

Appendix B: Distribution Maps

Figure 1: Survey Points and Depths
Glass Lake

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Glass Lake
Sand Hill, NY

0 300 600 900 1,200 Feet

N

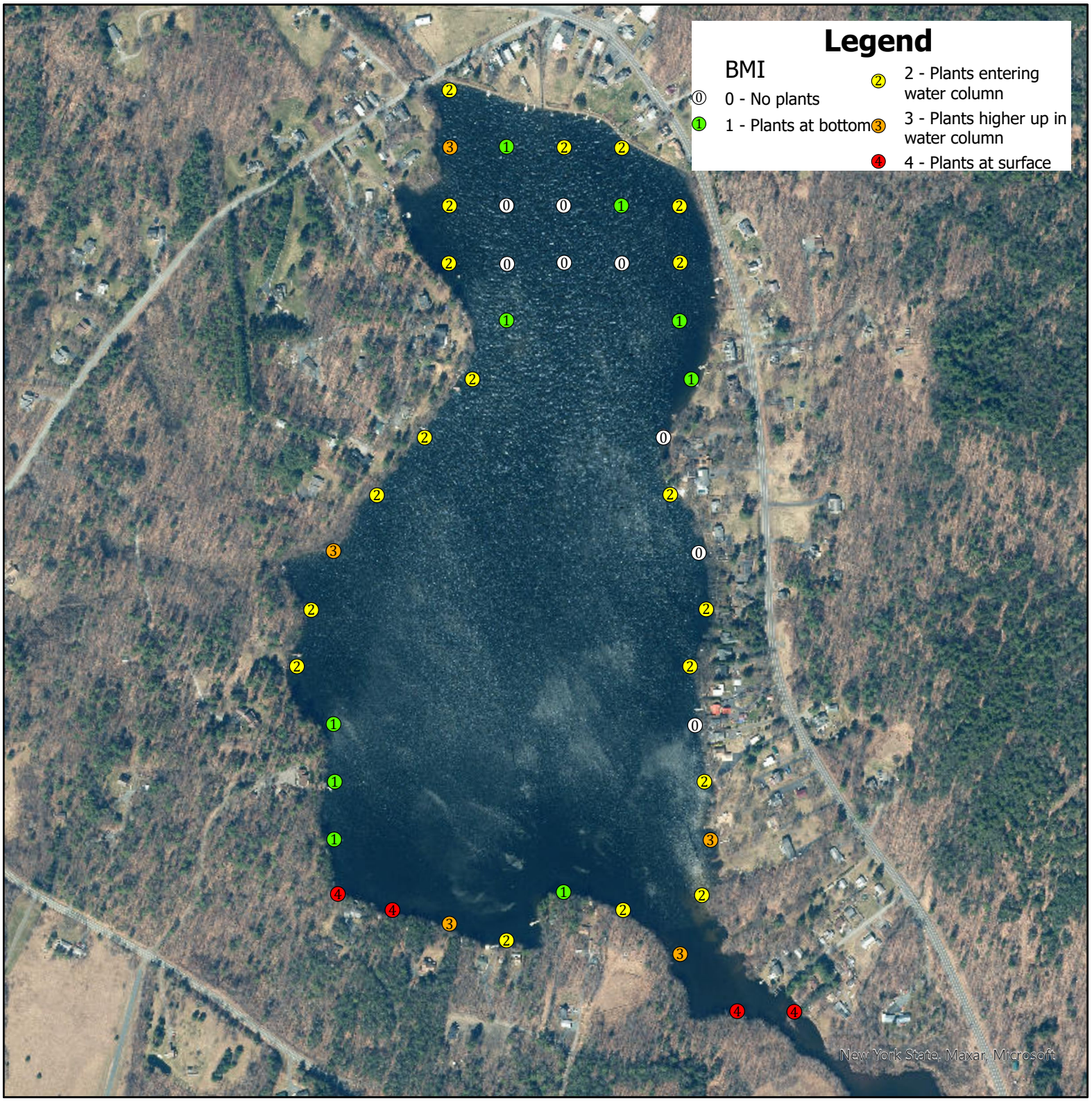
Map Date: 12/8/2022
Map Creator: KV
Office: Shrewsbury, MA

Legend

Depth (ft)
- n/a
- 0-4
- 4-6
- 6-8
- 8-10
- 10-12
- 12-14
- 14+

Figure 2: Biovolume of Aquatic Vegetation
Glass Lake

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Glass Lake
Sand Hill, NY

N

0 300 600 900 1,200 Feet

Map Date: 12/8/2022
Map Creator: KV
Office: Shrewsbury, MA

Figure 3: Percent Coverage of Submersed Aquatic Vegetation - Glass Lake

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com

Glass Lake
Sand Hill, NY

N

0 300 600 900 1,200 Feet

Map Date: 12/8/2022
Map Creator: KV
Office: Shrewsbury, MA

Legend

- 0
- 1-25%
- 26-50%
- 51-75%
- 75-100%

Figure 4: Percent Coverage of Floating-leaf Aquatic Vegetation - Glass Lake

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com

Glass Lake
Sand Hill, NY

N

0 300 600 900 1,200 Feet

Map Date: 12/8/2022
Map Creator: KV
Office: Shrewsbury, MA

Legend

- 0
- 1-25%
- 26-50%
- 51-75%
- 75-100%

Figure 5: Relative Abundance of Eurasian Watermilfoil - Glass Lake

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com

Glass Lake
Sand Hill, NY

N

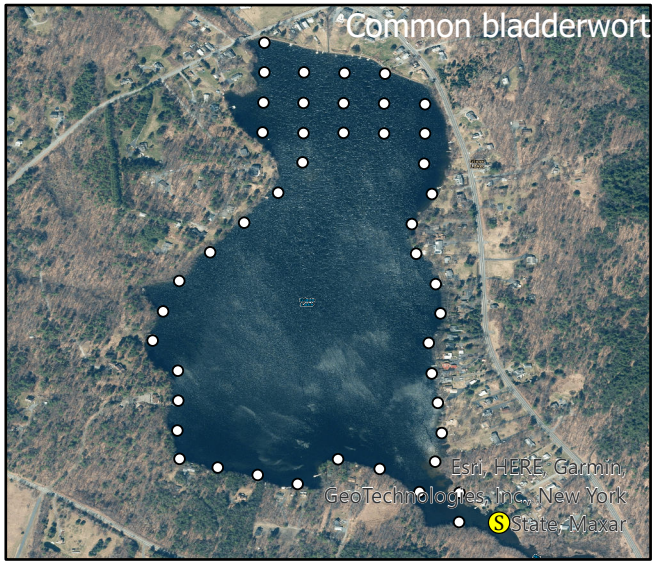
0 300 600 900 1,200 Feet

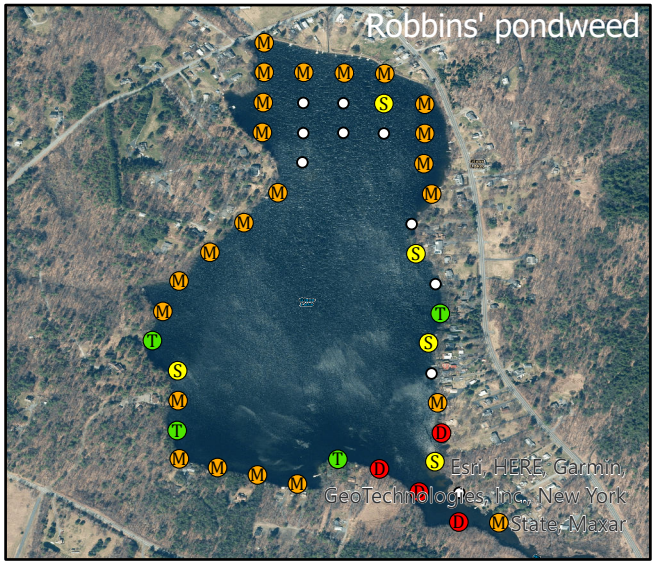
Map Date: 12/8/2022
Map Creator: KV
Office: Shrewsbury, MA

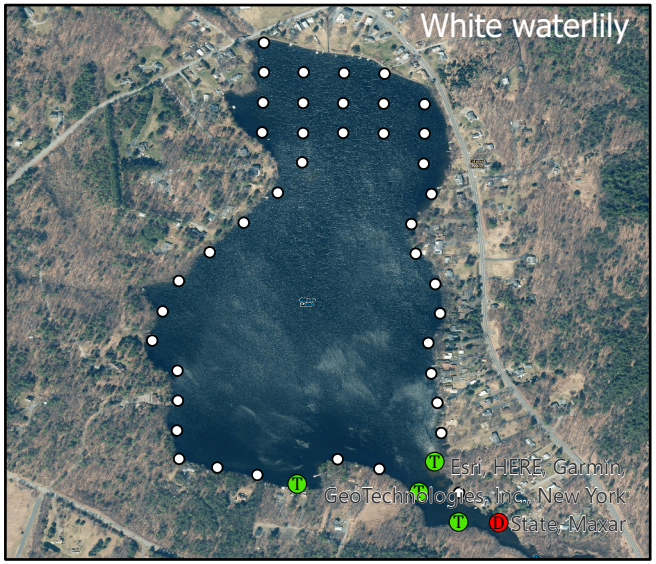
Legend
Eurasian watermilfoil
- Not present
- Sparse
- Trace

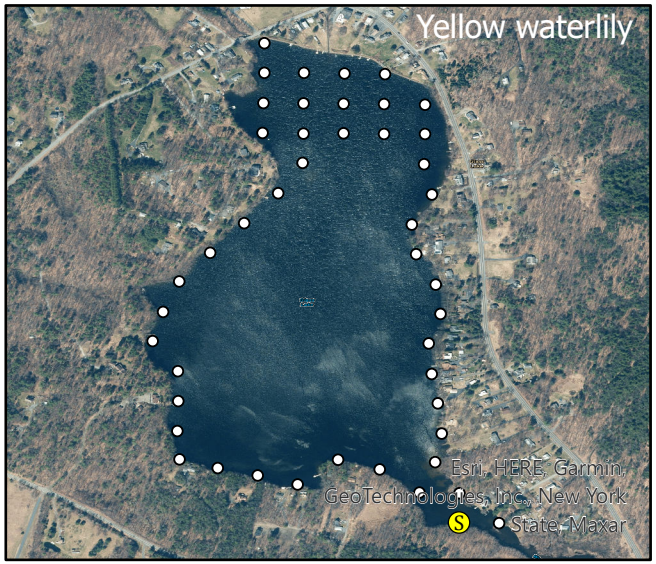
FIGURE 6a: Relative Abundance of Native Vegetation (1 of 3)
Glass Lake

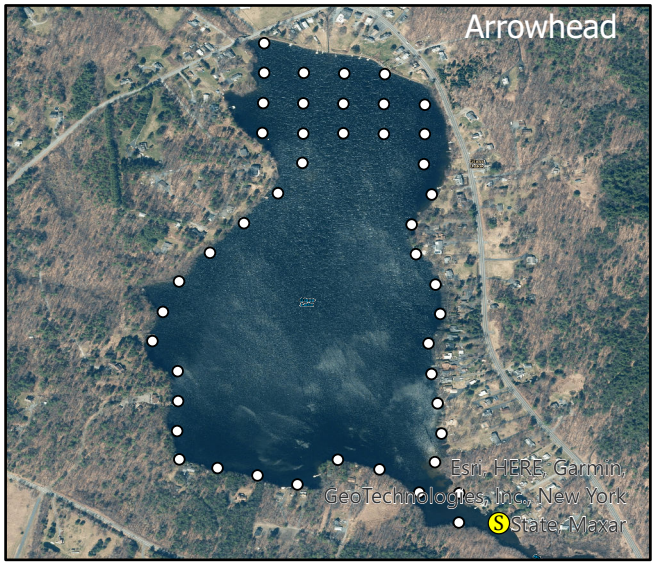
SŌLITUDE
LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com

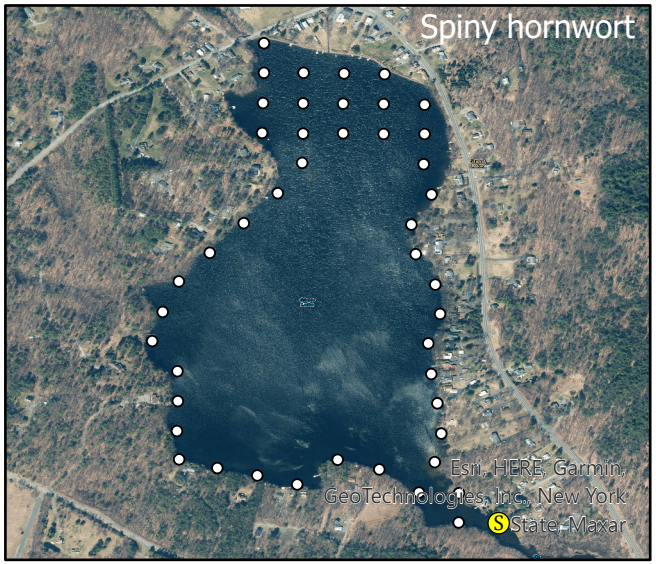












Glass Lake
Sand Hill, NY
Rensselaer County
42.623744, -73.531416

N

1:19,030

Glass Lake

0 500 1,000 2,000 Feet

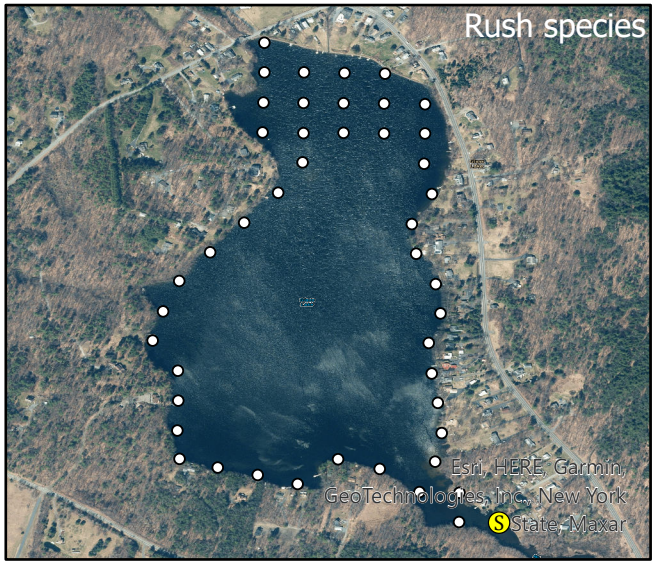
Legend

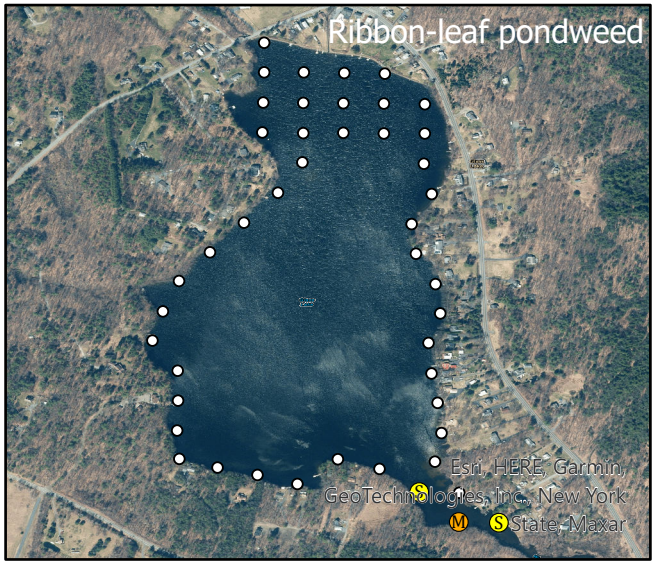
- Not present
- Dense
- Moderate
- Sparse
- Trace

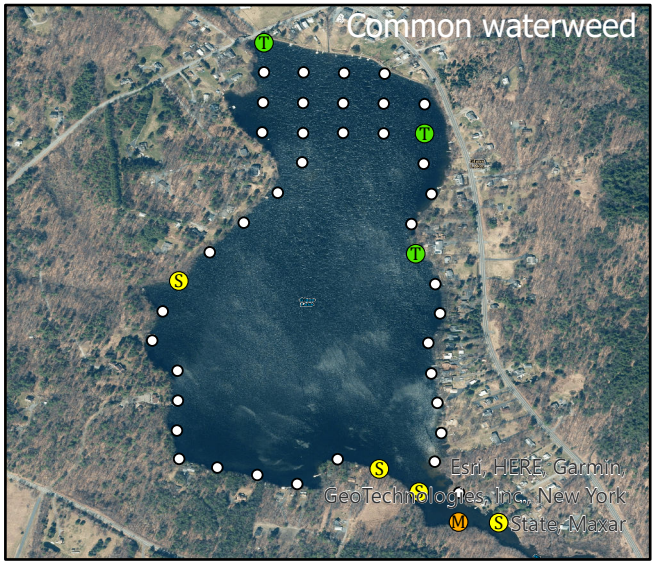
Map Date: 12/08/2022
Prepared by: KV
Office: Shrewsbury, MA

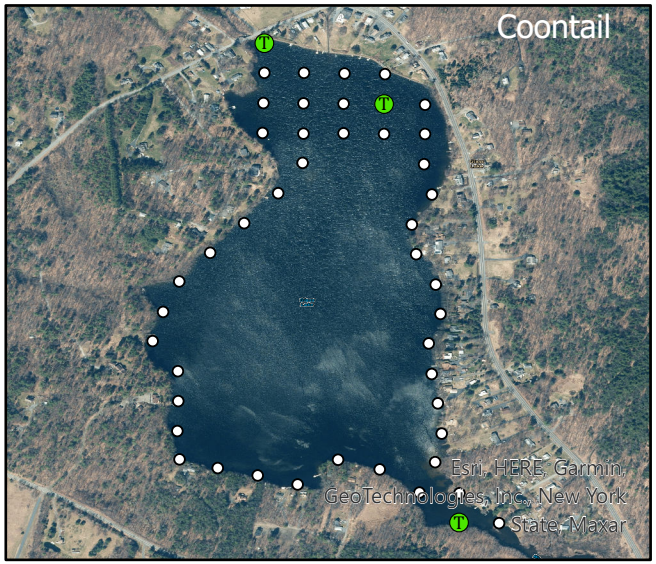
FIGURE 6b: Relative Abundance of Native Vegetation (2 of 3)
Glass Lake

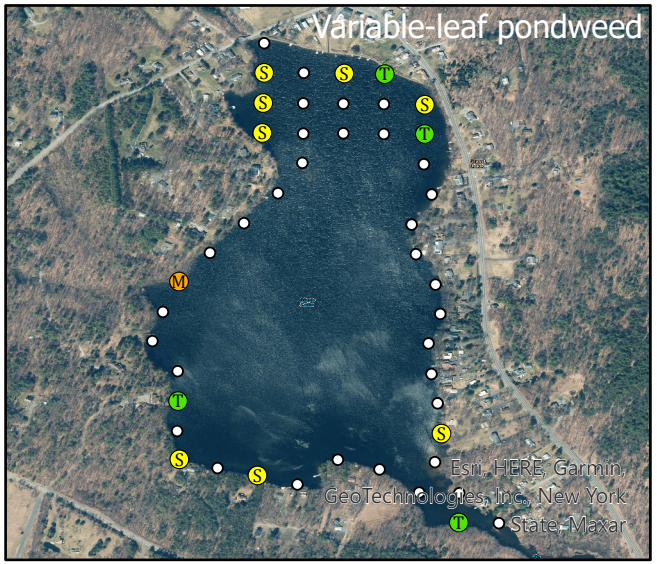
SŌLITUDE
LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com

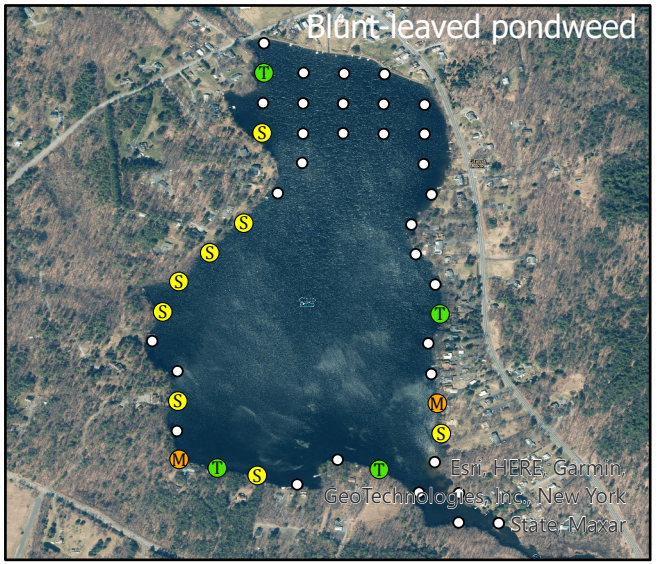












Glass Lake
Sand Hill, NY
Rensselaer County
42.623744, -73.531416

N

1:19,036

Glass Lake

0 500 1,000 2,000 Feet

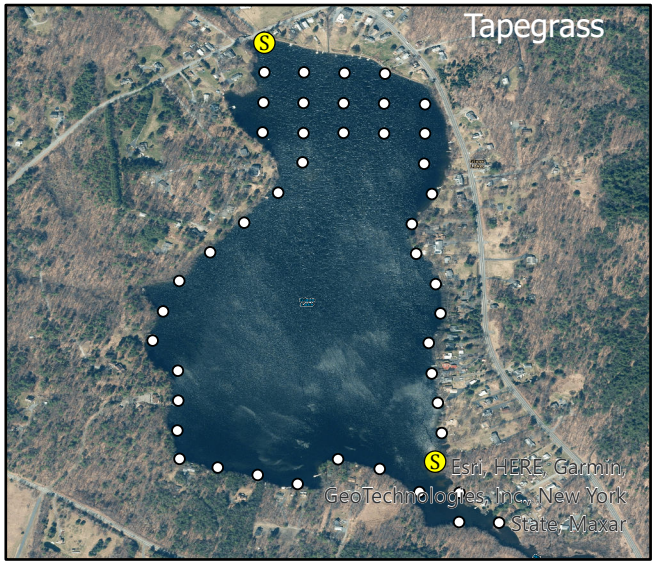
Legend

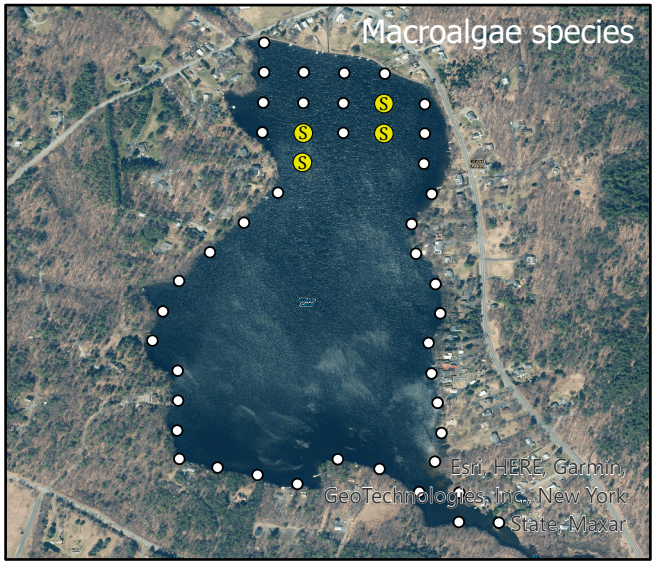
- Not present
- Dense
- Moderate
- Sparse
- Trace

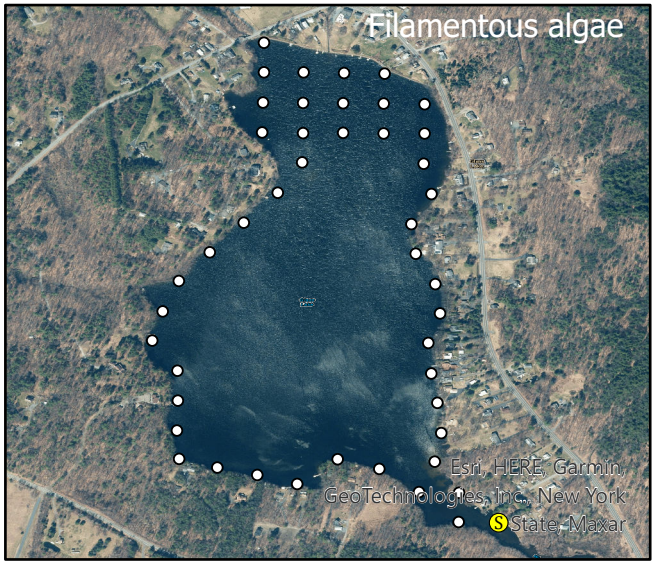
Map Date: 12/08/2022
Prepared by: KV
Office: Shrewsbury, MA

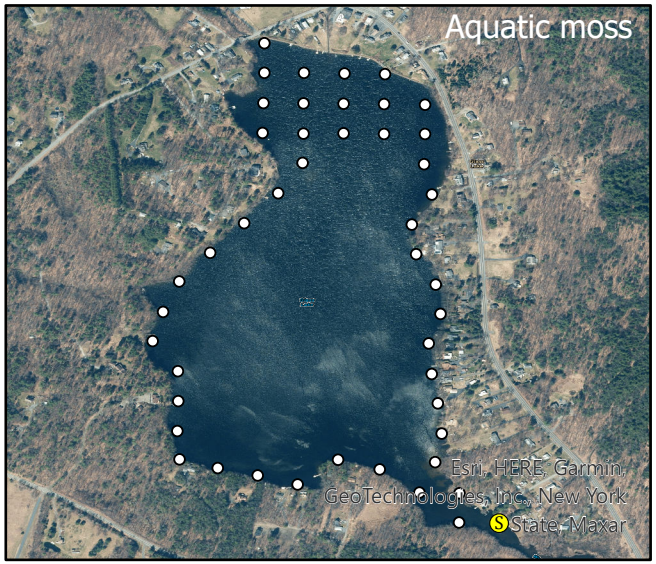
FIGURE 6c: Relative Abundance of Native Vegetation (3 of 3)
Glass Lake

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com









Glass Lake
Sand Hill, NY
Rensselaer County
42.623744, -73.531416

N

1:19,036

Glass Lake

0 500 1,000 2,000 Feet

Legend

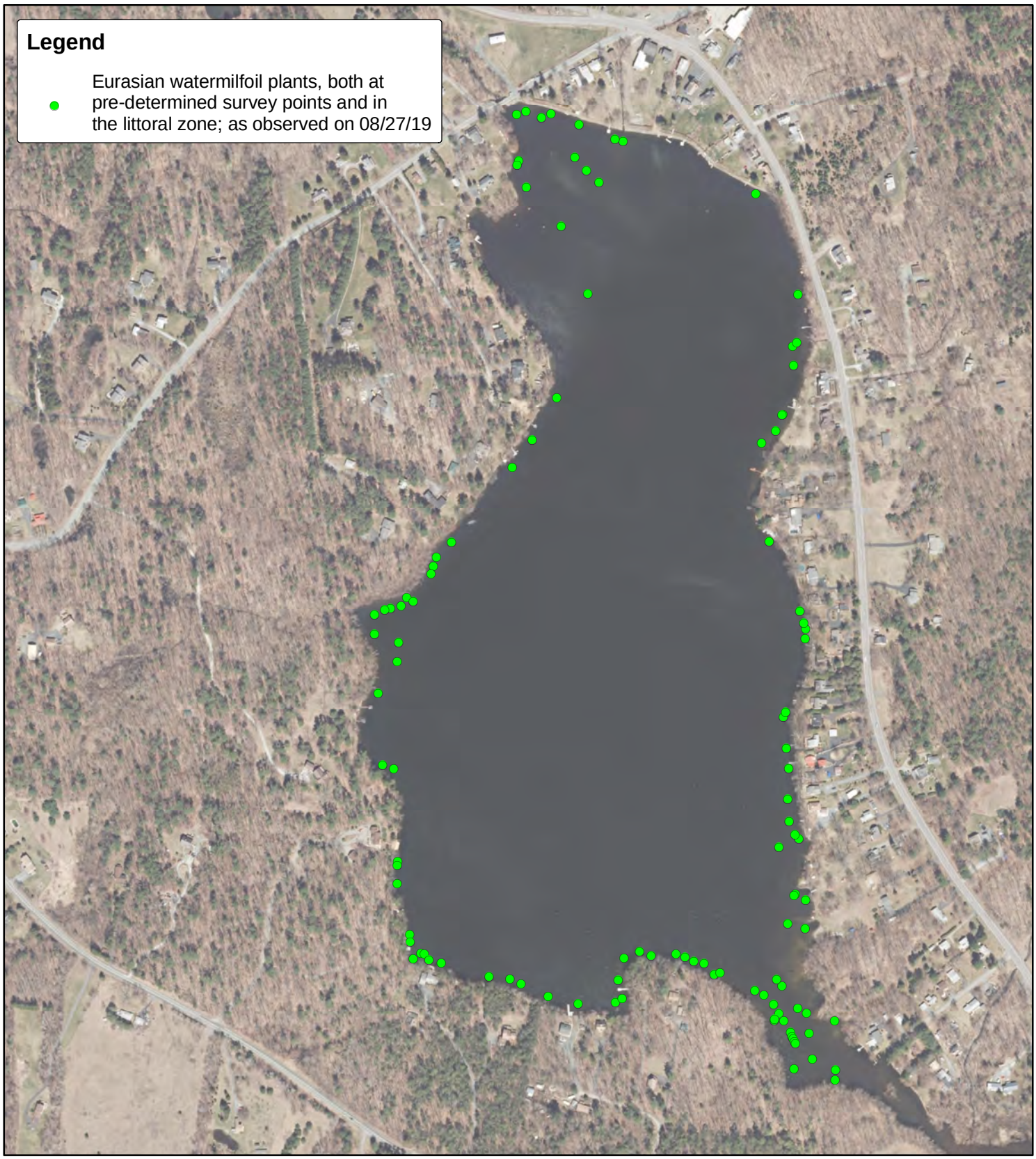
- Not present
- Dense
- Moderate
- Sparse
- Trace

Map Date: 12/08/2022
Prepared by: KV
Office: Shrewsbury, MA

2019 Eurasian Watermilfoil Distribution

Figure 7

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Glass Lake
Sand Lake, NY
Rensselaer County
42.623744°, -73.531416°

Glass Lake

0 500 1,000 Feet

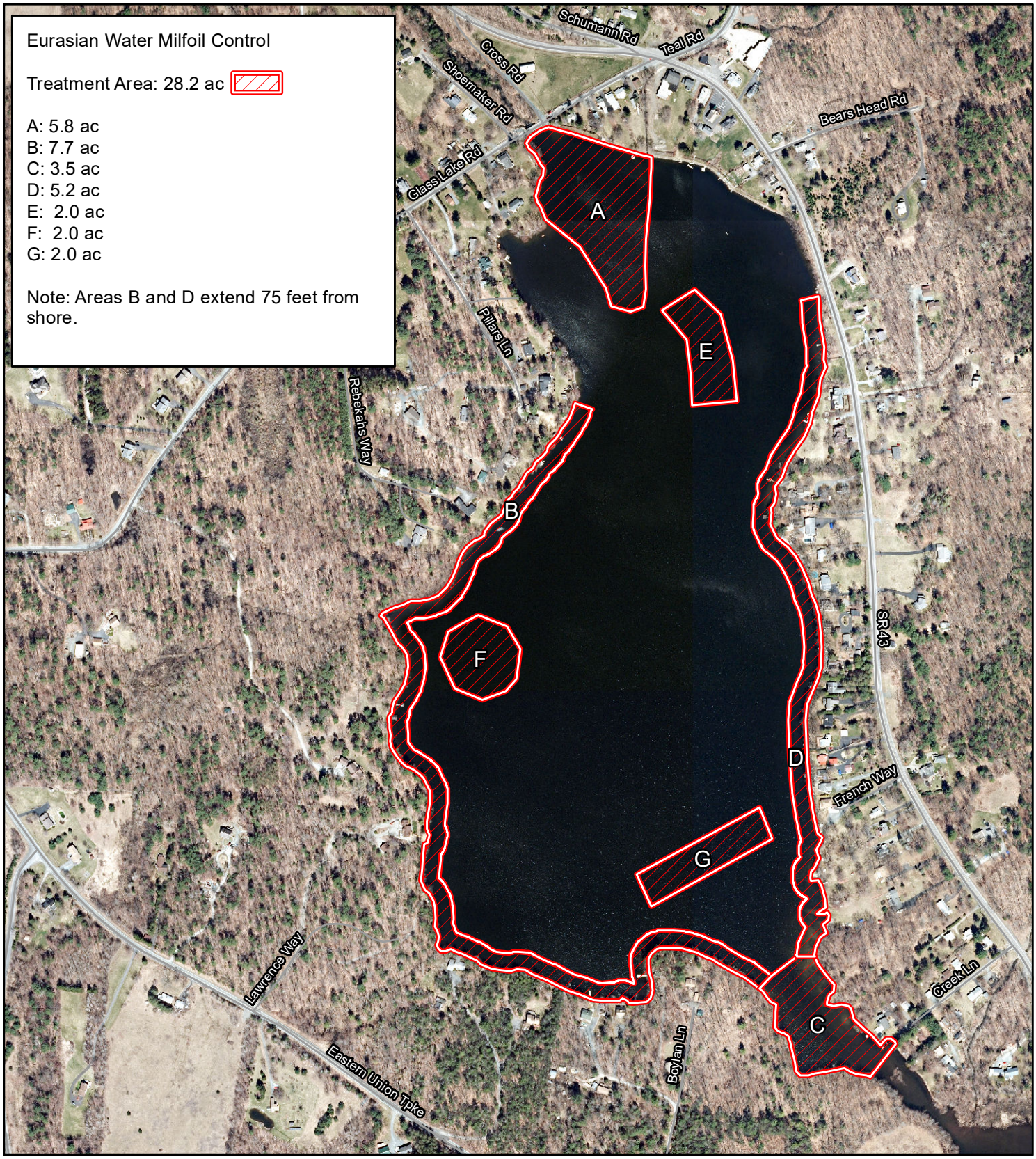
N

1:6,500

Map Date: 09/16/19
Prepared by: KS
Office: Shrewsbury, MA

2021 ProcellaCOR EC APPLICATION PLAN
Figure 8

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Glass Lake
Rte 43
Sand Lake, NY 12018
[Rennselaer County]
42.622°, -73.532°

GLASS LAKE

1:6,807

0 155 310 620 Feet

N

Date: 2/10/2021
File: Glass_TA_2021
Prepared by: KM
Office: Catskill, NY