Lake Oscaleta + Lake Rippowam

2022 Aquatic Macrophyte Surveys at Three Lakes

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2022 Aquatic Macrophyte Surveys at Lake Oscaleta & Rippowam

The Three Lakes Council
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Introduction

In 2008, the discovery of Brazilian elodea (*Egeria densa*) in Lake Waccabuc, rose concerns of potential infestations present in the other two waterbodies in the interconnected lake system (Lakes Oscaleta and Rippowam). In order to address these concerns, aquatic macrophyte surveys have been periodically performed at all three lakes over the past ten years. This report will include the following: aquatic macrophyte abundance, distribution, as well as a discussion. Maps from the aquatic macrophyte survey will also be included in the appendix of this report.

SŌLitude Lake Management was pleased to conduct a detailed aquatic macrophyte survey at Lake Oscaleta and Lake Rippowam on July 21, 2022. Two aquatic biologists utilized the Point Intercept Method (PIM) to determine the aquatic macrophyte community at Lakes Oscaleta and Rippowam. This survey method was also used to identify changes to the community structures based on the previous four years of collected data.

Methodology

The Point Intercept Method (PIM) of sampling macrophytes is designed to determine the extent of submersed aquatic plant growth within an area of concern. The total number of sample locations is typically based on the total acreage of a waterbody, where one sample location per acre is surveyed at a given site. At Lake Oscaleta 88 sites were sampled on July 21, 2022. At Lake Rippowam 60 sites were sampled on July 20, 2022. At each point, the real-time GPS coordinates of the sample location were recorded using a Trimble Geo 7X, a handheld GNSS system. Due to the characteristics of the aquatic system, visual documentation was also used to augment this survey.

The Point Intercept Methodology, developed by the US Army Corps of Engineers and modified by Cornell University was used for this survey (Lord and Johnson 2006). However, the referred methodology only requires one rake toss. At Lakes Oscaleta and Rippowam **two rake tosses** were conducted at each site, as historically performed before. The tosses were conducted from opposite sides of the boat, labeled, and recorded as A and B. The following data was collected for each rake toss: overall abundance of floating and submersed macrophyte growth, relative abundance of each species, and any other pertinent field notes regarding the sample location. The abundance scale, Table 1 below, defined by this methodology was used to categorize the observed macrophyte growth for each rake toss:

Table 1: PIM Abundance Descriptions

Abundance	**Description**
Z: Zero	No plants on rake
T: Trace	Fingerful on rake
S: Sparse	Handful on rake
M: Medium	Rakeful of plants
D: Dense	Difficult to bring into boat

The overall and relative abundance values from the two rake tosses were translated into a numeric value before further data analysis: 0 for no plants, 1 for trace, 2 for sparse, 3 for medium, and 4 for dense plants. For example, if toss A was Dense (4) and toss B was Sparse (2) for the same macrophyte, the mean abundance would be Medium (4+2=6/2=3). Raw abundance data with mean calculations can be found in the Appendix.

Any macrophyte specimen requiring further identification was collected and placed in a Ziploc-type bag with a reference to the sampled location. Regionally appropriate taxonomic keys were used for identification.

Macrophyte Abundance and Discussion

Lake Oscaleta

Table 2 displays the presence of all Lake Oscaleta species from each survey year starting in 2008 and ending with 2022. The percent change from 2020 to 2022 per species is also displayed in Table 2 below. Graphs displaying the abundance and distribution from year to year for each macrophyte are in the Appendix. Maps displaying the location and abundance for each aquatic species are also located in the Appendix.

Only one invasive macrophyte was present during the 2022 survey which was Eurasian water milfoil. Throughout the five-year data set, a range from one to three invasive macrophytes have been found.

Comparing the data from 2020 to 2022, floating filamentous algae in Lake Oscaleta increased the most with a percent change of +300.0%. Eleven other aquatic species exhibited a positive percent change in abundance which are displayed in Table 2 below. Several aquatic species were observed for the first-time including cattail, clasping-leaf pondweed, mermaid weed, pickerel weed, and small bladderwort. Ten aquatic macrophyte species displayed a negative percent change during the 2022 vegetation surveys. Common waterweed was the only macrophyte that displayed no percent change between 2020 and 2022.

Table 2: 2008-2022 Aquatic Plant Abundance Summary for Lake Oscaleta

Common Name	Scientific Name	2008	2016 # of Sites	2018 # of Sites	2020 # of Sites	2022 # of Sites	% Change 2020 – 2022
Arrowhead (rosette)	*Sagittaria sp.*	X	9	9	2		-100%
Bassweed	*Potamogeton amplifolius*	X	43	47	37	21	-43.24%
Benthic Filamentous Algae		X	16	14	8	16	+100%
Brittle Naiad	*Najas minor*		2	4	3		-100%
Cattail sp.	*Typha* sp.					1	+100%
Clasping-leaf Pondweed	*Potamogeton richardsonii*					2	+100%
Common Waterweed	*Elodea canadensis*	X	8	3	2	2	0.0%
Coontail	*Ceratophyllum demersum*	X	41	35	21	33	+57.14%
Creeping Bladderwort	*Utricularia gibba*	X	30	32	19		-100%
Curly-leaf Pondweed	*Potamogeton crispus*			3			0.0%
Eurasian Water Milfoil	*Myriophyllum spicatum*	X	66	58	59	55	-6.78%
Floating Bur-reed	*Sparganium fluctuans*		1	1		1	+100%
Floating Filamentous Algae			9	4	5	20	+300%
Leafy Pondweed	*Potamogeton foliosus*	X	5	2	2		-100%
Mermaid Weed	*Proserpinaca pectinata*					1	+100%
Pickerel Weed	*Pontederia cordata*					16	+100%
Pondweed Species	*Potamogeton sp.*			1			0.0%
Ribbon-leaf Pondweed	*Potamogeton epihydrus*	X	4	10			0.0%
Robbin's Pondweed	*Potamogeton robbinsii*	X	32	20	24	22	-8.33%
Small Bladderwort	*Utricularia minor*					29	+100%
Small Duckweed	*Lemna minor*		6	2	2	4	+100%
Southern Naiad	*Najas guadalupensis*		1				0.0%
Spatterdock	*Nuphar variegata*	X	33	37	37	29	-21.62%
Spiral Fruited Pondweed	*Potamogeton spirillus*				2		-100%
Stonewort	*Nitella sp.*	X					0.0%
Water Bulrush	*Schoenoplectus subterminalis*			2	2	4	+100%
Watershield	*Brasenia schreberi*	X	33	39	44	23	-47.73%
Water-thread Pondweed	*Potamogeton diversifolius*		1				0.0%
White Water Lily	*Nymphaea odorata*	X	63	66	65	66	+1.54%
Wild Celery	*Vallisneria americana*		2	2			0.0%

Red entries indicate invasive species. Green entries indicate algal species. X = presence of species.

The number of survey sites that each species was recorded at are displayed in Table 2 above. The X's in Table 2 indicate the presence of the listed species during the 2008 survey. The percent change represents whether a shift in plant abundance occurred from the previous year (2020) to the current year (2022). Change is represented in a positive (+) or negative (-) shift. No change is indicated by a 0.0%

At Lake Oscaleta, 88 sites were assessed to determine the abundance and distribution of submersed and floating vegetation on July 21, 2022. Submersed vegetation was collected at 71 sites or at 81% abundance in the basin. Overall, ten different submersed aquatic plants (including benthic and filamentous algae) were observed. Only one invasive aquatic macrophyte, Eurasian water milfoil, was found in Lake Oscaleta in 2022. Dense abundance of submersed macrophytes were recorded at 9 (or 13%) sites. Medium abundances were observed at 15 (or 21%) sites, while sparse amounts were present at 19 (or 27%) sites. Trace abundances of submersed plant species were observed at 28 sites (or 39%).

The invasive aquatic plant Eurasian water milfoil was the most observed submersed species at 55 (or 63%) survey sites. This is a 6.78% decrease in abundance when compared to the survey results from 2020. Dense amounts of the macrophyte were only observed at one (or 2%) site, while three (or 5%) sites were observed at medium abundance. These two amounts are nuisance levels of growth. Non-nuisance levels of Eurasian water milfoil were also observed. Sparse levels of abundance were present at 16 (or 29%) sites and trace abundances were observed at 35 (or 64%) sites. This invasive species was observed lining most of the basin with a few heavier densities located along the northeastern shoreline.

Coontail was the second most abundant submersed macrophyte at Lake Oscaleta in 2022. The plant species was present at 33 (or 38%) of the sites surveyed, which is a 57.14% increase when compared to the results from 2020. Only one (or 3%) site was considered dense, while eight (or 24%) sites supported medium densities. Sparse abundances were observed at seven (or 21%) sites and 17 (or 52%) sites recorded trace amounts.

Small bladderwort was documented at 29 (or 33%) sites with the most abundant populations located in the western inlet. A few trace populations were observed along the eastern shoreline, as well. Dense abundance was only recorded at one (or 3%) site while medium abundance was supported at five (or 17%) sites. Sparse abundance was observed at eight (or 28%) survey sites. Trace amounts of small bladderwort were observed at 15 (or 52%) sites. This is the first year that small bladderwort has been documented at Lake Oscaleta.

Robbin's pondweed, a desirable native, occurred at 22 (or 25%) survey sites throughout the basin. When compared to the results from 2020, Robbin's pondweed decreased in abundance by 6.78%. Dense abundances were observed at four (or 18%) sites, while three (or 14%) sites supported medium abundances. Sparse abundances were recorded at two (or 9%) sites and trace abundances were observed at 13 (or 59%) sites. The most dense populations of Robbin's pondweed were reported in the western part of the basin, near the inlet. This macrophyte was also observed dotting the northern and eastern shorelines.

Bassweed was observed at 21 (or 24%) sites at Lake Oscaleta in 2022, which is a 43.24% decrease when compared to 2020. The most abundant populations of this macrophyte were recorded within the western half of the basin with a few more patches located along the northern and eastern shorelines. Out of the sites observed, four (or 19%) were considered dense and two (or 10%) were considered medium. Sparse abundances occurred at eight (or

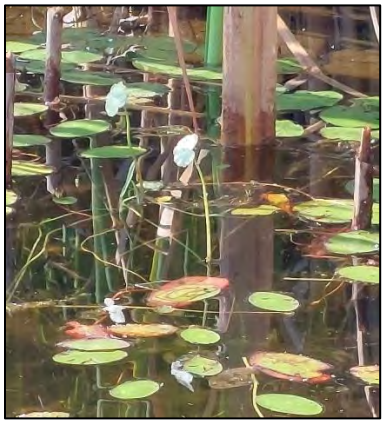
38%) sites and trace abundances were recorded at seven (or 33%) sites.

Benthic filamentous algae (BFA) were observed at 16 (or 18%) sites, which is a 100% increase when compared to 2020. No dense populations of BFA were observed. However, two (or 13%) survey sites supported medium abundance. Sparse abundance was observed at five (or 31%) sites and trace abundances were recorded at nine (or 56%) sites. Increasing densities of algae continue to be a concern in New York and the surrounding region as North Eastern summers increase in temperature.

Eight floating macrophyte species were observed at Lake Oscaleta in 2022. A total of 73 (or 83%) survey sites supported floating aquatic plant growth. At nuisance levels of growth, dense abundances of floating macrophytes were present at 32 (or 44%) sites. Medium abundances were observed at 12 (or 16%) survey sites. Non-nuisance levels of floating macrophytes were observed at 20 (or 27%) sites in sparse amounts and nine (or 12%) sites in trace amounts.

The most abundant floating aquatic plant in Lake Oscaleta in 2022, as well as the most dominant overall, was white water lily. This species was observed at 66 (or 75%) survey sites throughout the basin, which is a 1.54% increase when compared to 2020. The densest patches of white water lily were recorded near the boat launch and clustered along the main shorelines. Dense abundances were observed at 19 (or 29%) sites, while medium abundances occurred at 12 (or 18%) survey sites. Sparse amounts were observed at 22 (or 33%) sites and trace abundances were recorded at 13 (or 20%) sites.

Spatterdock was the second most abundant floating macrophyte and commonly present among the other lilies. This floating aquatic plant occurred at 29 (or 33%) survey sites with the most abundant populations located within the western inlet and along the eastern shoreline. When compared to the results from 2020, spatterdock decreased in total abundance by 21.62%. Dense abundances were reported at ten (or 34%) sites and medium amounts were assessed at two (or 7%) sites. Sparse abundances were also observed at ten (or 34%) sites and trace amounts were observed at seven (or 24%) sites.



The third most common floating macrophyte species was watershield and is pictured right. This floating plant species occurred at 23 (or 26%) survey sites throughout the basin, which is a 47.73% decrease from 2020. The most abundant populations were recorded along the southeastern shoreline of Lake Oscaleta. Dense levels of growth were observed at three (or 13%) survey sites, while medium abundances were recorded at six (or 26%) sites. Sparse amounts were reported at four (or 17%) sites and trace abundances were documented at ten (or 43%) survey sites.

Floating filamentous algae was observed at 20 (or 23%) of the sites surveyed, which is a 300% increase when compared to 2020. Dense floating algae was observed at only one (or 5%) site,

while medium abundance was reported at two (or 10%) sites. Sparse abundance was recorded at four (or 20%) sites and 13 (or 65%) sites were observed at trace abundances.

Aquatic macrophytes that were observed at 5% total abundance or less include the following: water bulrush, common waterweed, clasping leaf pondweed, mermaid weed (pictured right), small duckweed, bur-reed sp., and cattail sp.

Lake Rippowam

Table 3 displays the presence of all Lake Rippowam macrophytes from each survey year starting in 2008 and ending with 2022. The percent change from 2020 to 2022 per species is also displayed below. Graphs displaying the abundance and distribution from year to year for each macrophyte are in the Appendix. Maps displaying the location and abundance for each aquatic species are also located in the Appendix. Only one invasive macrophyte was present during the 2022 survey which was Eurasian water milfoil.

Table 3: 2008-2022 Aquatic Plant Abundance Summary for Lake Rippowam

Common Name	Scientific Name	2008	2016 # of Sites	2018 # of Sites	2020 # of Sites	2022 # of Sites	% Change 2020-2022
Arrowhead (rosette)	*Sagittaria sp.*		1	3			0.0%
Bassweed	*Potamogeton amplifolius*		2	2	2	1	-50.00%
Benthic Filamentous Algae		X	5			2	+100%
Coontail	*Ceratophyllum demersum*		3	1			0.0%
Eurasian Water Milfoil	*Myriophyllum spicatum*	X	29	35	30	31	+3.33%
Floating Filamentous Algae		X	2	5	1	20	+1,900%
Pickerel Weed	*Pontederia cordata*					12	+100%
Small Duckweed	*Lemna minor*		1				0.0%
Spatterdock	*Nuphar variegata*	X	8	8	7	10	+42.86%
Watermoss	*Fontinalis sp.*		2				0.0%
White Water Lily	*Nymphaea odorata*	X	21	21	27	28	+3.70%

Red entries indicate invasive species. Green entries indicate algal species. X = presence of species.

In Table 3 above, details each year the species that were or were not found compared to the

previous survey years. The percent change represents whether or not a shift in plant abundance occurred from the previous year (2020) to the current year (2022). Change is represented in a positive (+) or negative (-) shift. No change is indicated by a 0.0%

Since the last survey in 2020, floating filamentous algae has shown the highest positive percent change (+1,900%) in Lake Rippowam. Benthic filamentous algae, Eurasian water milfoil, pickerel weed, spatterdock, and white water lily also reported positive percent change in 2022. Only one aquatic plant species experienced a negative percent change in 2022: bassweed. All other species showed no shift in percent change.

Biologists surveyed 60 sites at Lake Rippowam to determine the abundance and distribution of aquatic vegetation on July 20, 2022. Submersed vegetation was collected at 31 sites which is equivalent to 52% abundance in the lake. Floating vegetation was also collected at 31 (or 52%) survey sites. Overall, seven different aquatic plants (including benthic and floating filamentous algae) were observed. Only one invasive species, Eurasian water milfoil, was documented in Lake Rippowam.

For overall submersed aquatic vegetation in Lake Rippowam, dense abundances were recorded at 2 (or 6%) sites in 2022. Medium densities were observed at three (or 10%) survey sites. Sparse densities were observed at 14 (or 45%) sites and trace densities were recorded at 12 (or 39%) sites.

Only three submersed macrophyte species were observed at Lake Rippowam. Out of the three observed species, Eurasian water milfoil was the most abundant submersed plant as well as the dominant macrophyte of the entire basin. This milfoil was recorded at 31 (or 52%) of the 60 sites surveyed, which is a 3.33% increase from 2020. Nuisance levels of growth were documented at 2 (or 6%) dense sites and three (or 10%) medium sites. Non-nuisance levels of growth were recorded in sparse abundances at 14 (or 45%) sites and trace abundances at 12 (or 39%) sites. The densest concentration of Eurasian water milfoil was observed along the western shoreline while smaller patches dotted the southern and eastern shorelines.

The other two submersed aquatic species were observed at less than 5% abundance within Lake Rippowam: benthic filamentous algae (2 sites) and bassweed (1 site). Benthic filamentous algae has not be reported in this basin since 2016.

Four floating macrophyte species were observed at Lake Rippowam in 2022. Of the 31 sites supporting floating plant growth, 12 (or 39%) survey sites supported dense abundances. Medium abundances were observed at seven (or 23%) survey sites. Sparse abundances were also observed at seven (or 23%) sites, while trace abundances were observed at five (or 16%) survey sites.

White water lilies were the most abundant floating plant observed during the 2022 vegetation survey. This macrophyte was reported at 28 (or 48%) sites, which is a 3.7% increase from 2020. Dense abundances were recorded at 11 (or 39%) sites, while medium densities were recorded

at 6 (or 21%) sites. Sparse abundances were observed at eight (or 29%) sites and three (or 11%) sites supported trace abundance. Heavy concentrations of white water lilies were located along the western and eastern shorelines. Scattered densities of the water lilies were found along most of the southern shoreline.

Floating filamentous algae was the second most abundant floating aquatic species during the 2022 Lake Rippowam vegetation survey. Floating filamentous algae was observed at 20 (or 33%) sites within the basin, which is a 1,900% increase from 2020. The algae patches were observed along the western and eastern shorelines as well as dotting the southern shoreline.

Pickerel weed is a native macrophyte that was observed for the first time at Lake Rippowam in 2022. This floating species was documented at 12 (or 20%) sites throughout the basin and all at trace abundance. Pickerel weed patches were scattered along the southern, western and northern shorelines.

The last floating macrophyte observed was spatterdock at ten (or 17%) survey sites. Only two (or 20%) sites supported dense abundances while the other eight (or 80%) sites reported sparse abundances. The densest patches of spatterdock were observed along the eastern shoreline while the sparse patches were recorded on the western shoreline.

Summary of Findings

Lake Oscaleta:

- Eurasian watermilfoil, an invasive species, continues to be the most dominant submersed macrophyte within Lake Oscaleta.
- **No Brazilian elodea or water chestnut were found in 2022.**
- Small bladderwort, pickerel weed, mermaid weed, clasping leaf pondweed, and cattail sp. were observed for the first time in Lake Oscaleta.
- White water lily, a native species, continues to be the dominant floating-leaf macrophyte within Lake Oscaleta.
- Five plants found in 2020 were not observed in 2022: arrowhead, brittle naiad, creeping bladderwort, leafy pondweed, and spiral fruited pondweed.
- Since 2020, the number of invasive species found decreased from two to one, as brittle naiad was not observed in 2022.
- The total number of aquatic macrophyte species observed increased from 17 in 2020 to 18 in 2022.

Lake Rippowam:

- Invasive Eurasian water milfoil continues to be the most dominant macrophyte within Lake Rippowam.
- **No Brazilian elodea or water chestnut were found in 2022.**
- White water lily, a native species, continues to be the dominant floating-leaf macrophyte within Lake Rippowam.
- Compared to 2020, only one macrophyte species decreased in abundance: bassweed (-50.0%)
- Macrophyte species diversity increased from five in 2020 to seven in 2022.
- Throughout the dataset, Eurasian water milfoil was the only invasive species consistently found each survey year.
- Benthic filamentous algae returned in 2022 while pickerel weed was observed for the first time.

Recommendations

We highly recommend a repetition of the SAV mapping in 2024. Monitoring is important for examining and understanding the abundance and distribution of non-native and native macrophytes throughout the aquatic systems.

The point-intercept methodology continues to work well in monitoring and quantifying the growth of aquatic macrophytes in Lake Oscaleta and Rippowam. If Brazilian elodea or water chestnut should re-infest Lake Waccabuc, this will pose a threat to the other two systems for infestation and create a need for more intensive effort for surveys. The point-intercept survey is ideal to direct short- or long-term management efforts in a cost-effective manner. We should increase the frequency of surveying yearly if this situation occurs. Since Lake Waccabuc was not surveyed in the 2022 season, we recommend that it be surveyed in the next season, 2023.

However, it is possible that other infestations (like hydrilla, as it becomes more established in the region) could appear or may not be within the boundaries of the survey. Non-native growth can be overlooked, especially when an infestation is small or intermittent. While not a priority, the growth of Eurasian water milfoil is concerning as it continues to dominate in all three systems. The Eurasian water milfoil population of both lake systems appears to be stable and local management via hand-pulling is likely enough to reduce impacts to recreational activity.

As always, SŌLitude Lake Management would like to take this opportunity to thank you for allowing us to be of service to the 3LC. We look forward to working with you in the 2023 season.

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Appendix

Aquatic Macrophyte Library

2022 Lake Oscaleta Aquatic Macrophyte Abundance and Distribution Tables

2022 Lake Oscaleta Aquatic Macrophyte Survey Maps

2008 – 2022 Lake Oscaleta Aquatic Macrophyte Percent Abundance Graphs

2022 Lake Rippowam Aquatic Macrophyte Abundance and Distribution Tables

2022 Lake Rippowam Aquatic Macrophyte Survey Maps

2008 – 2022 Lake Rippowam Aquatic Macrophyte Percent Abundance Graphs

Arrowhead – submersed rosette (*Sagittaria* sp.)

Arrowhead Native (Submersed Rosette): This is the submersed rosette of a species of arrowhead. The submersed rosette lacks both flowers and seeds, so further identification is not possible. Arrowhead has emergent leaves, and usually inhabits shallow waters at pond or lake edges, or along sluggish streams. It can tolerate a wide variety of sediment types and pH ranges. Arrowhead is very suitable for constructed wetland development due to its tolerance of habitats, and ability to act as a nutrient sink for phosphorous. Typical arrowhead reproduction is via rhizomes and tubers although seed production is possible if conditions are ideal. Arrowhead has high wildlife value, providing high-energy food sources for waterfowl, muskrats, and beavers. Arrowhead beds provide suitable shelter and forage opportunities for juvenile fish as well.

Bassweed (*Potamogeton amplifolius*)

Large-leaf pondweed, Musky weed

Bass Weed Native: Bass weed has robust stems that originate from black-scaled rhizomes. The submersed leaves of bass weed are among the broadest in the region. The submersed leaves are arched and slightly folded, attached to stems via stalks, and possess many (25-37 veins). Floating leaves are produced on long stalks (8-30 cm). Stipules are large, free, and taper to a sharp point. Flowers, and later in the season fruit are densely packed onto a spike. Bass weed prefers soft sediments in water one to 4 meters deep. This plant is sensitive to increased turbidity and has difficulty recovering from top-cutting, from such devices as boat propellers and aquatic plant harvesters. As its name implies the broad leaves of this submersed plant provides abundant shade, shelter, and foraging opportunities for fish. The high number of nutlets produced per plant make it an excellent waterfowl food source.

Brazilian Elodea (*Egeria densa*)

Egeria, Anacharis, Brazilian waterweed

Brazilian Elodea Invasive: Brazilian elodea is an aggressive exotic invasive submersed plant that originated from South America. It was introduced via the aquarium hobby trade and is a top selling plant used as an oxygenator. The stems can be several meters long, and the strap-like leaves are situated in whorls of three to six, but usually four. The leaves are finely serrated and are tightly packed together near the end of the stem. Brazilian elodea can be rooted or free floating, and due to its highly branching nature, can quickly reach nuisance densities and crowd out or block light penetration for desirable native submersed plants. Although it can be confused with *Hydrilla*, another invasive submersed plant, its lack of tuber production and leaf structure differentiates it. Although it can produce white flowers, it reproduces vegetatively in the United States. Waterfowl consume Brazilian elodea, and fish and invertebrates use the stems for refuge and habitat.

Brittle Naiad (*Najas minor*)

Brittle water nymph, European naiad

Brittle Naiad Invasive: Brittle naiad is a submersed annual that flowers in August to October. It resembles other naiads, except its leaves are highly toothed with 6-15 spinules on each side of the leaf, visible without the aid of magnification. The leaves are opposite, simple, thread-like, and usually lime-green in color, often with a "brittle" feel to them. Brittle naiad fruit are narrow, slightly curved, and marked with 10-18 longitudinal ribs, resembling a ladder. Brittle Naiad has been introduced from Europe in the early 1900's and can be found in most of the northeastern states. Brittle naiad prefers sandy and gravel substrates but can tolerate a wide range of bottom types. It's tolerant of turbid and eutrophic conditions. Waterfowl graze on the fruit.

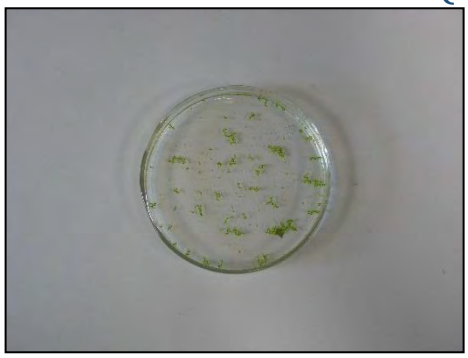
Cattail sp. (*Typha sp.*)

Cattail sp. Native: Cattails emerge from a robust, spreading rhizome that lies within the sediment. The leaves of the plant are sheathed around one another at the base. Depending on the species of cattail, the structure at the junction of the leaf sheath and blade can differ. The sheath either has membranous ear-shaped lobes called auricles or is tapered. The flower of a cattail looks like a hotdog on a stick. The lower portion of the flower is a cylindrical spike of thousands of tightly packed female flowers. The shape and color of these flowers can vary depending on the species. The top of the female spike is separated from the male spike which contains hundreds of anthers that shed pollen to the wind. Cattails provide nesting habitat for many marsh birds ranging from small to large. Shoots and rhizomes are food for muskrats and geese. The submersed stalks also provide habitat for sunfish and shelter for young fish.

Clasping-Leaf Pondweed (*Potamogeton richardsonii*)

Clasping-Leaf Pondweed Native: Clasping-leaf pondweed has sinuous stems that emerge from a spreading rhizome. The leaves are oval to almost lance-shaped that clasp to the stem of the plant. The leaf base is heart-shaped and covers one half to three-quarters of the stem circumference. 13-21 veins run through each leaf. At the axil of each leaf is a fibrous stipule that disintegrates, leaving behind a beard of white fibers at each node. No floating leaves are produced. The pondweed can grow in a variety of sediment types in water up to four meters deep. It can tolerate sediment disturbance and is often found growing with coontail or small pondweed. The fruit of clasping-leaf pondweed is an important food source for a variety of ducks and geese. Grazers such as muskrat, deer and beaver also consume this pondweed. The leaves and stem are colonized by invertebrates and create foraging opportunities as well as cover for fish.

Common Watermeal (*Wolffia columbiana*)



Common Watermeal Native: Common watermeal appears as pale green globes of vegetative matter without roots, stems or true leaves. It is one of the world's smallest flowering plants, but flowers are rarely found and require magnification to see. Watermeal usually reproduces by budding. Watermeal is typically found on the surface, intermingled with duckweeds. Its drifts with the water's current or wind, and therefore it grows independent of water depth, clarity, or sediment type. In the fall it produces winter buds that sink to the bottom. In the spring, the buds become buoyant and float to the surface. Waterfowl, fish, and muskrats all include watermeal in their diets.

Common Waterweed (*Elodea canadensis*)

Elodea

Common Waterweed Native: Common waterweed has slender stems that can reach a meter in length, and a shallow root system. The stem is adorned with lance-like leaves that are attached directly to the stalk that tend to congregate near the stem tip. The leaves are populated by a variety of aquatic invertebrates. Male and female flowers occur on separate plants, but it can also reproduce via stem fragmentation. Since common waterweed is disease resistant, and tolerant to low-light conditions, it can reach nuisance levels, creating dense mats that can obstruct fish movement, and the operation of boat motors.

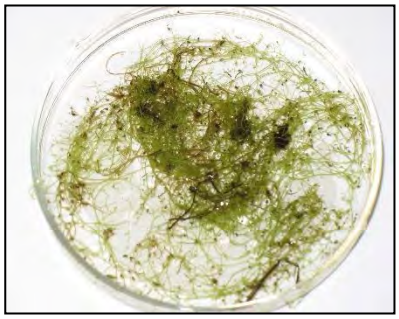
Coontail (Ceratophyllum demersum)

Hornwort

Coontail Native: Coontail has long trailing stems that lack true roots, although it can become loosely anchored to sediment by modified leaves. The leaves are stiff and arranged in whorls of 5- 12 at each node. Each leaf is forked once or twice and has teeth along the margins. The whorls of leaves are spaced closer at the end of the stem, creating a raccoon tail appearance. Coontail is tolerant of low light conditions, and since it is not rooted, it can drift into different depth zones. Coontail can also tolerate cool water and can over winter as a green plant under the ice. Typically, it reproduces via fragmentation. Bushy stems of coontail provide valuable habitat for invertebrates and fish (especially during winter), and the leaves are grazed on by waterfowl.

Creeping Bladderwort (*Utricularia gibba*)

Humped bladderwort, Cone-Spur Bladderwort



Creeping Bladderwort Native**:** Creeping bladderwort is a small (usually less than 10 cm long), delicate, free-floating stem. It often forms tangled mats in quiet shallow waters, often associated with bogs, or stranded on soil. It is sometimes mistaken for algae. It has short side branches that fork once or twice, a defining characteristic. Small bladders, used to capture live prey, are situated on these side branches. Small yellow snap- dragon-like flowers are produce on a short stalk. Mats of creeping bladderwort offer limited cover and foraging opportunities for fish.

Curly-leaf Pondweed (*Potamogeton crispus*)

Curly-leaf Pondweed Invasive: Curly-leaf pondweed has spaghetti-like stems that often reach the surface by mid- June. Its submersed leaves are oblong and attached directly to the stem in an alternate pattern. The margins of the leaves are wavy and finely serrated, hence its name. No floating leaves are produced. Curly-leaf pondweed can tolerate turbid water conditions better than most other macrophytes. In late summer, Curly-leaf pondweed enters its summer dormancy stage. It naturally dies off (often creating a sudden loss of habitat and releasing nutrients into the water to fuel algae growth) and produces vegetative buds called turions. These turions germinate when the water gets cooler in the autumn and give way to a winter growth form that allows it to thrive under ice and snow cover, providing habitat for fish and invertebrates.

Dwarf Water Milfoil (*Myriophyllum tenellum*)

Dwarf Water Milfoil Native: Dwarf milfoil, which does not look anything like other milfoil species, has slender unbranched stems ranging from 2 cm to 15 cm in height. The leaves are reduced to scales or “bumps”. If the tips rise out of the water, they can produce pale flowers and nut-like fruits. The toothpick-like stems arise from rhizomes in a chain. Dwarf milfoil is often small and overlooked, preferring sandy bottoms in waters up to four meters deep. Dwarf water milfoil provides suitable spawning habitat for panfish and adequate shelter for small invertebrates. The rhizome networks also help stabilize bottom sediments.

Eurasian Watermilfoil (*Myriophyllum spicatum*)

Asian Water Milfoil

Eurasian Watermilfoil Invasive: Eurasian water milfoil has long (2 meters or more) spaghetti- like stems that grow from submerged rhizomes. The stems often branch repeatedly at the water's surface creating a canopy that can crowd out other vegetation and obstruct recreation and navigation. The leaves are arranged in whorls of 4 to 5 and spread out along the stem. The leaves are divided like a feather, resembling the bones on a fish spine. Eurasian watermilfoil is an exotic originating in Europe and Asia, but its range now includes most of the United States. It's ability to grow in cool water and at low light conditions gives it an early season advantage over other native submersed plants. In addition to reproducing via fruit production, it can also reproduce via fragmentation. Waterfowl graze on Eurasian watermilfoil, and its vegetation provides habitat for invertebrates. However, studies have determined mixed beds of pondweeds and wild celery can support more diverse invertebrate populations.

Filamentous Algae

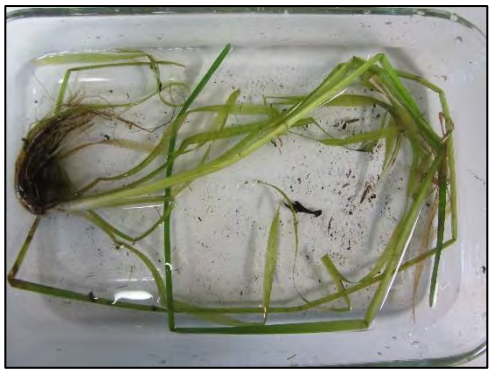
Floating Filamentous Algae, Benthic Filamentous Algae

Filamentous Algae: Filamentous algae is a chain or series of similar algae cells arranged in an end-to-end manner. Benthic filamentous algae is often attached to a hard substrate, such as logs, rocks, a lake bottom, or even other aquatic plants. When growing in heavy densities, benthic filamentous algae can appear as brown or green mats of vegetation that can reach the surface. When large pieces break off the bottom substrate, they become floating filamentous algae patches. Benthic filamentous algae can comprise an entire range of morphologies, but flagellated taxa are far less common.

Flat-stem Pondweed (*Potamogeton zosteriformis*)

Flat-stem Pondweed Native: Flat-stem pondweed is freely branched, emerging from a delicate rhizome system. The stems are strongly flattened with an angled appearance. The long leaves are stiff and linear with a prominent midvein, and numerous fine parallel veins. This prominent midvein distinguishes this pondweed from water stargrass. The stipules are firm and free situated in the leaf axils. Flat-stem pondweed lacks floating leaves. Flat-stem pondweed inhabits a variety of water depths from shallow water to water several meters deep. It prefers soft sediment types. Although it produces nut-like fruits, it over winters primarily by rhizomes and winter buds. It can be a locally important food source to fauna, such as waterfowl, muskrat, deer, beaver, and moose. It also provides suitable habitat and food for fish and aquatic invertebrates.

Floating Bur-reed (*Sparganium fluctuans*)



Floating Bur-reed Native: Floating bur-reed is an aquatic perennial that grows along rhizomes in static or slow- moving water. The leaves are limp, strap-shaped, float on the water's surface, often growing in the direction of any flow. At maturity (July-September), the floating bur-reed produce an emergent flowering spike that supports few white flowers with an appearance of small, fluffy cotton balls. From the flowers, floating bur-reed produces spiky fruits (seed heads) that are primarily dispersed by water. The fruits are water-repellent and can remain floating for several months. Various species of bur- reed display the floating leaves.

Great Duckweed (*Spirodela polyrhiza)*

Large Duckweed

Great Duckweed Native: Great duckweed is the largest of the duckweeds, but it is still very small compared to other aquatic macrophytes. It has simple flattened fronds with irregular oval shapes, often up to 1 cm in length and 2.5 to 8.0 mm long. The frond surface is usually green with a conspicuous purple dot. The underside of the frond is magenta with a cluster of 5-12 roots that dangle into the water. Indeed, peering at great duckweed from under the water grants it the appearance a tiny jellyfish. Although great duckweed produces flowers, it usually reproduces via budding, and like other duckweeds, it is capable of rapid growth. It often occurs with other duckweeds, and since it is free floating, it can be moved via the wind or water currents. It derives its nutrients from the water column and often occurs in eutrophic systems. It is an excellent food source for waterfowl and is also used by muskrat and fish. The dense mats offer shade and cover for fish.

Leafy Pondweed (*Potamogeton foliosus*)

Leafy Pondweed Native: Leafy pondweed has freely branched stems that hold slender submersed leaves that become slightly narrower as they approach the stem. The leaf contains 3-5 veins and often tapers to a point. No floating leaves are produced. It produces early season fruits in tight clusters on short stalks in the leaf axils. These early season fruits are often the first grazed upon by waterfowl during the season. Muskrat, beaver, deer and even moose also graze on the fruit. It inhabits a wide range of habitats, but usually prefers shallow water. It has a high tolerance for eutrophic conditions, allowing it to even colonize secondary water treatment ponds.

Mermaid Weed (*Proserpinaca pectinata*)

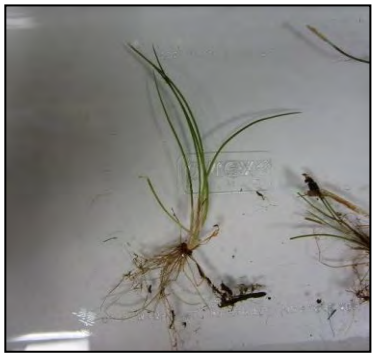
Comb-Leaved Mermaid Weed

Mermaid Weed Native: Mermaid weed is a small plant that is typically found along shorelines. A member of the water milfoil family, it is often confused with the invasive species known as parrotfeather. The whitish to green stems are often sprawling while the upper parts are erect. Unlike most milfoil species, mermaid weed leaves are alternate on the stem and feathery in appearance. The flowers are tiny, greenish white and typically bloom in the spring or early summer. The fruit of the plant are three-angled nutlets that are attached at the leaf axils.

Pickerel Weed (*Pontedaria cordata*)

Pickerel weed Native: Pickerel weed is a native emergent plant that inhabits lake margins and sluggish stream from ankle deep to several meters deep. It was glossy heart-shaped leaves that originate from a sprawling rhizome. The leaf blade is adorned with numerous parallel veins. The flower spike is crammed with small blue flowers, a distinguishing characteristic. Pickerelweed is very common in the Northeast. Reproduction is by rhizome spread and late season seed dispersal. The flowering stalk plays host to a myriad of insect species, while the seeds are often consumed by waterfowl. The rhizomes and stems offer shade and habitat for fish. Another ecological benefit of pickerelweed is shoreline stabilization and established beds help to dampen wave action.

Quillwort (*Isoetes sp.*)



Quillwort Native: Quillwort is a low growing, submersed aquatic plant with many leaves forming from a basal structure called a corm. The size of the hollow leaves is dependent on the species. Quillwort is actually a lycopod and does not have 'true' rhizomes or seeds. Instead, quillwort has pseudo-rhizomes and megaspores. The megaspores act like seeds and are found in the expanded bases of each leaf; the megaspores are the primary method for species identification of quillwort genus.

Ribbon-leaf Pondweed (*Potamogeton epihydrus*)

Ribbon-leaf Pondweed Native: Ribbon-leaf pondweed has flattened stems and two types of leaves. The submersed leaves are alternate on the stem, lack a leaf stalk, and are long tape-like in shape. Each leaf, which can reach lengths up to 2 meters long, has a prominent stripe of pale green hollow cells flanking the midvein, and 5 to 13 other veins. Stipules are not fused to the leaf. Floating leaves are egg or ellipse-shaped and supported by a leaf stalk about as long as the leaf itself. Fruiting stalks are located at the top of the stem and packed with flattened disk-shaped fruits. It is typically found growing in low alkalinity environments, and in a variety of substrates. Seeds are highly sought after by all manner of waterfowl.

Robbins Pondweed (*Potamogeton robbinsii*)

Fern Pondweed

Robbins Pondweed Native: Robbins pondweed has robust stems that emerge from spreading rhizomes. The leaves are strongly ranked creating a fern-like appearance most clearly seen while still submerged. Its distinct closely spaced fern-like leaves give it a unique appearance among the pondweeds of our region. Each leaf is firm and linear, with a base that wraps around the stem. At the stem it has ear-like lobes fused with a fibrous stipule. No floating leaves are produced. Robbins pondweed thrives in deeper water, and under some circumstances, it can remain green over winter. Robbins pondweed creates suitable invertebrate habitat, and cover for lie-in-wait predaceous fish, such as pickerel and pike.

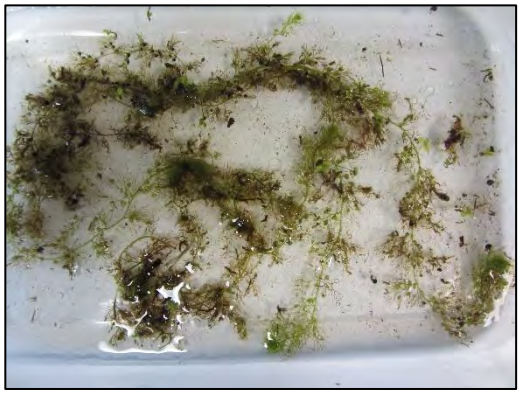
Slender Naiad (*Najas flexilis*)

Bushy Pondweed

Slender Naiad Native: Slender naiad has fine-branched stems that can taper to lengths of one meter, originating from delicate rootstalks. Plant shape varies; sometimes compact and bushy, other times long and slender, depending on growing conditions. The leaves are short (1-4 cm long) and finely serrated, tapering to a point. It is found in a variety of habitats and can colonize sandy or gravelly substrates. If conditions are ideal, it can reach nuisance densities. It is a true annual, and dies off in the fall, relying on seed dispersal to return the next year. It is an important food source for waterfowl.

Small Bladderwort (*Utricularia minor*)

Lesser Bladderwort



Small Bladderwort Native: Small bladderwort is a free-floating aquatic perennial herb. The stems are both floating and creeping usually no more than 75 cm long. The stem is densely lined with leaves bearing the bladders. The bladders are used to capture prey, such as protozoa, zooplankton, and even small insect larvae. The leaves are linear, flat, and bristle-tipped, generally three parted at the base and forked 1 to 3 times. Small yellow snap dragon-like flowers are produced. Since it is free floating, and it derives nutrients from captured prey, it can inhabit low nutrient waters. It is not limited to substrate type, water clarity, or water depth, due to its lack of roots, but it is at the mercy of wind or water currents.

Small Duckweed (*Lemna minor*)

Water Lentil, Lesser Duckweed

Small Duckweed Native: Small duckweed is a free-floating plant, with round to oval-shaped leaf bodies typically referred to as fronds. The fronds are small (typically less than 0.5 cm in diameter), and it can occur in large densities that can create a dense mat on the water's surface. Each frond contains three faint nerves, a single root (a characteristic used to distinguish it from other duckweeds), and no stem. Although it can produce flowers, it usually reproduces via budding at a tremendous rate. Its population can double in three to five days. Since it is free floating, it drifts with the wind or water current, and is often found intermixed with other duckweeds. Since it's not attached to the sediment, it derives nutrients directly from the water, and is often associated with eutrophic conditions. It over winters by producing turions late in the season. Small duckweed is extremely nutritious and can provide up to 90% of the dietary needs for waterfowl. It is also consumed by muskrat, beaver and fish, and dense mats of duckweed can inhibit mosquito breeding.

Southern Naiad (*Najas guadalupensis*)

Southern Water Nymph, Bushy Pondweed

Southern Naiad Native (*Najas guadalupensis*. Common Names: Southern water nymph, bushy pondweed.): Southern naiad is an annual aquatic plant that can form dense stands of rooted vegetation. Its ribbon-like leaves are dark green to greenish purple. The leaves are also wider and less pointed than slender naiad. Flowers occur at the base of the leaves, but are so small, they usually require magnification to detect. Southern naiad is widely distributed but is less common than slender naiad in northern zones. Southern naiad reproduces by seeds and fragmentation.

Spatterdock (*Nuphar variegata*)

Yellow Pond Lily, Bullhead Pond Lily

Spatterdock Native: Spatterdock leaf stalks emerge directly from a submerged fleshy rhizome. Spatterdock has heart-shaped leaves with a prominent notch. Depending on the habitat, these leaves can be held aloft via erect stems. A distinguishing characteristic of spatterdock is the leaf stalk, which bears a winged margin. Flowering occurs in the summer and, the flowers open during the day and close at night. Spatterdock typically inhabits quiet water less than two meters deep with a soft substrate, such as ponds, shallow lakes, and slow-moving streams. The leaves offer shade and protection for fish, and the leaves, stems, and flowers are grazed upon by muskrats, beaver, and sometimes, even deer.

Spiral-Fruited Pondweed (*Potamogeton spirillus*)

Spiral-Fruited Pondweed Native: Spiral-fruited pondweed has slender stems that originate from a delicate, spreading rhizome. The stems tend to be compact and have numerous branches. Submersed leaves are linear with a curved appearance. Floating leaves are delicate, ellipse-shaped and range from 7 to 35 mm long and two to 13 mm wide. Stipules are fused to the leaf blade for more than half of their length. Nut-like fruits are produced on stalks of varies lengths. Shorter stalks tend to be on lower axils with fruit arranged in a compact head, while longer stalks tend to appear on upper axils, with fruit arranged in a cylindrical head. The fruit itself is a flatten disc with a sharply toothed margin. Its smooth sides appear like a tightly coiled embryo, a distinguishing characteristic. Spiral-fruited pondweed prefers shallow water with sandy substrate but can inhabit a wide range of bottom substrates. It serves as an important stabilizer and cover for fish fry and invertebrates.

Water Bulrush (*Scirpus subterminalis, Schoenoplectus subterminalis)*

Bulrush

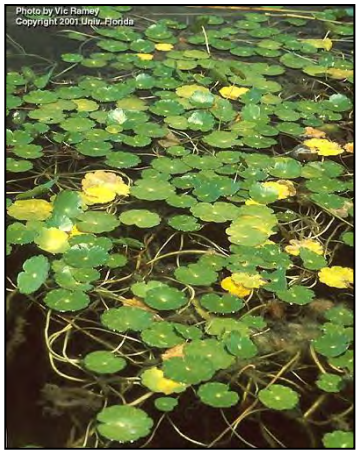
Water bulrush Native (*Scirpus subterminalis*; *Schoenoplectus subterminalis*). Common names: water bulrush, bulrush. Water bulrush is a truly aquatic bulrush, with only the tips of fertile stems poking above the water's surface, if any. The slender, limp stems originate from a delicate rhizome, typically less than 2.0 mm diameter. The hair-like stems can reach lengths up to 1.0 meter and occur in flowing or still-water environments. The leaves are sheathed at the base and become crescent-shaped above the sheath. This basal sheathing is a distinct characteristic that sets water bulrush apart from spikerush species. The leaves have one to five lengthwise veins and scattered cross-veins. The leaves are often covered with a fine coating of algae in nutrient-poor environments. Researchers believe the bulrush plants are a phosphorus source for the algae. When nutlets are produced, they are three-angled with a slender beak. Water bulrush prefers shallow water but can become established in depths exceeding 1.0 meter. Water bulrush stands produce grass-like meadows which provide suitable habitat for invertebrates and juvenile fish.

Water Chestnut (*Trapa natans*)

Water Nut

Water Chestnut Invasive: Water chestnut is native to Europe and Asia and was first observed in the United States in the late 1800's in Massachusetts. Water chestnut has two types of leaves, submerged and floating rosettes. The submersed leaves are delicate, opposite and contain numerous adventitious roots. Floating leaves are strongly toothed triangular leaves displayed in a rosette fashion, supported by long petioles with spongy inflated bladders for buoyancy. These petioles can reach lengths of up to 16 feet. Water chestnut prefers to inhabit nutrient-rich slow-moving waters in lakes, ponds, or streams. Although water chestnut can reproduce via fragmented rosettes, the plant produces numerous single-seeded horned nuts armed with sharp half-inch barbs. After maturation, these nuts fall off the plant and over winter, producing 10-15 new rosettes the following season. These nuts can inflict painful wounds to swimmers if stepped on. Studies have shown a water chestnut can lie dormant on a lake bottom for up to 12 years, and still germinate. Water chestnut is a poor source of food for waterfowl. High densities of water chestnut can inhibit boating and fishing.

Water Pennywort (*Hydrocotyle sp.*)



Water Pennywort: Water pennywort varies in appearance depending on the species, but most possess the same general characteristics. The leaves are circular, umbrella-shaped, and about the size of a half-dollar coin. The leaves are shiny green and leathery in texture with long leaf stalks attached to the center. The color of pennywort flowers can be white, green, or yellow. The fruit are typically egg-shaped with a flattened appearance. Pennywort can become a nuisance as they can form dense mats in lakes, pond, rivers, or marshes. The seeds of pennywort provide food for some waterfowl and the plants themselves provide habitat for aquatic biota. Several species of water pennywort, including native and invasive, are common throughout the United States, especially in Florida.

Water Stargrass (*Zosterella dubia*)

Water Stargrass Native: Water stargrass has slender free-branched stems that originate from rhizomes. The leaves are narrow and alternate, attaching directly to the stem. Leaves can be up to 15 cm long, and lack a prominent midvein, a distinguishing characteristic. Water stargrass can inhabit a wide range of water depths and sediment types. This macrophyte can also tolerate reduced clarity environments. Yellow star-shaped flowers are produced by midsummer, but reproduction is usually via over wintering rhizomes. Water stargrass is a locally important waterfowl food source and provides suitable cover and foraging for fish.

Water-thread Pondweed (*Potamogeton diversifolius*)

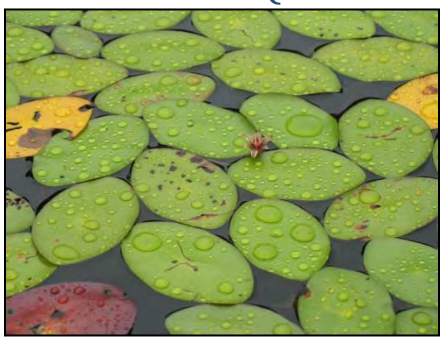
Variable-leaf Pondweed, Snailseed Pondweed

Water-thread Pondweed Native (*Potamogeton diversifolius*. Common Names: Water-thread pondweed, variable-leaf pondweed, snailseed pondweed.): Variable-leaf pondweed have freely branched stems emerging from slender rhizomes. The submersed leaves are narrow and linear with one obvious midvein bordered by a row of hollow cells. The floating leaves are shaped like an ellipse, but are usually less than 4 cm long, Variable-leaf pondweed fruit spikes are produced in two distinct forms. It occurs in lakes, ponds, rivers and streams and prefers soft sediment and water less than 2 meters deep. Waterfowl graze on the fruit, and local fauna often graze on the stems and leaves.

Water Moss (*Fontinalis* sp.)

Water Moss Native: Water mosses are submerged mosses that are attached to rocks, trees, logs, and other hard substrates by false rootlets located at the base of their stems. The stems are dark green to brown, and about one foot long. The leaves share a similar color as the stems and are usually ovate with fine-toothed margins. Water moss is utilized by aquatic invertebrates, and as a breeding site for small fish. Water moss rarely reaches nuisance levels.

Watershield (*Brasenia schreberi*)



Watershield Native: Watershield is a floating-leaf aquatic plant similar to water lilies. Its stem and leaves are elastic and are attached to a rooted rhizome that acts as an anchor as well as a source of stored nutrients. The leaf stalks are attached to the middle of the leaf, creating a bull's eye effect. The leaves are green on the upper surface and purple underneath. Maroon to purple flowers peak above the water's surface on short, stout stalks. Watershield is usually coated with a clear gelatinous slime on the stem and underside of the leaves. This plant prefers soft-water lakes and ponds with sediments containing decomposing organic matter. The whole plant is consumed by waterfowl, and the floating leaves provide shade and cover for fish.

White Water Lily (*Nymphaea* odorata)

Fragrant Water Lily

White Water Lily Native: White water lily leaf stalks emerge directly from a submerged fleshy rhizome. White water lilies have round floating leaves. Flowering occurs during the summer, and the flowers open during the day, and close during the night. Water lilies typically inhabit quiet water less than two meters deep, such as ponds, shallow lakes, and slow-moving streams. The leaves offer shade and protection for fish, and the leaves, stems, and flowers are grazed upon by muskrats, beaver, and sometimes even deer.

Wild celery (*Vallisneria Americana*)

Eel-grass, Tape-grass

Tape-grass (*Vallisneria americana*. Common Names: Wild celery, eel-grass, tape-grass. **Native**.): Tape-grass has long flowing ribbon-like leaves that have a basal arrangement from a creeping rhizome. The leaves can be up to two meters long, have a cellophane-like texture, with a prominent center stripe and finely serrated edges. The leaves are mostly submersed, although they can reach the surface allowing the tips to trail. Male and female flowers are produced on separate plants, but reproduction is usually via over wintering rhizomes and tubers. Tape-grass usually inhabits hard substrate bottoms in shallow to deep water. It can tolerate a wide variety of water chemistries. Tape-grass is the premiere food source for waterfowl, which greedily consume all parts of the plant. Canvasback ducks (*Aythya valisneria*) enjoy a strong relationship with tape-grass, going so far to alter their migration routes based on tape-grass abundance. Extensive beds of tape-grass are considered good shade, habitat and feeding opportunities for fish.

Floating Aquatic Plant Density

Trace

Medium

Sparse

Dense

SOLITUDE
LAKE MANAGEMENT

Submersed Aquatic Plant Density

Trace

Medium

Sparse

Dense

SOLITUDE
LAKE MANAGEMENT

Lake Oscaleta
Aquatic Macrophyte Abundance Distribution
July 21, 2022

	Total		Trace		Sparse		Medium		Dense	
	Sites	%	Sites	%	Sites	%	Sites	%	Sites	%
TOTAL SITES	88									
Total Submersed Abundance	71	81%	28	39%	19	27%	15	21%	9	13%
Eurasian Water Milfoil	55	63%	35	64%	16	29%	3	5%	1	2%
Coontail	33	38%	17	52%	7	21%	8	24%	1	3%
Small Bladderwort	29	33%	15	52%	8	28%	5	17%	1	3%
Robbin's Pondweed	22	25%	13	59%	2	9%	3	14%	4	18%
Bassweed	21	24%	7	33%	8	38%	2	10%	4	19%
Benthic Filamentous Algae	16	18%	9	56%	5	31%	2	13%	0	0%
Water Bulrush	4	5%	4	100%	0	0%	0	0%	0	0%
Common Waterweed	2	2%	2	100%	0	0%	0	0%	0	0%
Clasping Leaf Pondweed	2	2%	2	100%	0	0%	0	0%	0	0%
Mermaid Weed	1	1%	1	100%	0	0%	0	0%	0	0%
Total Floating Abundance	73	83%	9	12%	20	27%	12	16%	32	44%
White Water Lily	66	75%	13	20%	22	33%	12	18%	19	29%
Spatterdock	29	33%	7	24%	10	34%	2	7%	10	34%
Watershield	23	26%	10	43%	4	17%	6	26%	3	13%
Floating Filamentous Algae	20	23%	13	65%	4	20%	2	10%	1	5%
Pickerel Weed	16	18%	16	100%	0	0%	0	0%	0	0%
Small Duckweed	4	5%	4	100%	0	0%	0	0%	0	0%
Bur-reed sp.	1	1%	0	0%	1	100%	0	0%	0	0%
Cattail sp.	1	1%	1	100%	0	0%	0	0%	0	0%

Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

STATION	SAMPLE#	LAT (NAD83)	LONG (NAD83)	Total Floating Abundance	Total Submersed Abundance	Bassweed	Benthic Filamentous Algae	Bur-reed sp.	Cattail sp.	Clasping Leaf Pondweed	Common Waterweed	Coontail	Eurasian Water Milfoil	Floating Filamentous Algae	Mermaid Weed	Pickerel Weed	Robbin's Pondweed	Small Bladderwort	Small Duckweed	Spatterdock	Water Bulrush	Watershield	White Water Lily
1	A			M	T		T					T				T				S			M
1	B			S															T	S			T
1	M	41.297586°	-73.571229°	M	T		T					T				T			T	S			S
2	A			S	T		T					T								S			S
2	B			S												T				S			S
2	M	41.297525°	-73.570731°	S	T		T					T				T				S			S
3	A			S	T		T					T							T	S			S
3	B			S																S			T
3	M	41.297462°	-73.57012°	S	T		T					T							T	S			S
4	A			S	T		T					T								S			S
4	B			S																S			S
4	M	41.297135°	-73.569803°	S	T		T					T								S			S
5	A			M	T							T				T			T	M			M
5	B			M	S							S								M			M
5	M	41.297044°	-73.56925°	M	S							S				T			T	M			M
6	A			D	M		M			T		T				T		M		S			D
6	B			D	M		M											M					D
6	M	41.297279°	-73.56879°	D	M		M			T		T				T		M		T			D
7	A			D	M	T	M					T	T					T				T	D
7	B			D	M		M					T	T					S				T	D
7	M	41.297378°	-73.568556°	D	M	T	M					T	T					S				T	D
8	A			D	T					T			T			T				M			D
8	B			D	T					T			T							M			D
8	M	41.297579°	-73.568452°	D	T					T			T			T				M			D
9	A			D	M							M	T			T	T	T		S			D
9	B			D	M							M	T				T	T		S			D
9	M	41.297539°	-73.568159°	D	M							M	T			T	T	T		S			D
10	A			D	M							S	M					T		T		S	D
10	B			D	M							S	M					T		T		S	D
10	M	41.297388°	-73.568202°	D	M							S	M					T		T		S	D
11	A			D	S		T					T		T				S		T		S	D
11	B			D	S		T					T						S		T		S	D
11	M	41.297161°	-73.568217°	D	S		T					T		T				S		T		S	D
12	A			D	S							T	T	T				S		D			M
12	B			D	S							T	T	T				S		D			M
12	M	41.297059°	-73.567903°	D	S							T	T	T				S		D			M
13	A			D	M	T	S					T	T	T				M		T		M	D
13	B			D	M	T	S					T	T	S				M		T		M	D
13	M	41.297313°	-73.567912°	D	M	T	S					T	T	S				M		T		M	D
14	A			S	M	S	S				T		M	T	T		S	T					
14	B			S	M	S	S				T		M				S	T					
14	M	41.297393°	-73.567611°	S	M	S	S				T		M	T	T		S	T					
15	A			D	M	T							T	T			T	M		S			D
15	B			D	M	T							T				T	M		S			D
15	M	41.297155°	-73.567592°	D	M	T							T	T			T	M		S			D
16	A			D	T							T	T	T						D		T	M
16	B			D	T							T	T	T						D		T	M
16	M	41.296912°	-73.567591°	D	T							T	T	T						D		T	M
17	A			D	M							M	T	T				M		D		M	
17	B			D	M							M	T	T				M		D		M	
17	M	41.29651°	-73.567321°	D	M							M	T	T				M		D		M	
18	A			D	S							S	T					S		D		M	
18	B			D	S							S	T					S		D		M	
18	M	41.296715°	-73.567344°	D	S							S	T					S		D		M	
19	A			D	D	D						M	T	T			S	D		D			T
19	B			D	D	D						M	T	T			S	D		D			T
19	M	41.296962°	-73.56736°	D	D	D						M	T	T			S	D		D			T
20	A			M	D	M						D		S			M	T		S			M
20	B			M	D	M						D		S			M	T		S			M
20	M	41.297163°	-73.567303°	M	D	M						D		S			M	T		S			M
21	A			T	D	M						T	S				D	S					T
21	B				D	D						T	S				D	S					
21	M	41.29735°	-73.5673°	T	D	D						T	S				D	S					T
22	A			D				M														M	D
22	B			D										M								M	D
22	M	41.297541°	-73.56732°	D				S						S								M	D
23	A			M	D							T	S	M			D	T				M	
23	B			M	D							T	S	M			D	T				S	
23	M	41.297488°	-73.567046°	M	D							T	S	M			D	T				M	
24	A				D	M											D	M					
24	B				D	M											D	M					
24	M	41.297128°	-73.567005°		D	M											D	M					
25	A				D	D						S						S					

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STATION	SAMPLE#	LAT (NAD83)	LONG (NAD83)	Total Floating Abundance	Total Submersed Abundance	Bassweed	Benthic Filamentous Algae	Bur-reed sp.	Cattail sp.	Clasping Leaf Pondweed	Common Waterweed	Coontail	Eurasian Water Milfoil	Floating Filamentous Algae	Mermaid Weed	Pickerel Weed	Robbin's Pondweed	Small Bladderwort	Small Duckweed	Spatterdock	Water Bulrush	Watershield	White Water Lily
25	B				D	D						S						S					
25	M	41.296775°	-73.566993°		D	D						S						S					
26	A			D	T								T					T		D		T	S
26	B			D	T								T					T		D		T	S
26	M	41.296376°	-73.56707°	D	T								T					T		D		T	S
27	A			D	T													T		T			D
27	B			D	T													T					D
27	M	41.2961°	-73.566986°	D	T													T		T			D
28	A			D	T								T					T		S			D
28	B			D	T								T					T		S			D
28	M	41.29602°	-73.566691°	D	T								T					T		S			D
29	A			D	M							M	T					T		S			D
29	B			D	S							M	T					T		S			D
29	M	41.296418°	-73.566728°	D	M							M	T					T		S			D
30	A				M	S						S	S				M	S					
30	B				M	S						S	S				M	S					
30	M	41.296769°	-73.566724°		M	S						S	S				M	S					
31	A				S	S						S	S										
31	B				S	S						S	S										
31	M	41.297132°	-73.566736°		S	S						S	S										
32	A			M	T	T							T	S				T				M	T
32	B			M	T	T							T	T				T				M	
32	M	41.297522°	-73.566698°	M	T	T							T	S				T				M	T
33	A				D								D										
33	B				D								D										
33	M	41.297844°	-73.566285°		D								D										
34	A			T	T								T	T								T	T
34	B				M								M										
34	M	41.297489°	-73.566213°	T	S								S	T								T	T
35	A																						
35	B																						
35	M	41.297123°	-73.566286°																				
36	A																						
36	B																						
36	M	41.296779°	-73.566256°																				
37	A			M	M	S						M	S					S					M
37	B				M	S						M	S					S					
37	M	41.296441°	-73.56629°	S	M	S						M	S					S					S
38	A			D	T												T					S	D
38	B			D	T												T					S	D
38	M	41.296075°	-73.566266°	D	T												T					S	D
39	A			D	S								S					T				T	D
39	B			D	S								S					T				T	D
39	M	41.296406°	-73.565762°	D	S								S					T				T	D
40	A																						
40	B																						
40	M	41.296807°	-73.565833°																				
41	A			D	T								T										D
41	B			D	T								T										D
41	M	41.29634°	-73.565424°	D	T								T										D
42	A			M	S								S	T			T					M	S
42	B			S	S								S	T			T					T	S
42	M	41.296091°	-73.564814°	M	S								S	T			T					S	S
43	A			S	T								T										S
43	B			S	T								T										S
43	M	41.29589°	-73.564305°	S	T								T										S
44	A			S	T								T										S
44	B																						
44	M	41.295591°	-73.563763°	T	T								T										T
45	A			S	T								T			T	T					S	T
45	B																						
45	M	41.295243°	-73.563122°	T	T								T			T	T					T	T
46	A			T	S								S									T	T
46	B																						
46	M	41.29505°	-73.562549°	T	T								T									T	T
47	A																						
47	B																						
47	M	41.295012°	-73.561949°																				
48	A																						
48	B																						
48	M	41.295024°	-73.561364°																				
49	A																						
49	B																						

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STATION	SAMPLE#	LAT (NAD83)	LONG (NAD83)	Total Floating Abundance	Total Submersed Abundance	Bassweed	Benthic Filamentous Algae	Bur-reed sp.	Cattail sp.	Clasping Leaf Pondweed	Common Waterweed	Coontail	Eurasian Water Milfoil	Floating Filamentous Algae	Mermaid Weed	Pickerel Weed	Robbin's Pondweed	Small Bladderwort	Small Duckweed	Spatterdock	Water Bulrush	Watershield	White Water Lily
49	M	41.295015°	-73.560731°																				
50	A																						
50	B																						
50	M	41.295026°	-73.56016°																				
51	A			S																S			
51	B																						
51	M	41.295112°	-73.559593°	T																T			
52	A			M	T								T							M			T
52	B																						
52	M	41.295189°	-73.558985°	S	T								T							S			T
53	A			S	S								S									S	T
53	B																						
53	M	41.295226°	-73.558394°	T	T								T									T	T
54	A			M	S								S	T									M
54	B																						
54	M	41.295574°	-73.557844°	S	T								T	T									S
55	A			T												T							
55	B																						
55	M	41.295506°	-73.557148°	T												T							
56	A			D	T						T	T	T			T						D	
56	B			D	T							T	T									D	
56	M	41.29559°	-73.55658°	D	T						T	T	T			T						D	
57	A			D	S	T							S			T							D
57	B				T								T										
57	M	41.295689°	-73.556178°	S	S	T							S			T							S
58	A			D	S		S						T			T						D	T
58	B			D	S		S						T									D	
58	M	41.295832°	-73.555728°	D	S		S						T			T						D	T
59	A			D	S		S						S			T	T					D	T
59	B			D	S		S						S				T					D	T
59	M	41.296023°	-73.555282°	D	S		S						S			T	T					D	T
60	A			D	D	D							T				T						D
60	B			T	D	D							T				T						T
60	M	41.296293°	-73.555284°	M	D	D							T				T						M
61	A			D	M							M	T				M	T		D			T
61	B			D	M							M	T				M			D			T
61	M	41.296665°	-73.555226°	D	M							M	T				M	T		D			T
62	A			D	S							S	T	M		T		T		D			D
62	B			D	S							S	T	M						D			D
62	M	41.297036°	-73.555283°	D	S							S	T	M		T		T		D			D
63	A			D	M		T					M	T	D					T	D			S
63	B			D	M		T					M		D					T	D			S
63	M	41.297015°	-73.554944°	D	M		T					M	T	D					T	D			S
64	A			D	T		T					T	T	T		T				D			M
64	B			D	T		T						T	T						D			M
64	M	41.296658°	-73.554802°	D	T		T					T	T	T		T				D			M
65	A			D	M		S					M	T					T		T			D
65	B			D	M		S					M						T		T			D
65	M	41.296271°	-73.554613°	D	M		S					M	T					T		T			D
66	A				S								S										
66	B				S								S										
66	M	41.296637°	-73.555708°		S								S										
67	A			D	D	S						T					D	T					D
67	B			M	D	S						T					D	T					S
67	M	41.297023°	-73.55574°	D	D	S						T					D	T					M
68	A			D	T	T						T	T				T						D
68	B				S	T						T	S				T						
68	M	41.297017°	-73.556198°	S	S	T						T	S				T						S
69	A			S																	S		S
69	B			S																			S
69	M	41.297236°	-73.556589°	S																	T		S
70	A			S																			S
70	B			S																			S
70	M	41.29724°	-73.557132°	S																			S
71	A			M					S												S		M
71	B			M																			M
71	M	41.297543°	-73.557112°	M					T												T		M
72	A			D	T								T										D
72	B			D	T								T										D
72	M	41.297322°	-73.557719°	D	T								T										D
73	A			M																			M
73	B			T																			T
73	M	41.297258°	-73.558357°	S																			S

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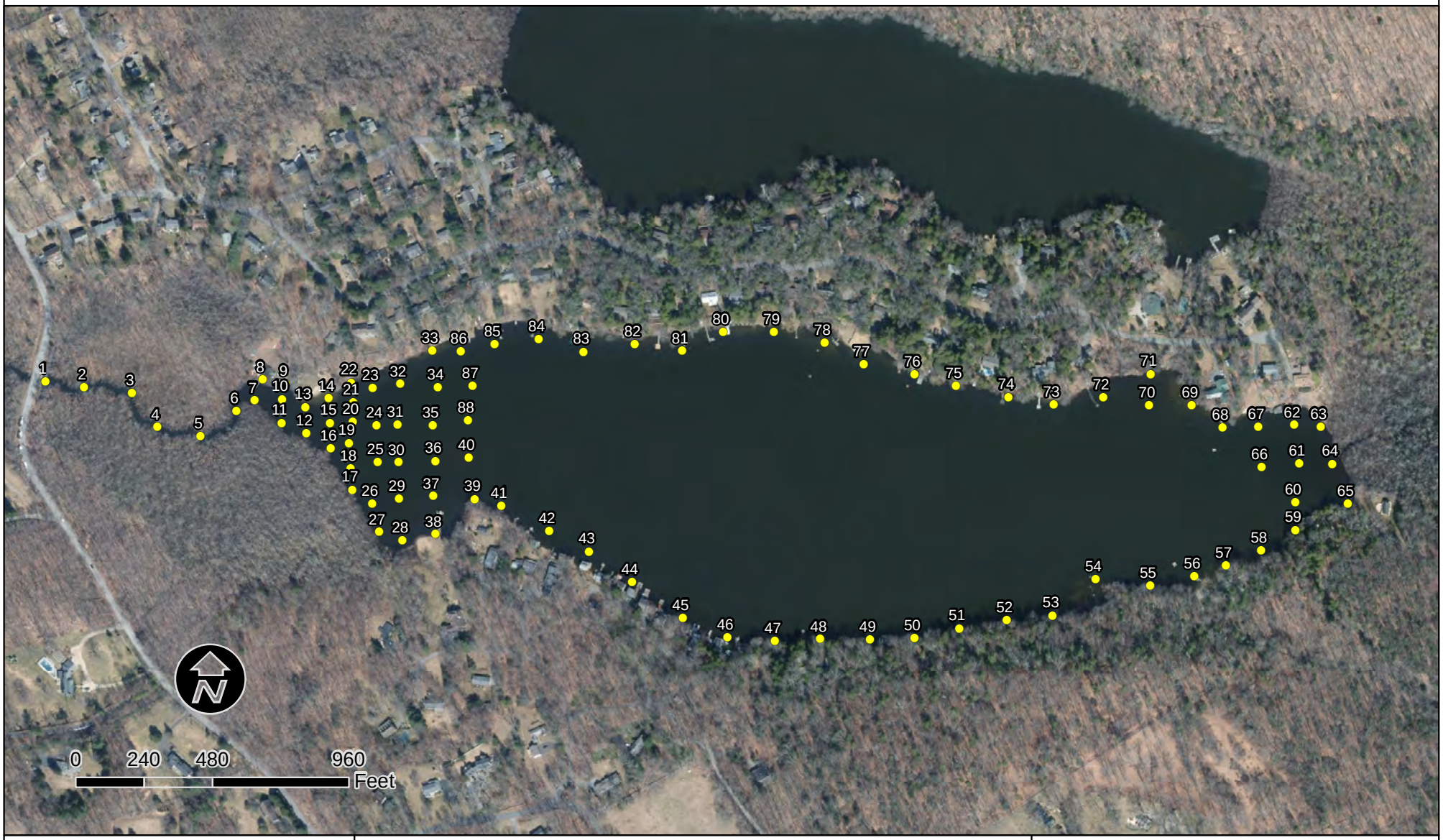
STATION	SAMPLE#	LAT (NAD83)	LONG (NAD83)	Total Floating Abundance	Total Submersed Abundance	Bassweed	Benthic Filamentous Algae	Bur-reed sp.	Cattail sp.	Clasping Leaf Pondweed	Common Waterweed	Coontail	Eurasian Water Milfoil	Floating Filamentous Algae	Mermaid Weed	Pickerel Weed	Robbin's Pondweed	Small Bladderwort	Small Duckweed	Spatterdock	Water Bulrush	Watershield	White Water Lily
74	A			M	T								T										M
74	B			T																			T
74	M	41.297336°	-73.558928°	S	T								T										S
75	A			S	S								S			T							S
75	B																						
75	M	41.297448°	-73.559598°	T	T								T			T							T
76	A			D	M								M			T					T		D
76	B				T								T										
76	M	41.297562°	-73.560125°	S	S								S			T					T		S
77	A			D	S								S										D
77	B				T								T										
77	M	41.297667°	-73.560772°	S	S								S										S
78	A			S	T												T						S
78	B			S	T												T						S
78	M	41.297877°	-73.561273°	S	T												T						S
79	A			M	T		T							T								T	M
79	B			M	T		T							T								T	M
79	M	41.297987°	-73.561918°	M	T		T							T								T	M
80	A			M	T												T				T		M
80	B			M	T												T						M
80	M	41.297993°	-73.562568°	M	T												T				T		M
81	A			M	S	S							S										M
81	B			T	S	S							S										T
81	M	41.297813°	-73.563087°	S	S	S							S										S
82	A			M																			M
82	B			S																			S
82	M	41.297885°	-73.563692°	M																			M
83	A			S	M	S							M				T						S
83	B			S	S	T							S				T						S
83	M	41.297815°	-73.564353°	S	M	S							M				T						S
84	A			D	S	S							T				T					S	D
84	B			D	S	S							T										D
84	M	41.29794°	-73.564921°	D	S	S							T				T					T	D
85	A			M	T	T	T						T	T									M
85	B			M	T	T	T						T	T									M
85	M	41.297898°	-73.565486°	M	T	T	T						T	T									M
86	A			S	S							T	S				T						S
86	B			S	S							T	S				T						S
86	M	41.297833°	-73.565914°	S	S							T	S				T						S
87	A																						
87	B																						
87	M	41.297497°	-73.565769°																				
88	A																						
88	B																						
88	M	41.297167°	-73.565834°																				

SAMPLE POINT LOCATION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Sample Point

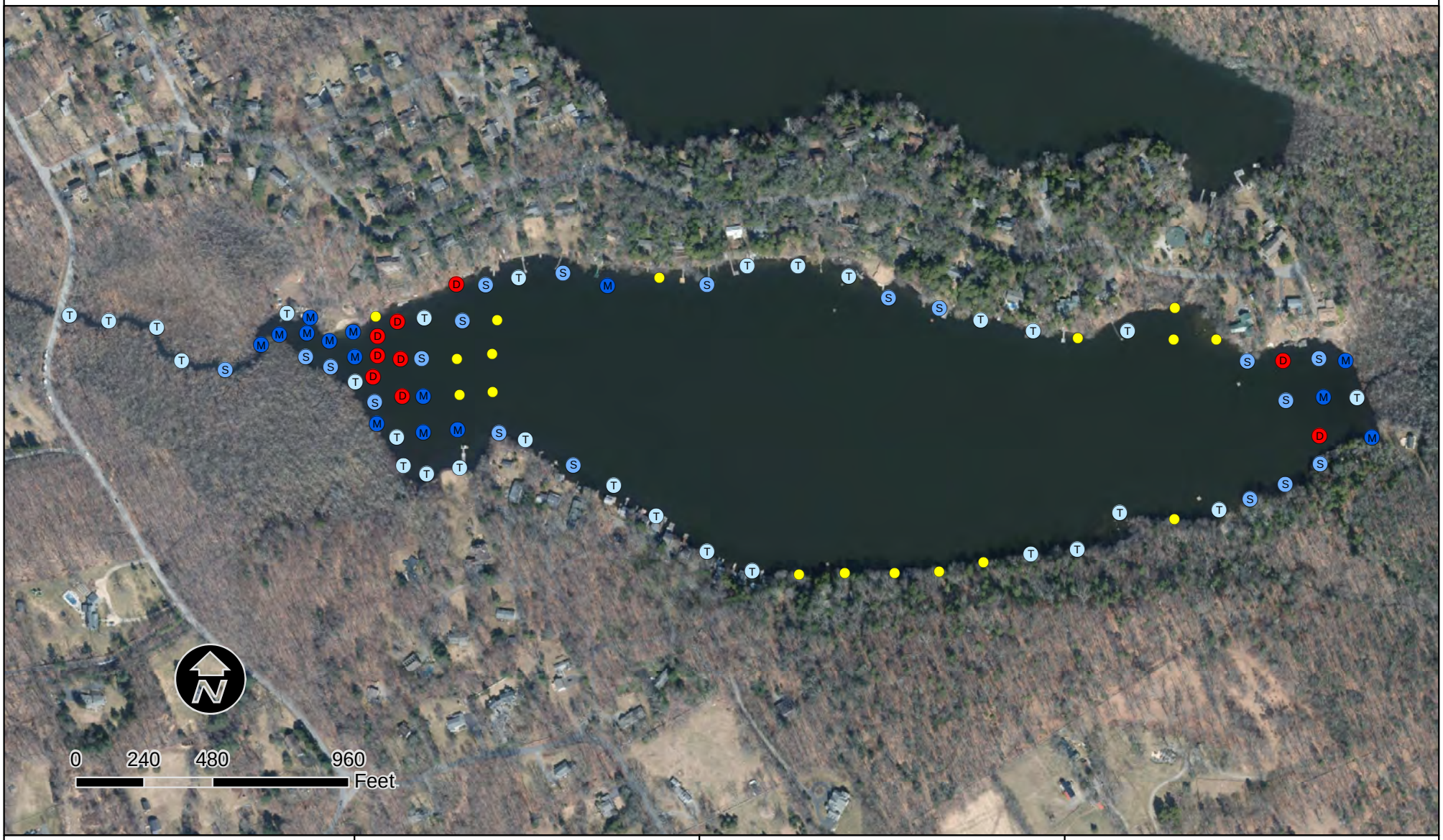
SOLITUDE LAKE MANAGEMENT

888.480.5253
www.solitudelakemanagement.com

Prepared by: KM

Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

TOTAL SUBMERSED VEGETATION ABUNDANCE



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	71	81%
Trace	28	39%
Sparse	19	27%
Medium	15	21%
Dense	9	13%

SOLITUDE LAKE MANAGEMENT
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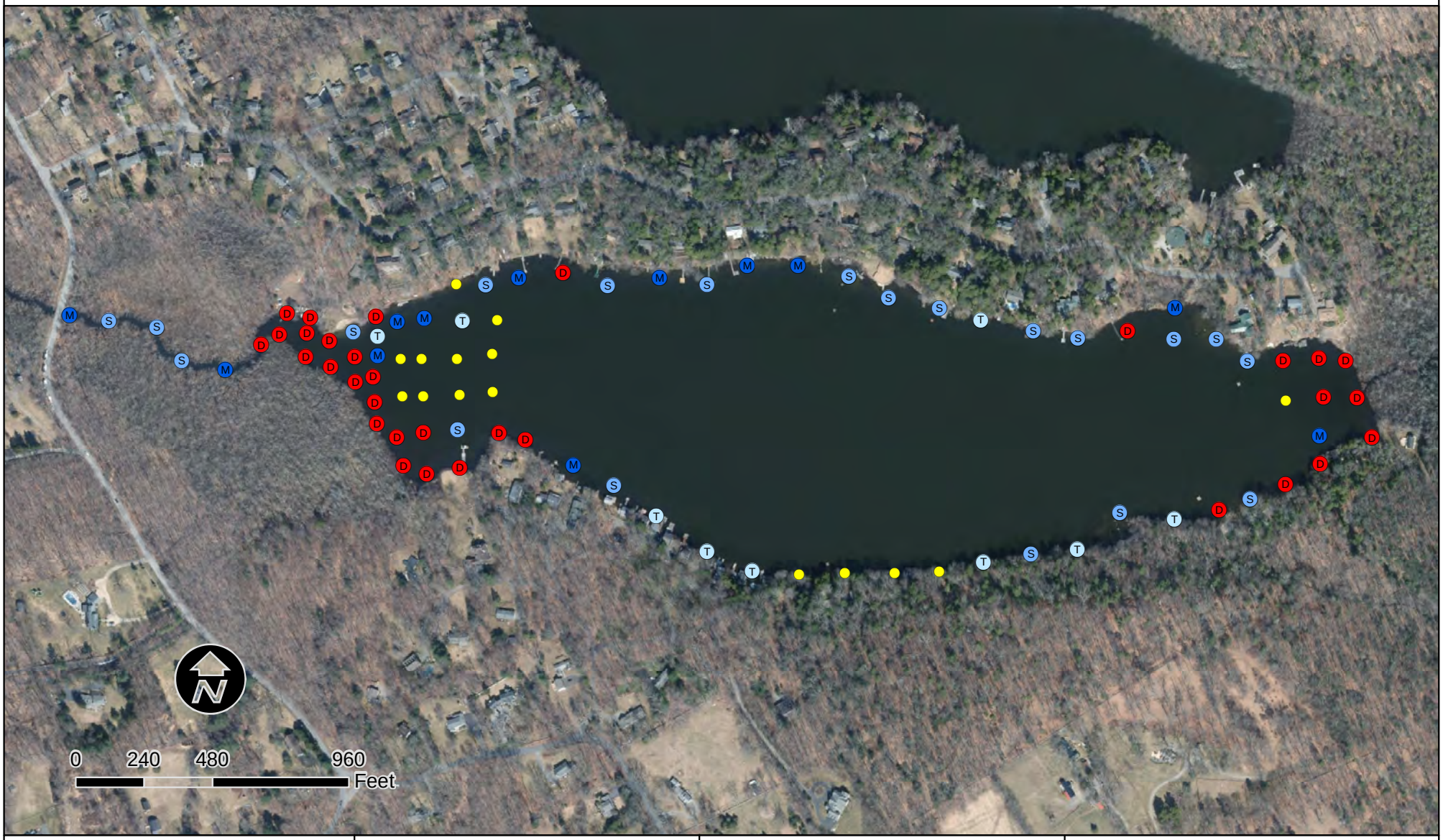
TOTAL FLOATING VEGETATION ABUNDANCE



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	73	83%
Trace	9	12%
Sparse	20	27%
Medium	12	16%
Dense	32	44%

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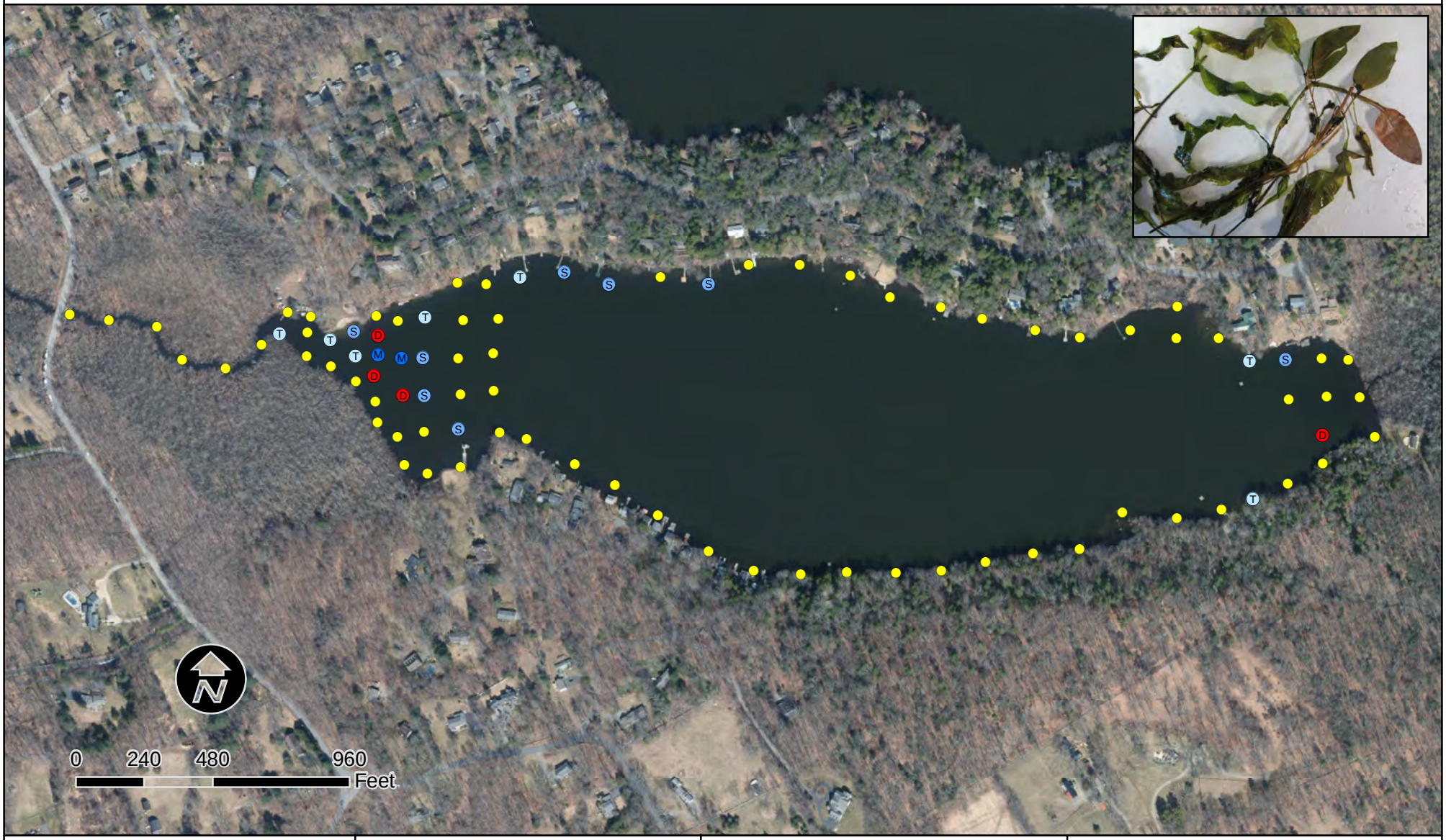
BASSWEED (*Potamogeton amplifolius*)
DISTRIBUTION



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Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	21	24%
Trace	7	33%
Sparse	8	38%
Medium	2	10%
Dense	4	19%

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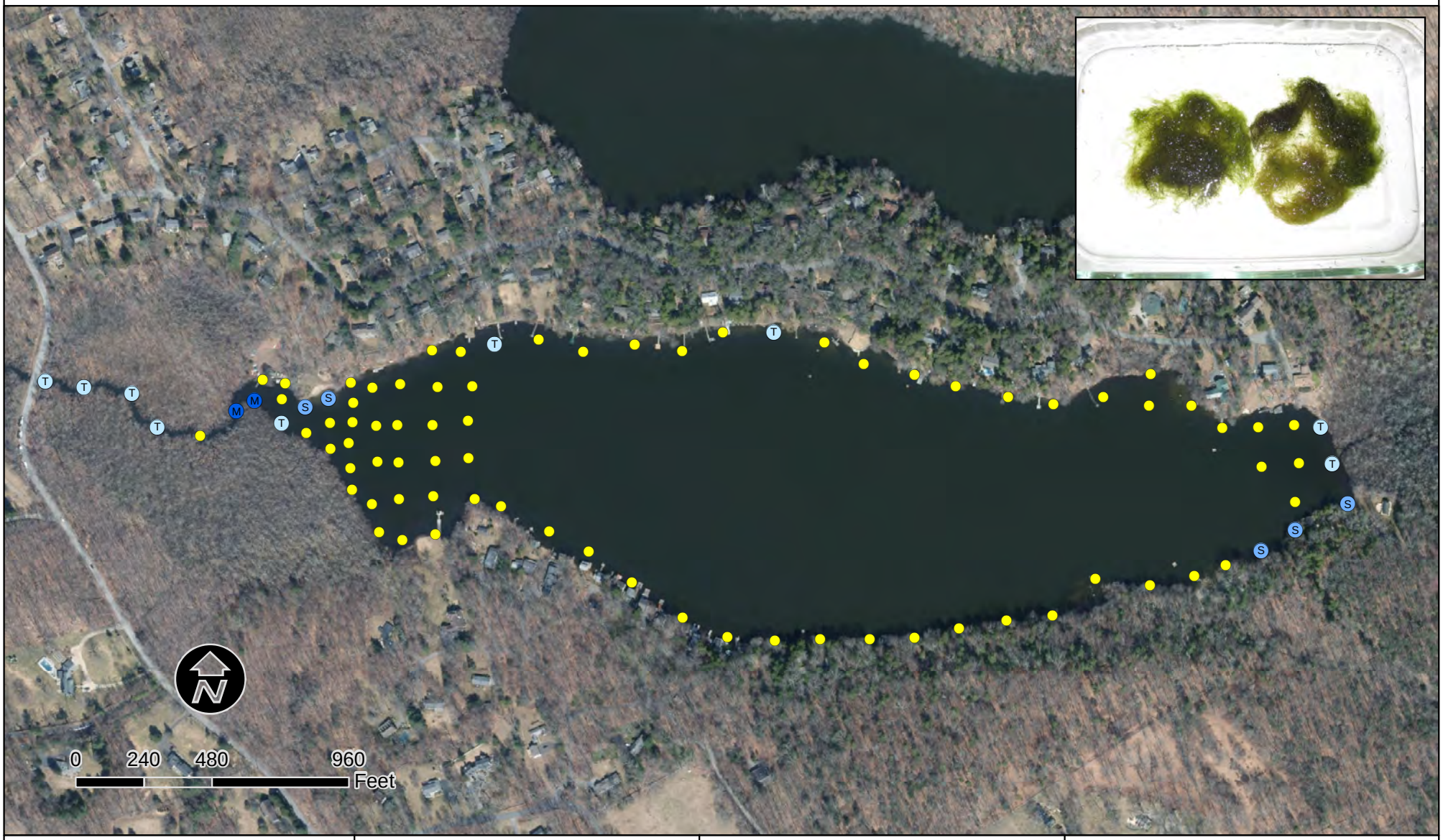
BENTHIC FILAMENTOUS ALGAE DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	16	18%
Trace	9	56%
Sparse	5	31%
Medium	2	13%
Dense	0	0%

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BUR-REED (*Sparganium* sp.)
DISTRIBUTION

Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	1	1%
Trace	0	0%
Sparse	1	100%
Medium	0	0%
Dense	0	0%

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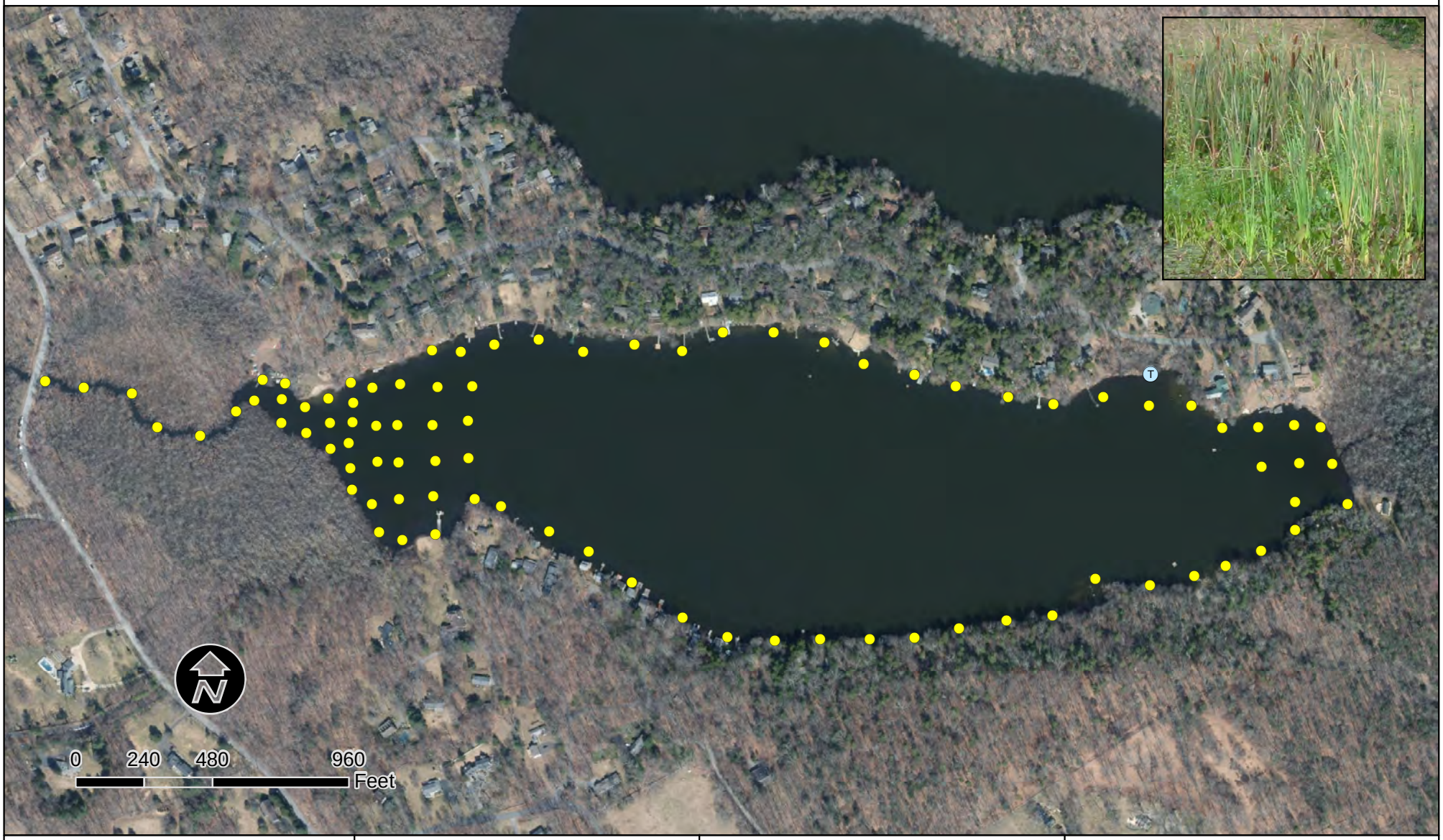
CATTAIL (*Typha* sp.) DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	1	1%
Trace	1	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

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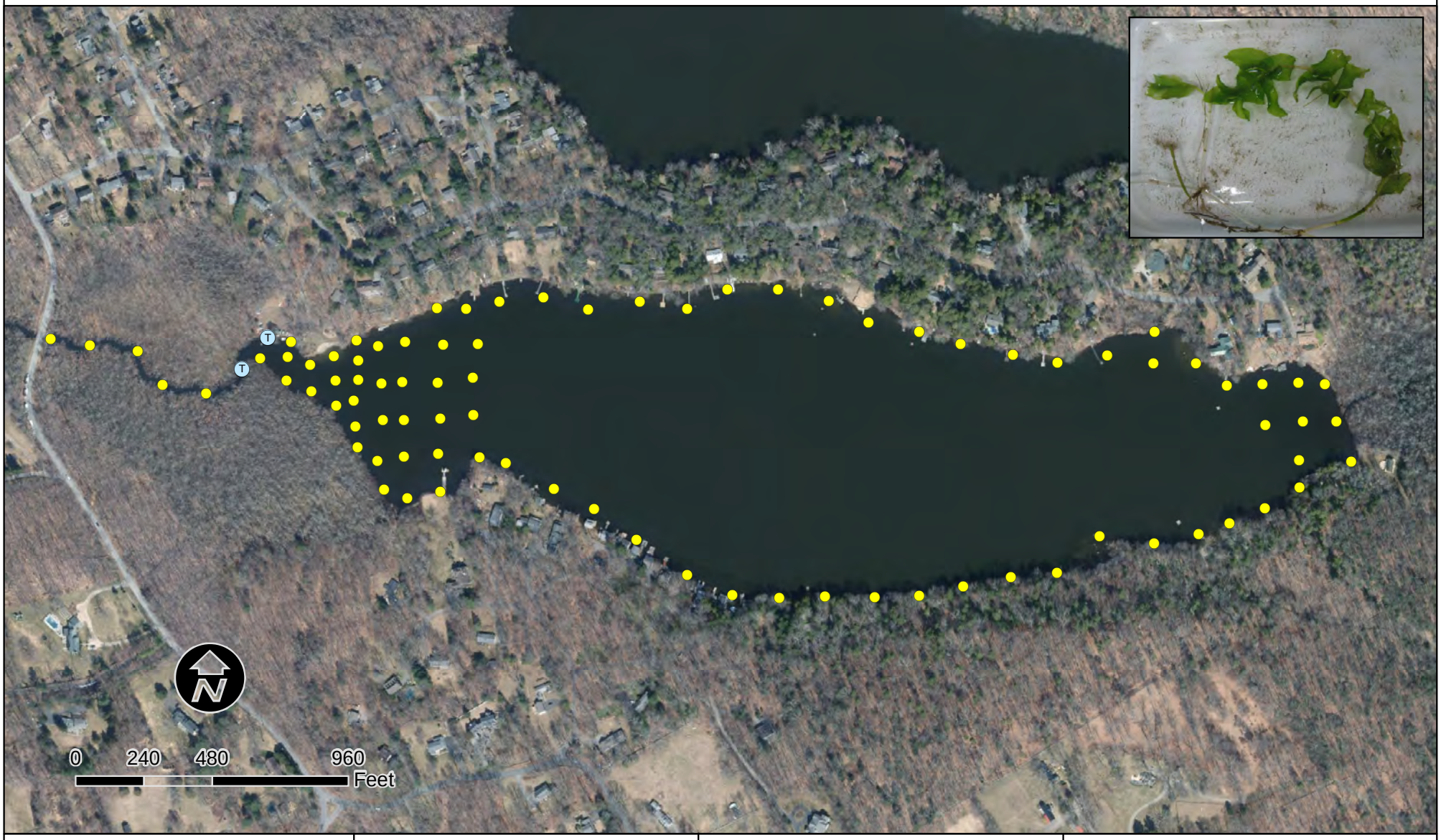
CLASPING-LEAF PONDWEED (*Potamogeton richardsonii*) DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	2	2%
Trace	2	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

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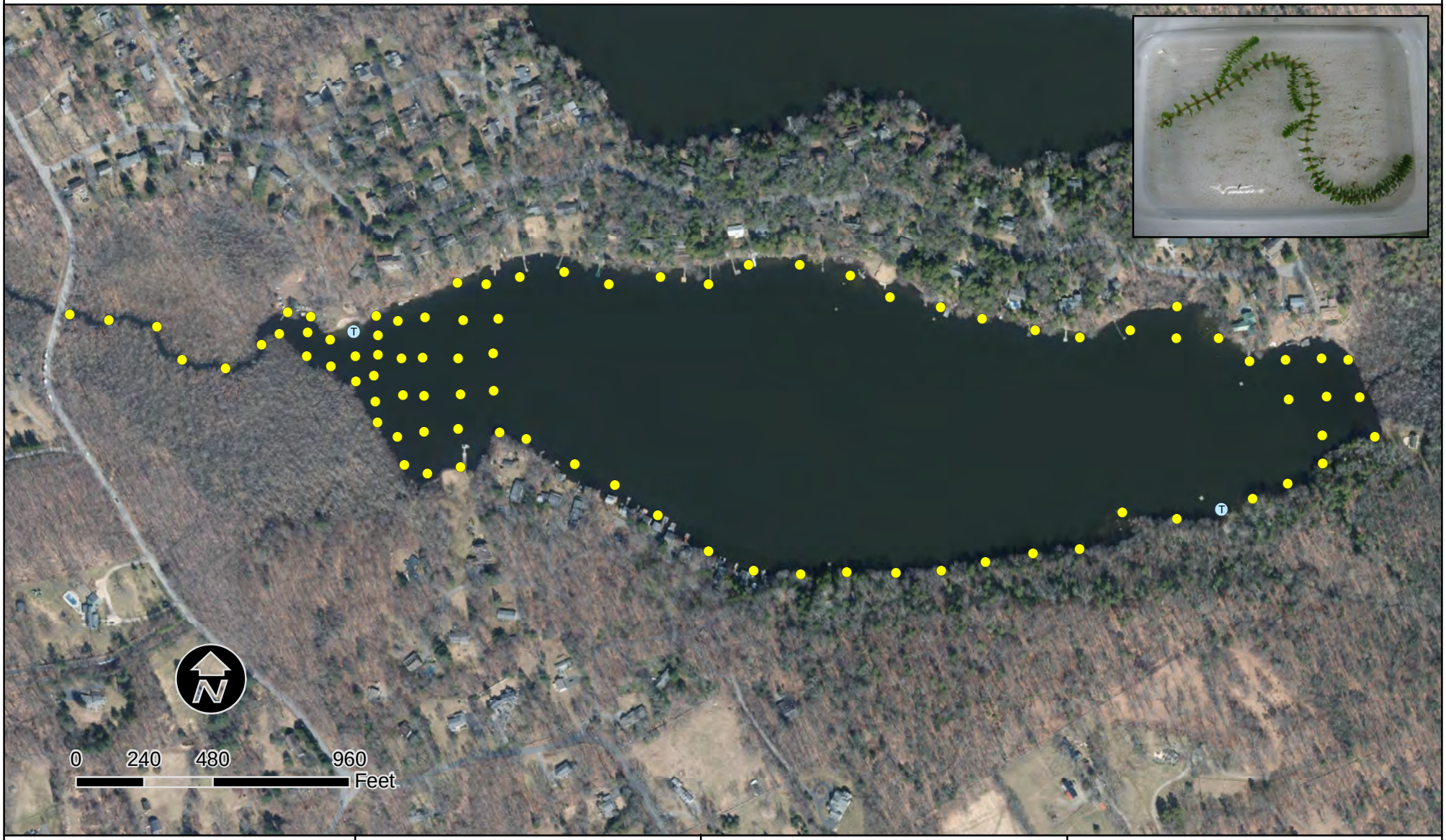
COMMON WATERWEED (*Elodea canadensis*) DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	2	2%
Trace	2	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

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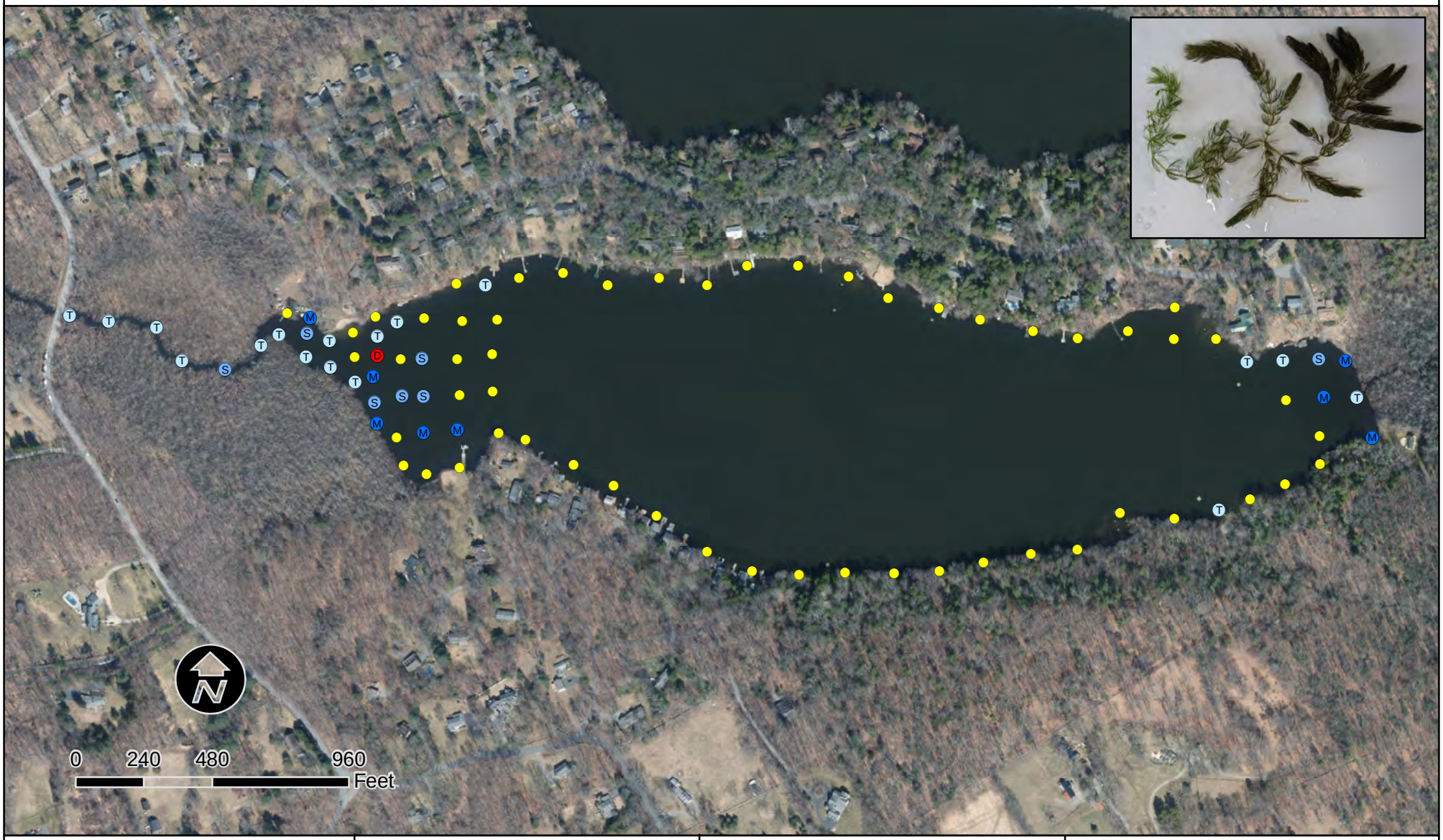
COONTAIL (*Ceratophyllum demersum*) DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	33	38%
Trace	17	52%
Sparse	7	21%
Medium	8	24%
Dense	1	3%

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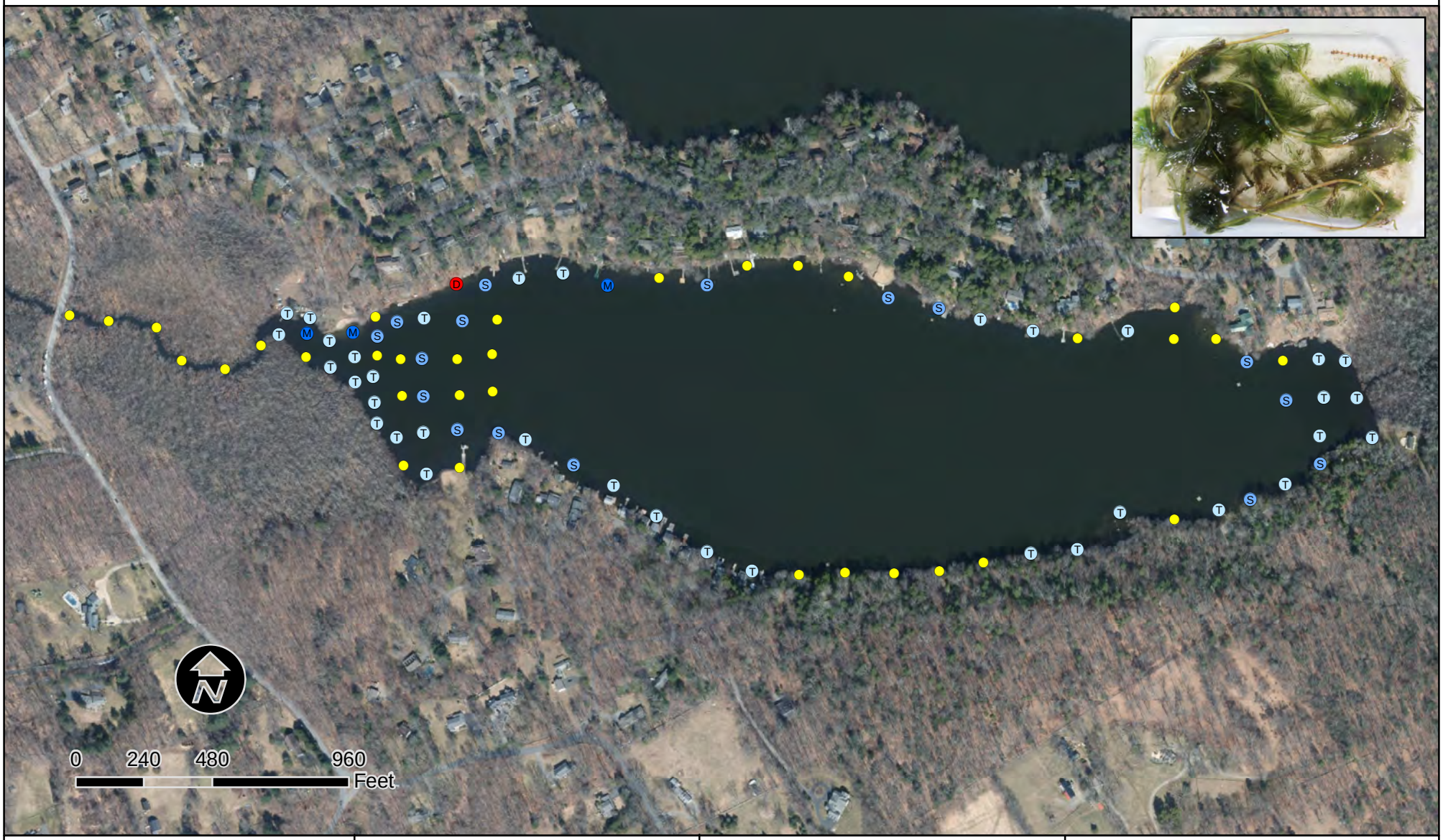
EURASIAN WATER MILFOIL (*Myriophyllum spicatum*) DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	55	63%
Trace	35	64%
Sparse	16	29%
Medium	3	5%
Dense	1	2%

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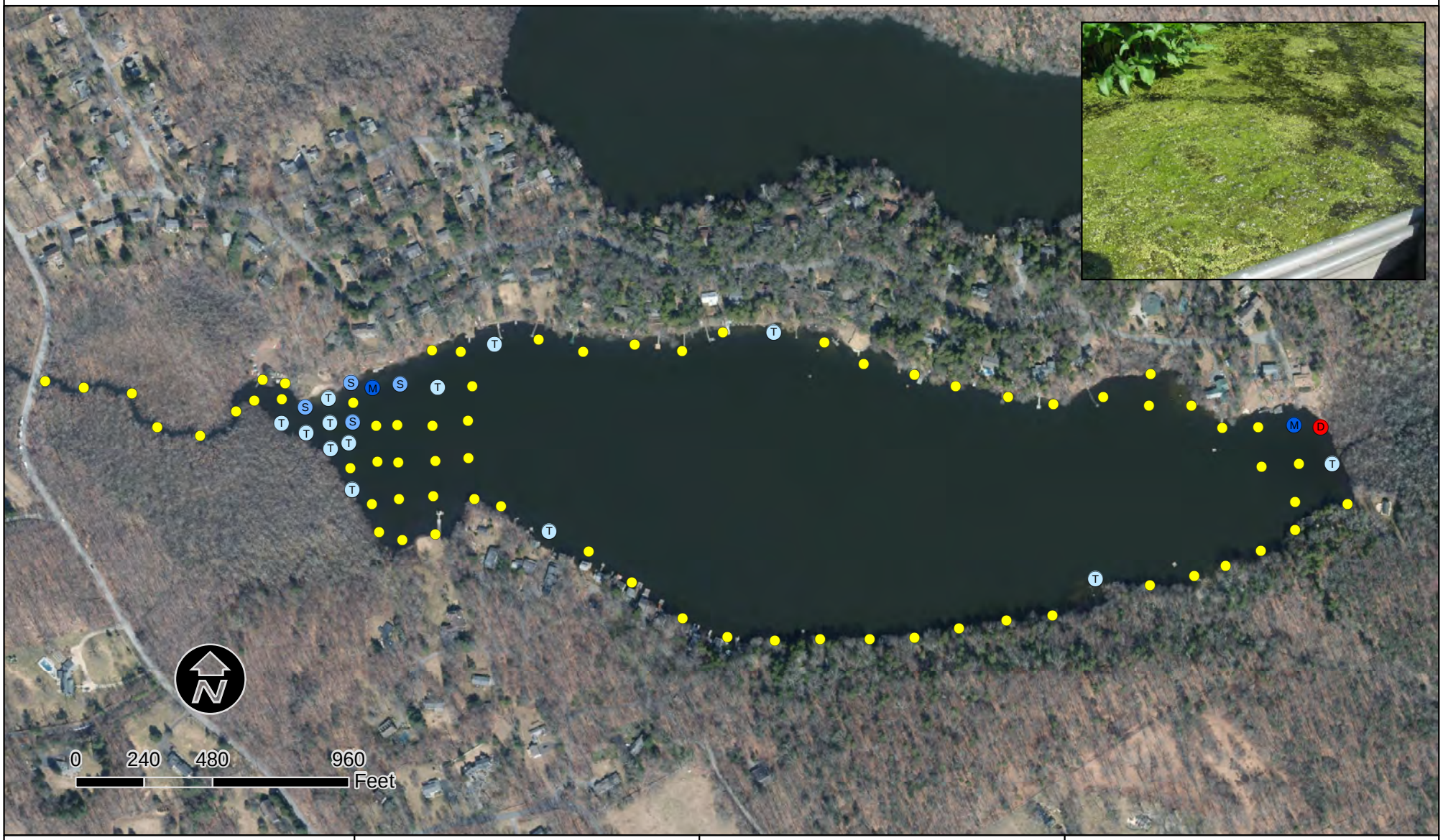
FLOATING FILAMENTOUS ALGAE DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	20	23%
Trace	13	65%
Sparse	4	20%
Medium	2	10%
Dense	1	5%

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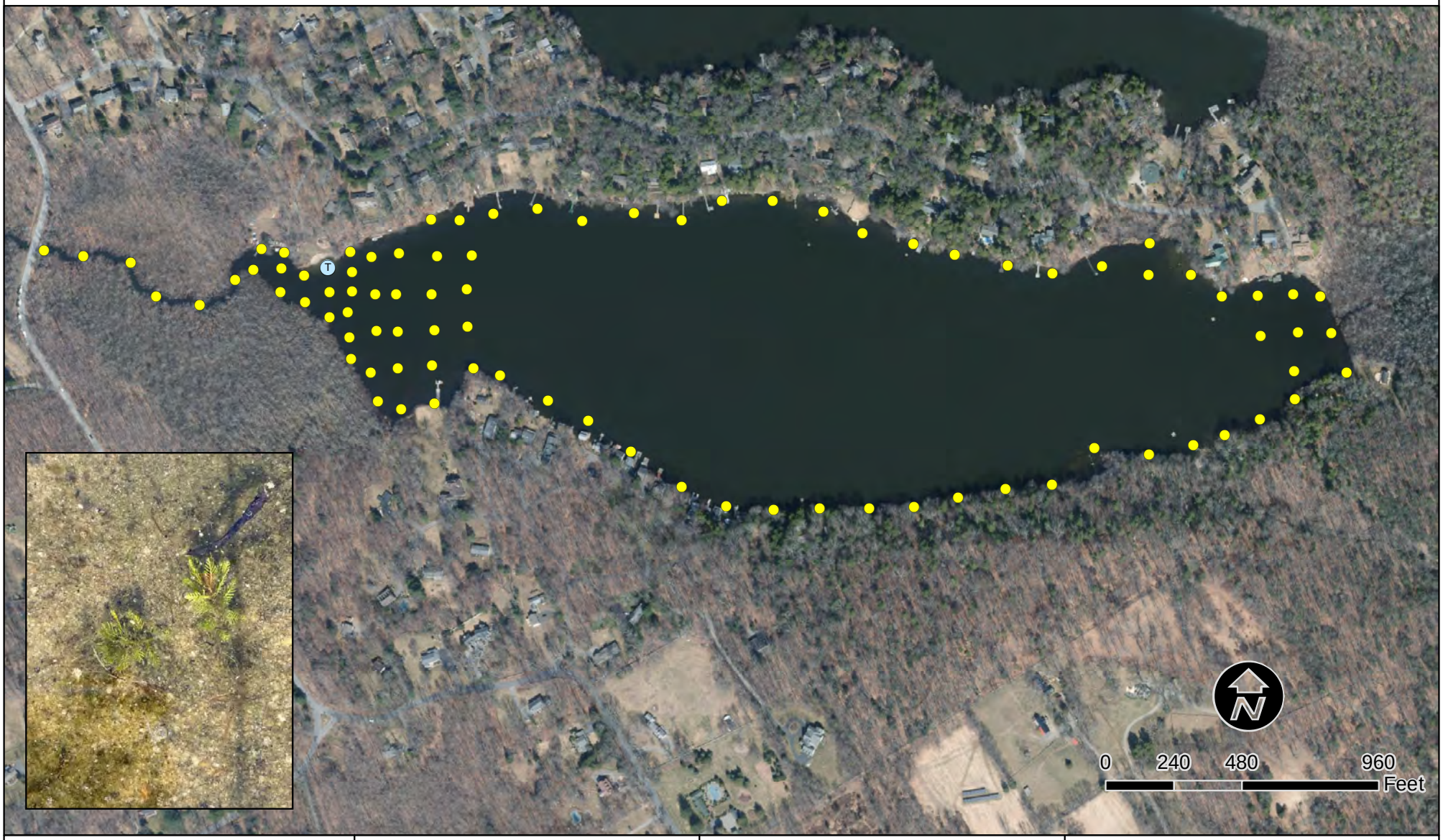
MERMAID WEED (*Proserpinaca pectinata*) DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	1	1%
Trace	1	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

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PICKEREL WEED (*Pontederia cordata*)
DISTRIBUTION

Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	16	18%
Trace	16	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

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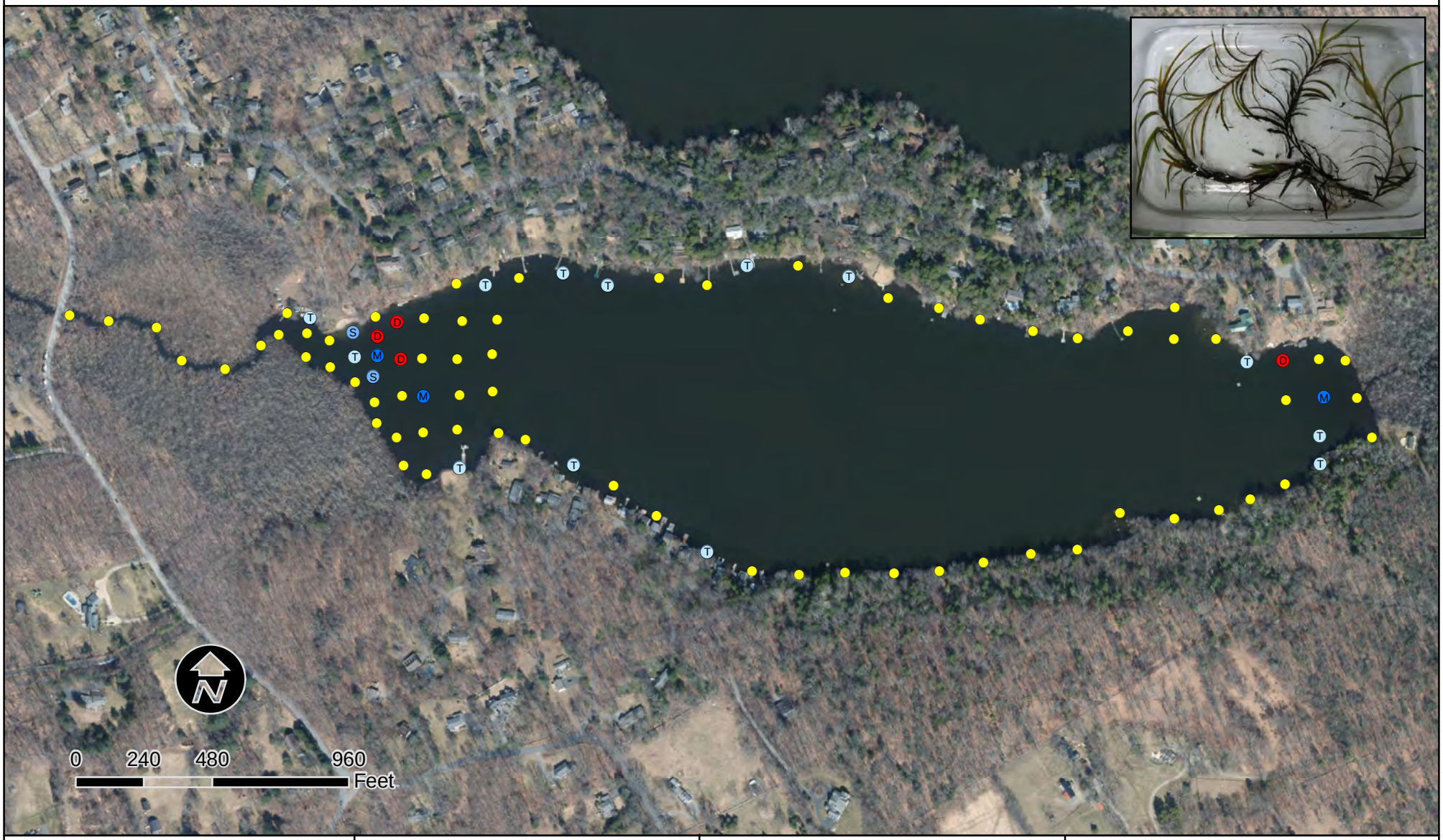
ROBBIN'S PONDWEED (*Potamogeton robbinsii*) DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	22	25%
Trace	13	59%
Sparse	2	9%
Medium	3	14%
Dense	4	18%

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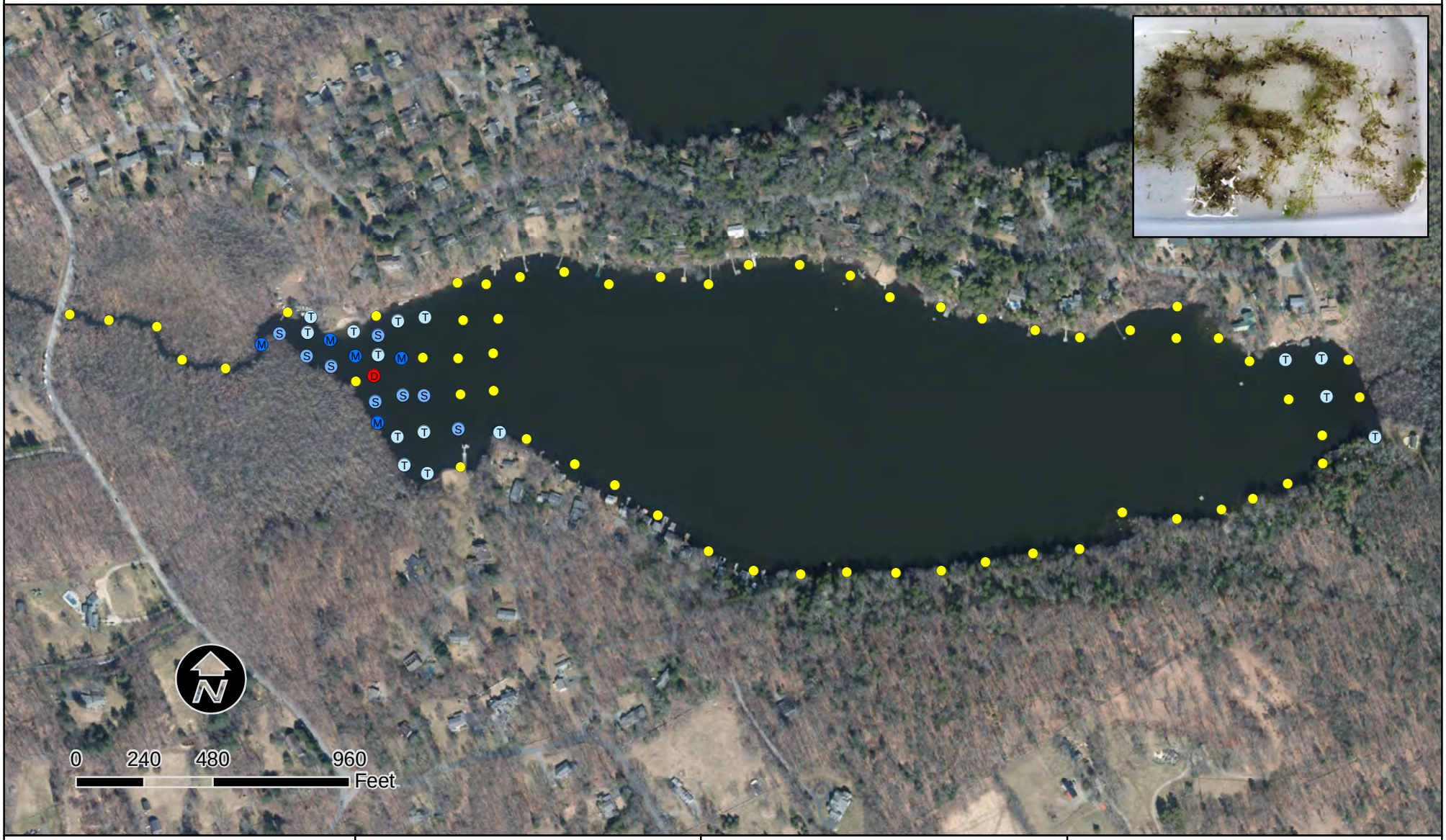
SMALL BLADDERWORT (*Utricularia minor*) DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	29	33%
Trace	15	52%
Sparse	8	28%
Medium	5	17%
Dense	1	3%

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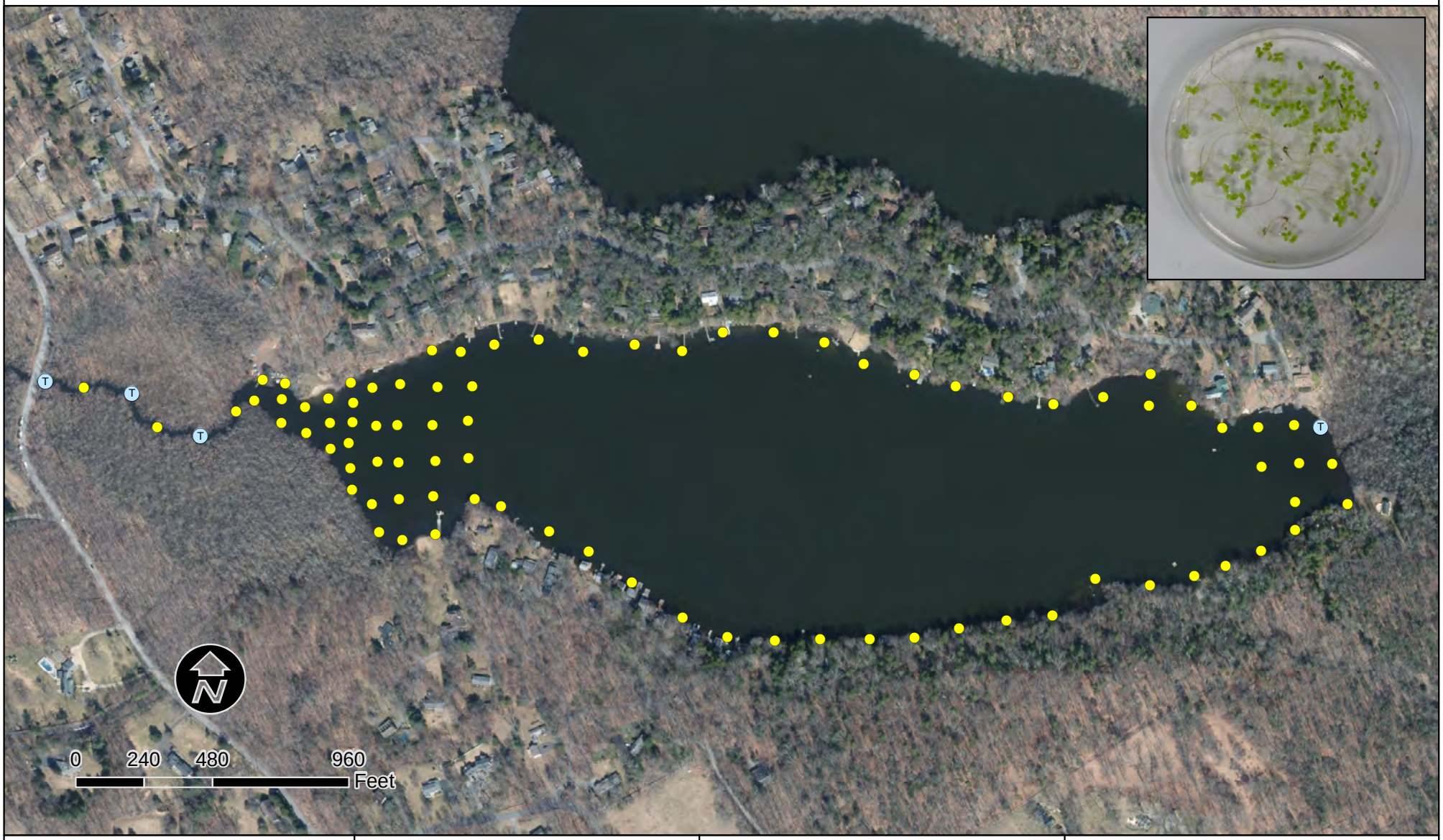
SMALL DUCKWEED (*Lemna minor*) DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	4	5%
Trace	4	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

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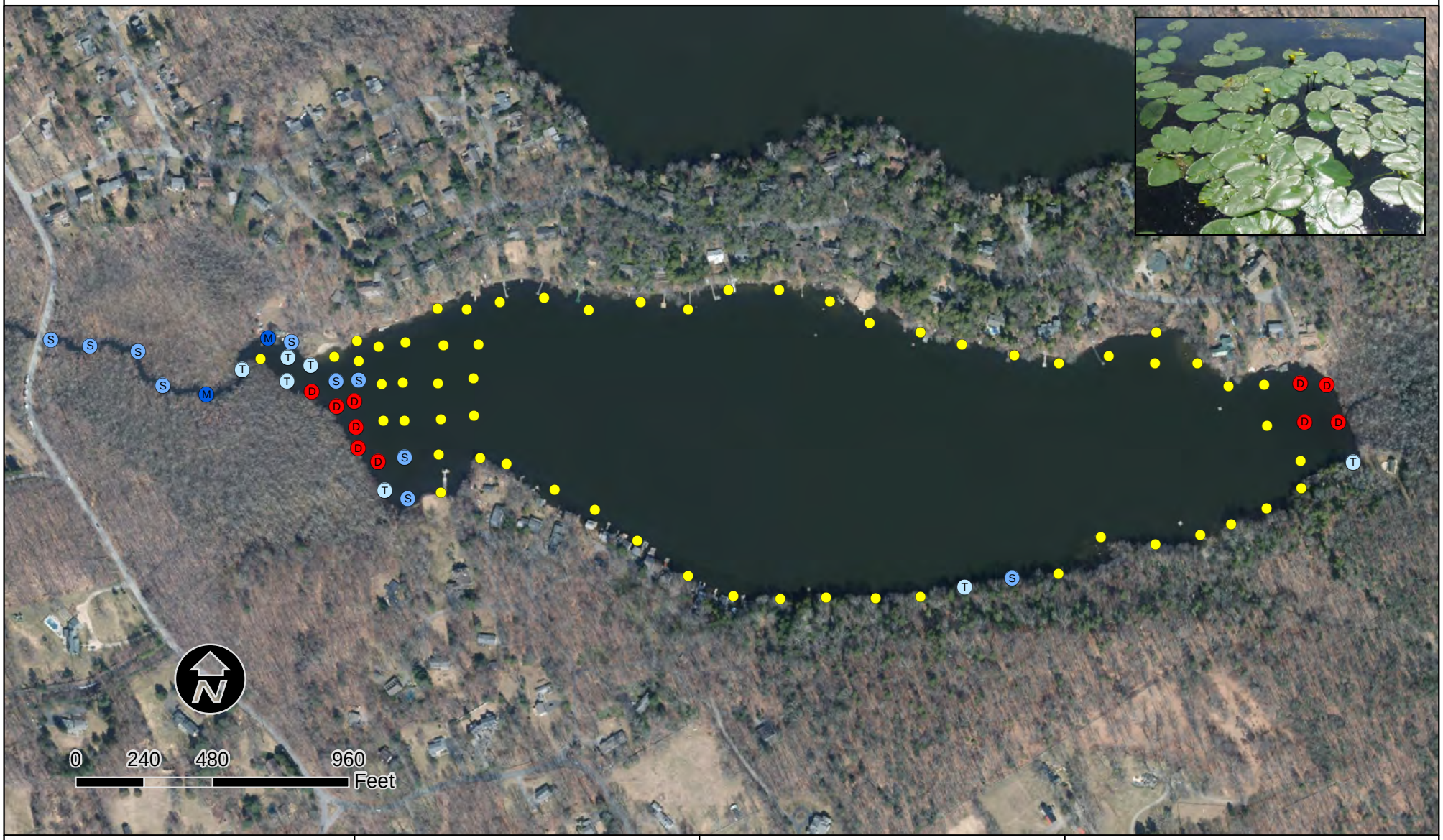
SPATTERDOCK (*Nuphar variegata*) DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	29	33%
Trace	7	24%
Sparse	10	34%
Medium	2	7%
Dense	10	34%

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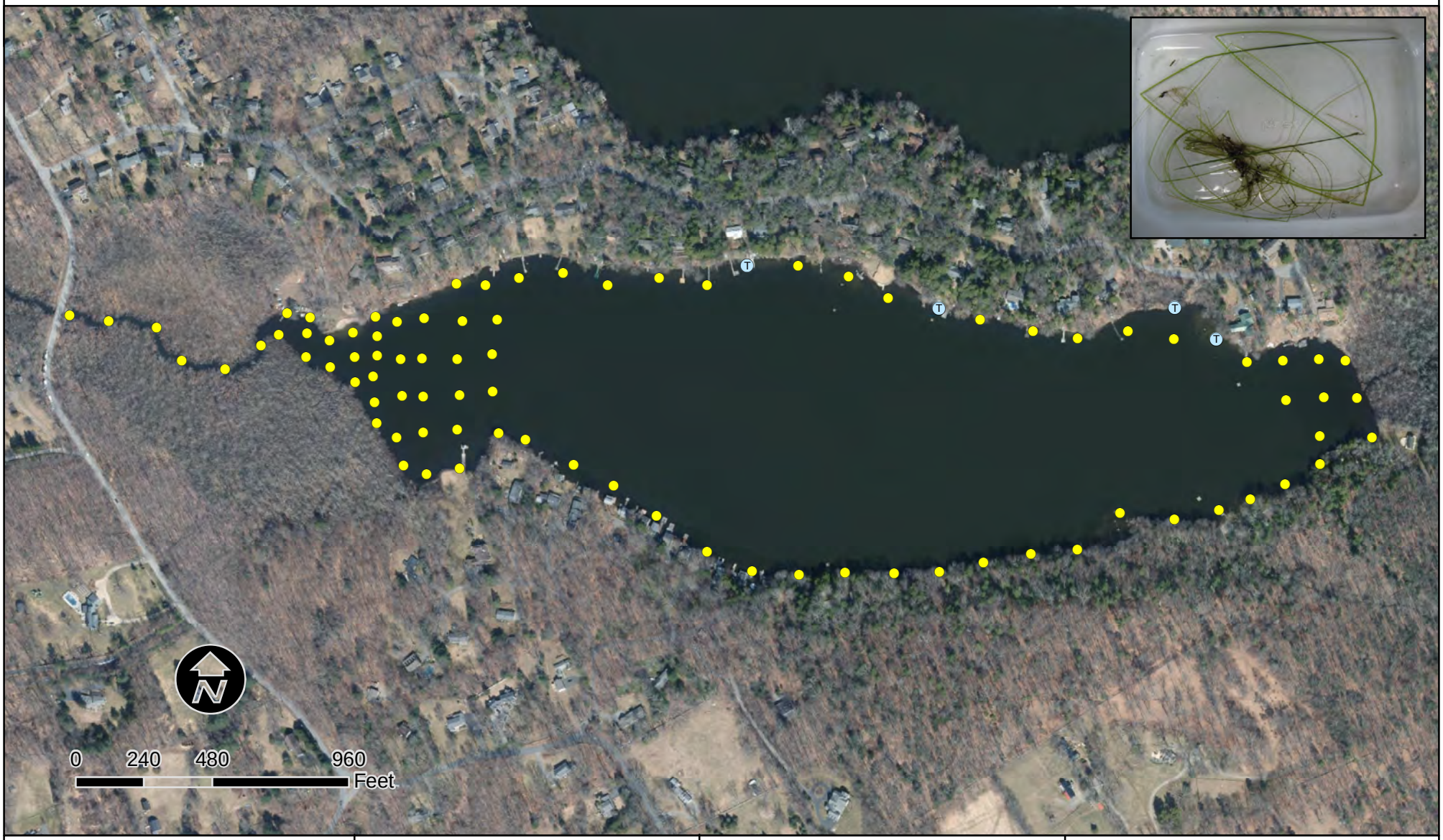
WATER BULRUSH (*Scirpus subterminglis*) DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	4	5%
Trace	4	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

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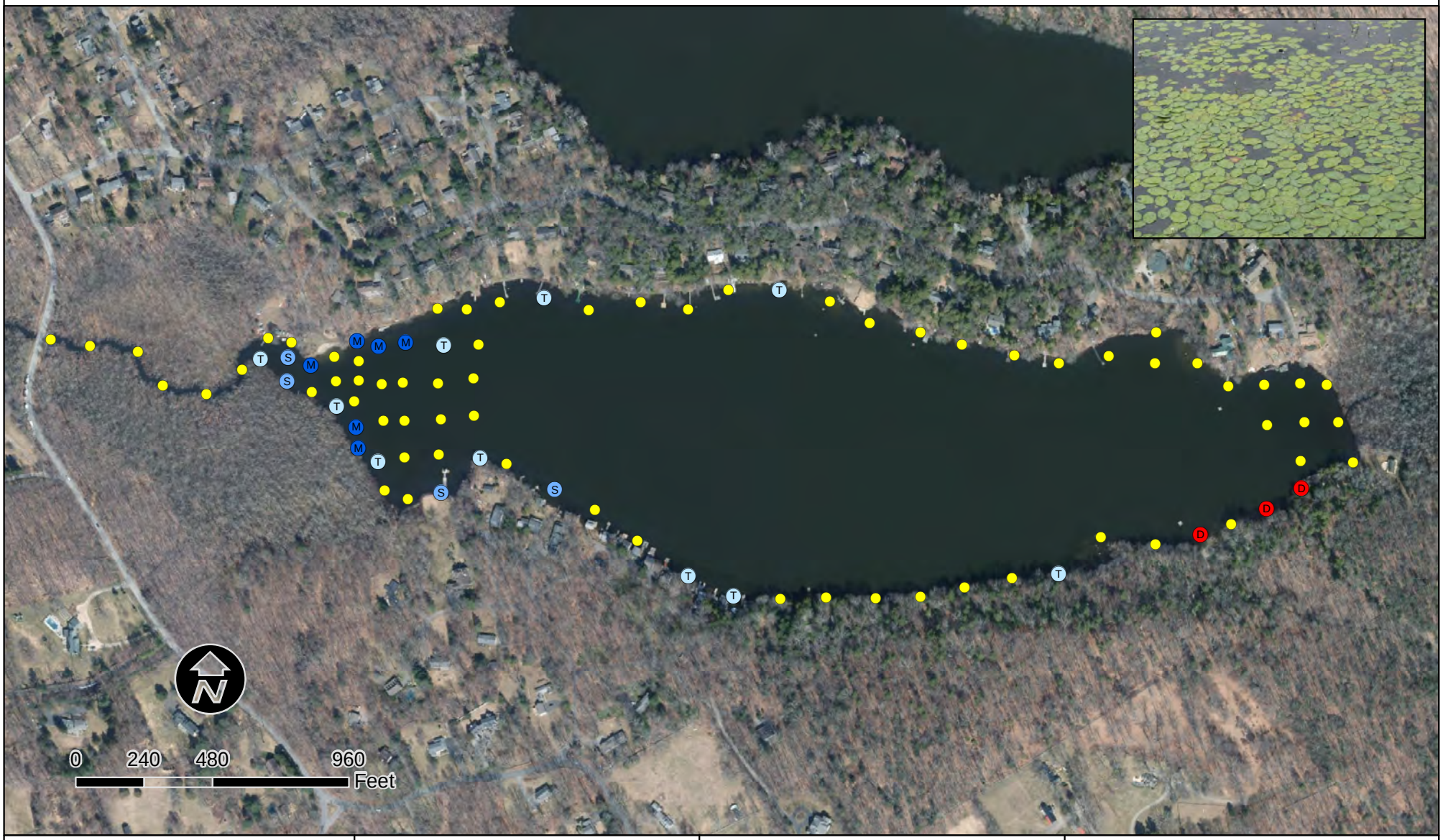
WATERSHIELD (*Brasenia schreberi*) DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	23	26%
Trace	10	43%
Sparse	4	17%
Medium	6	26%
Dense	3	13%

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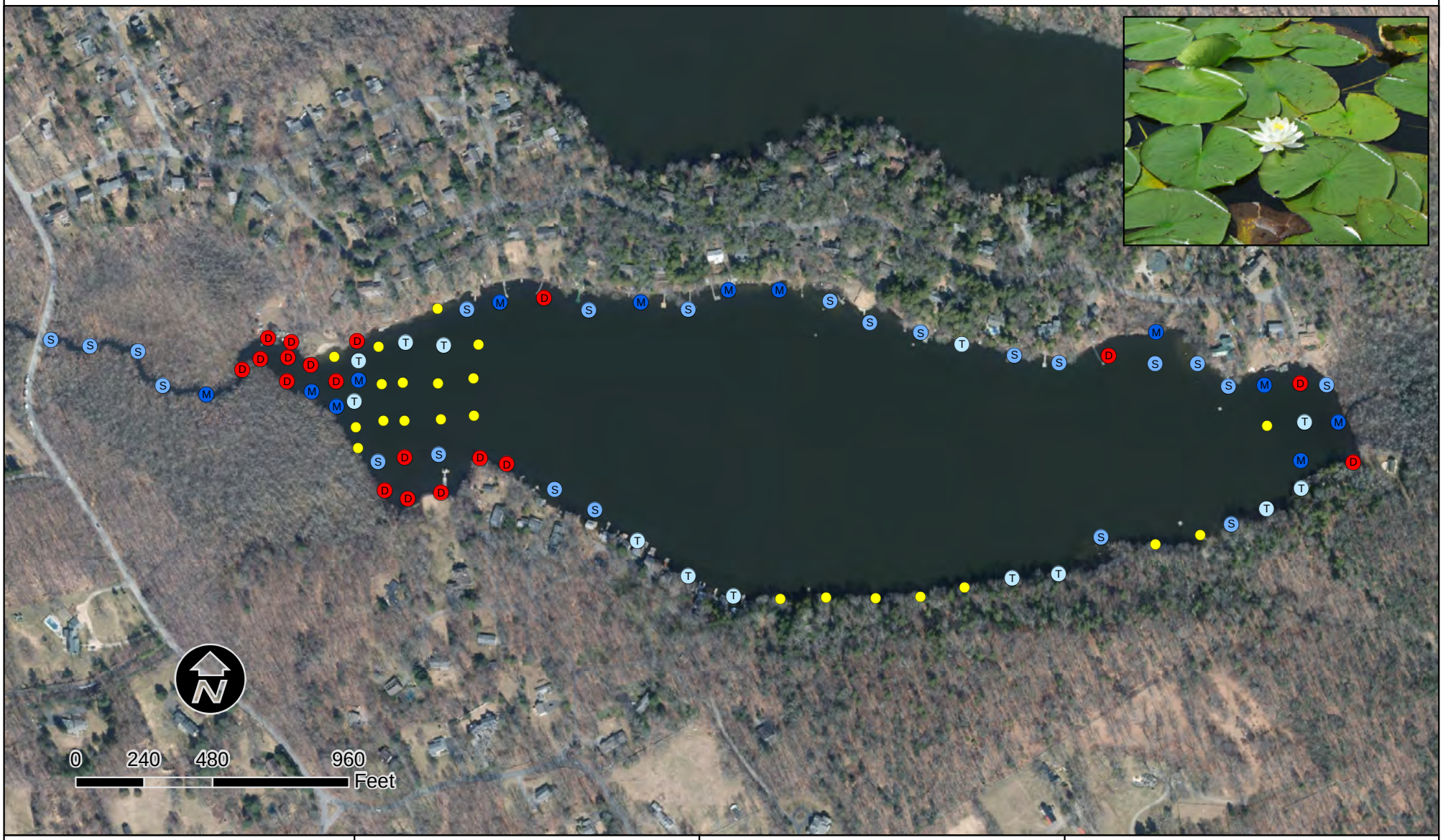
WHITE WATER LILY (*Nymphaea odorata*) DISTRIBUTION



Lake Oscaleta
Aquatic Vegetation Survey
July 21, 2022

Total Sample Sites: 88

Plant Density Legend

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	66	75%
Trace	13	20%
Sparse	22	33%
Medium	12	18%
Dense	19	29%

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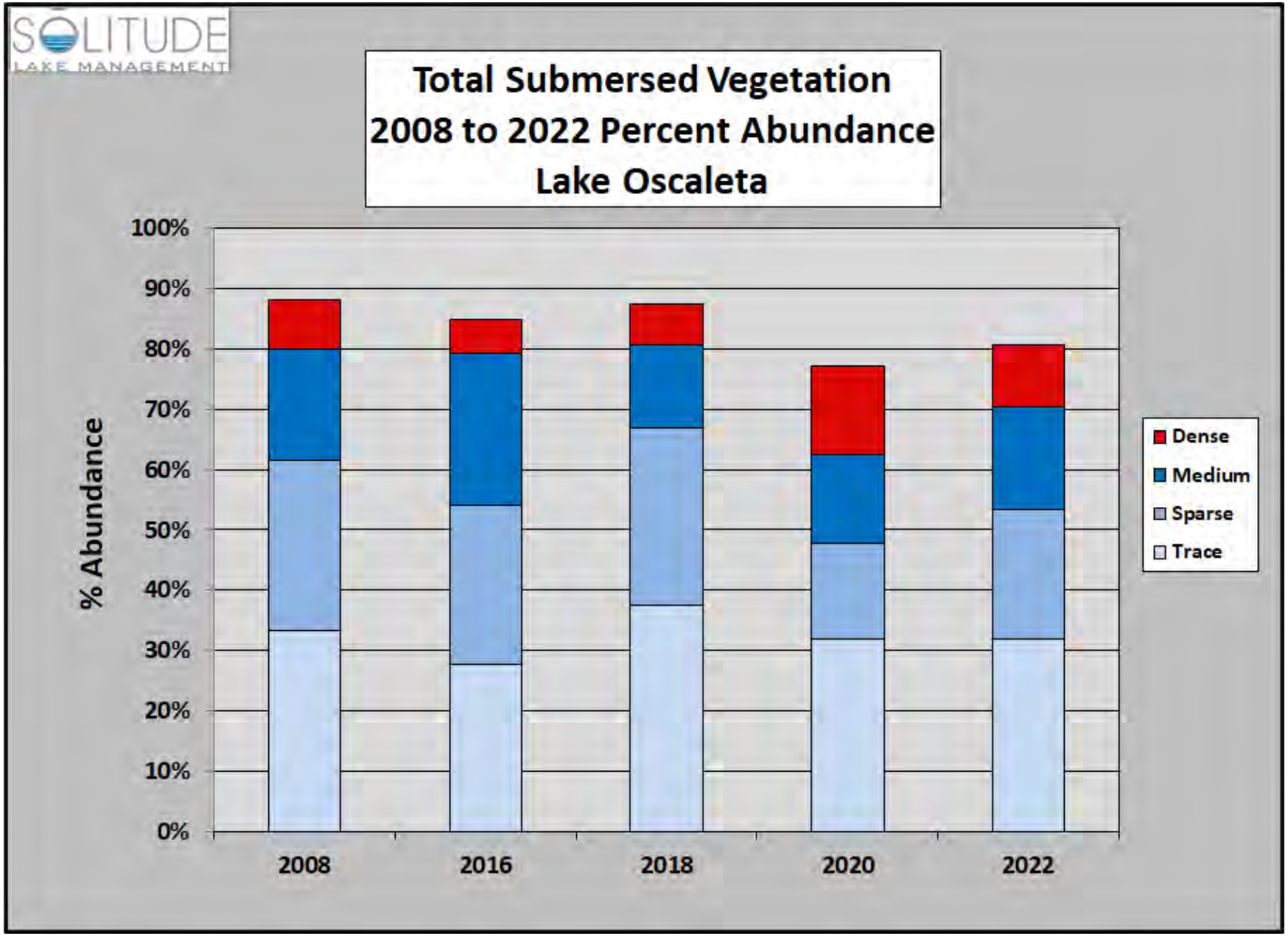
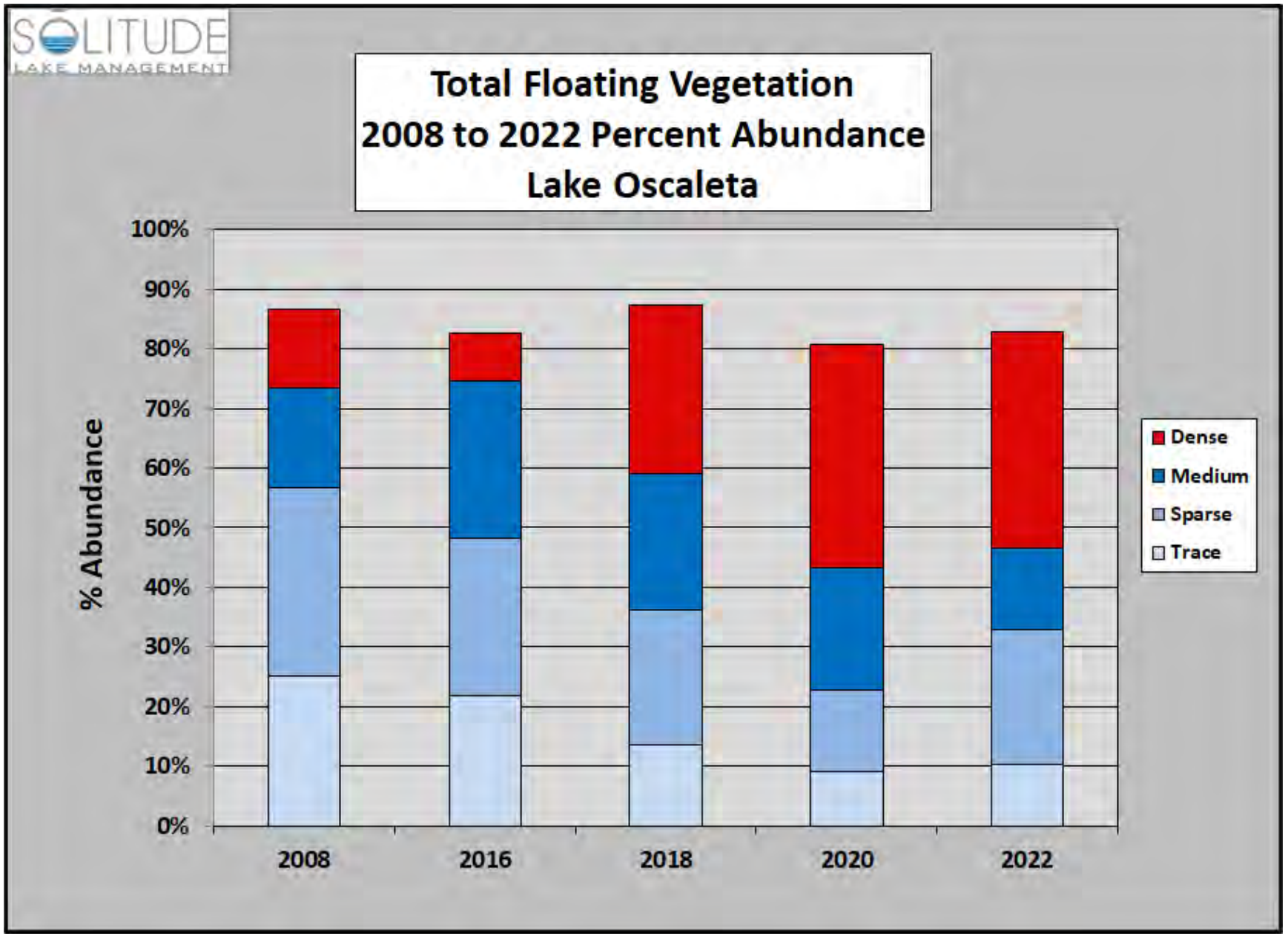
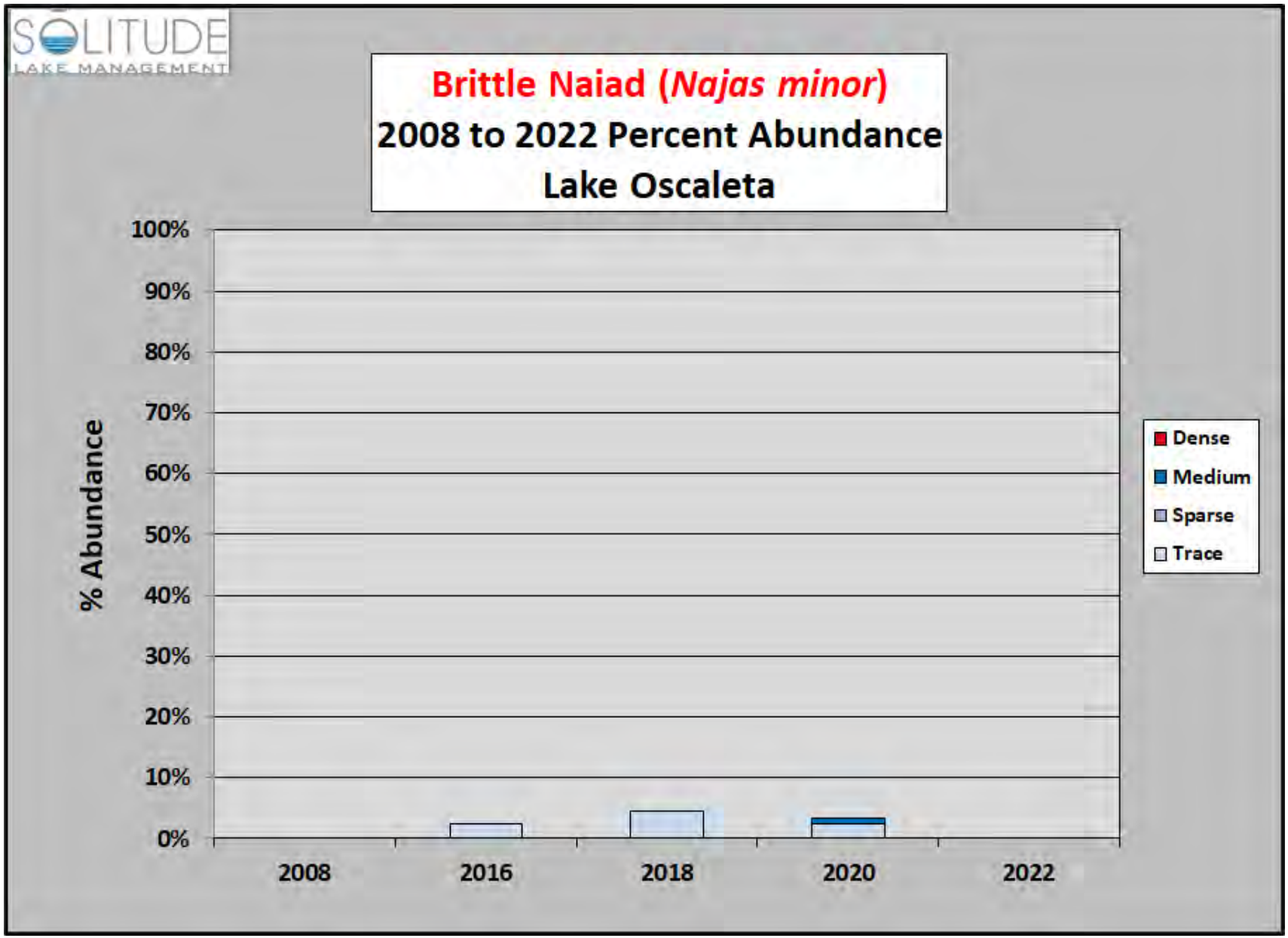
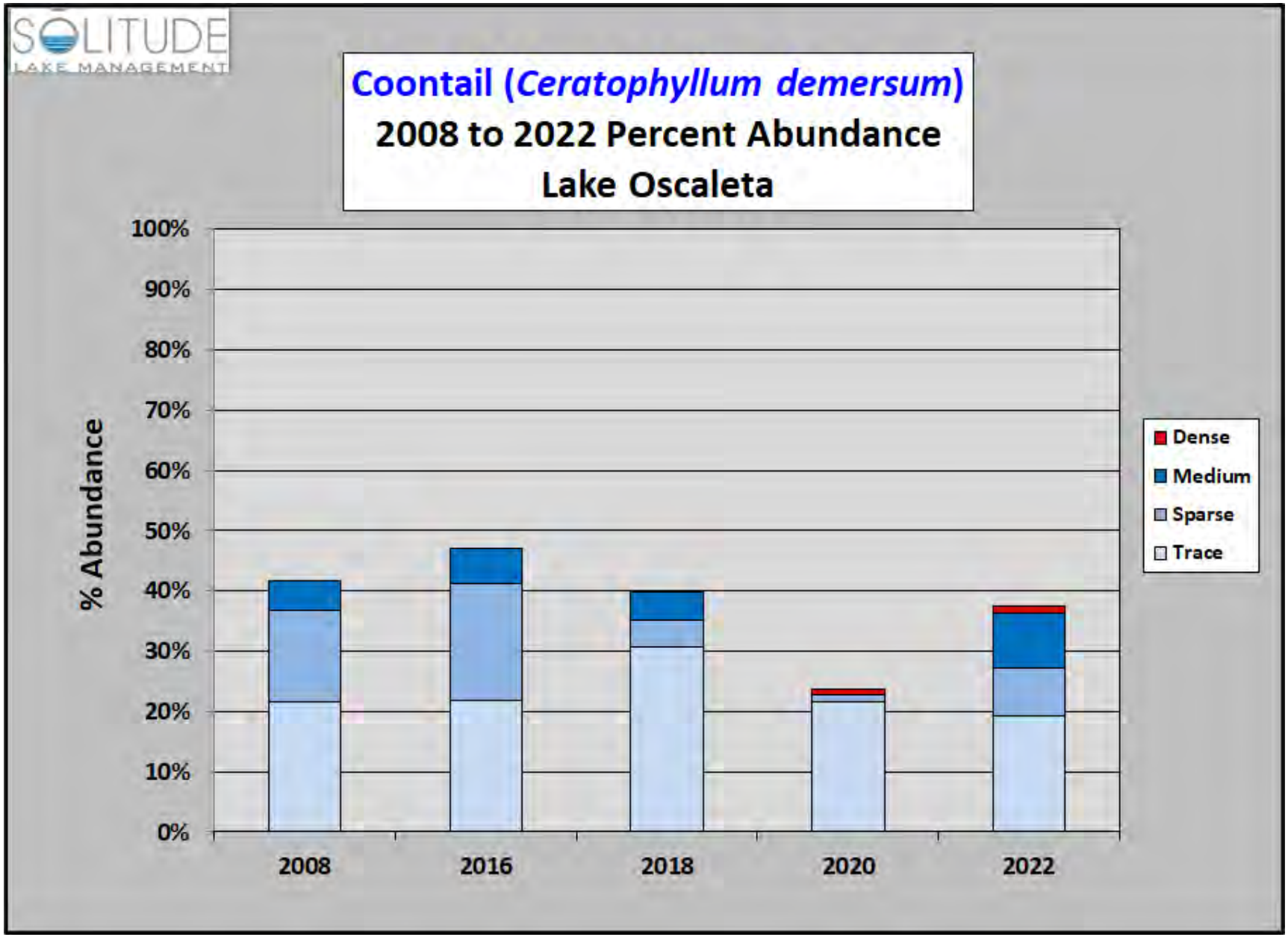
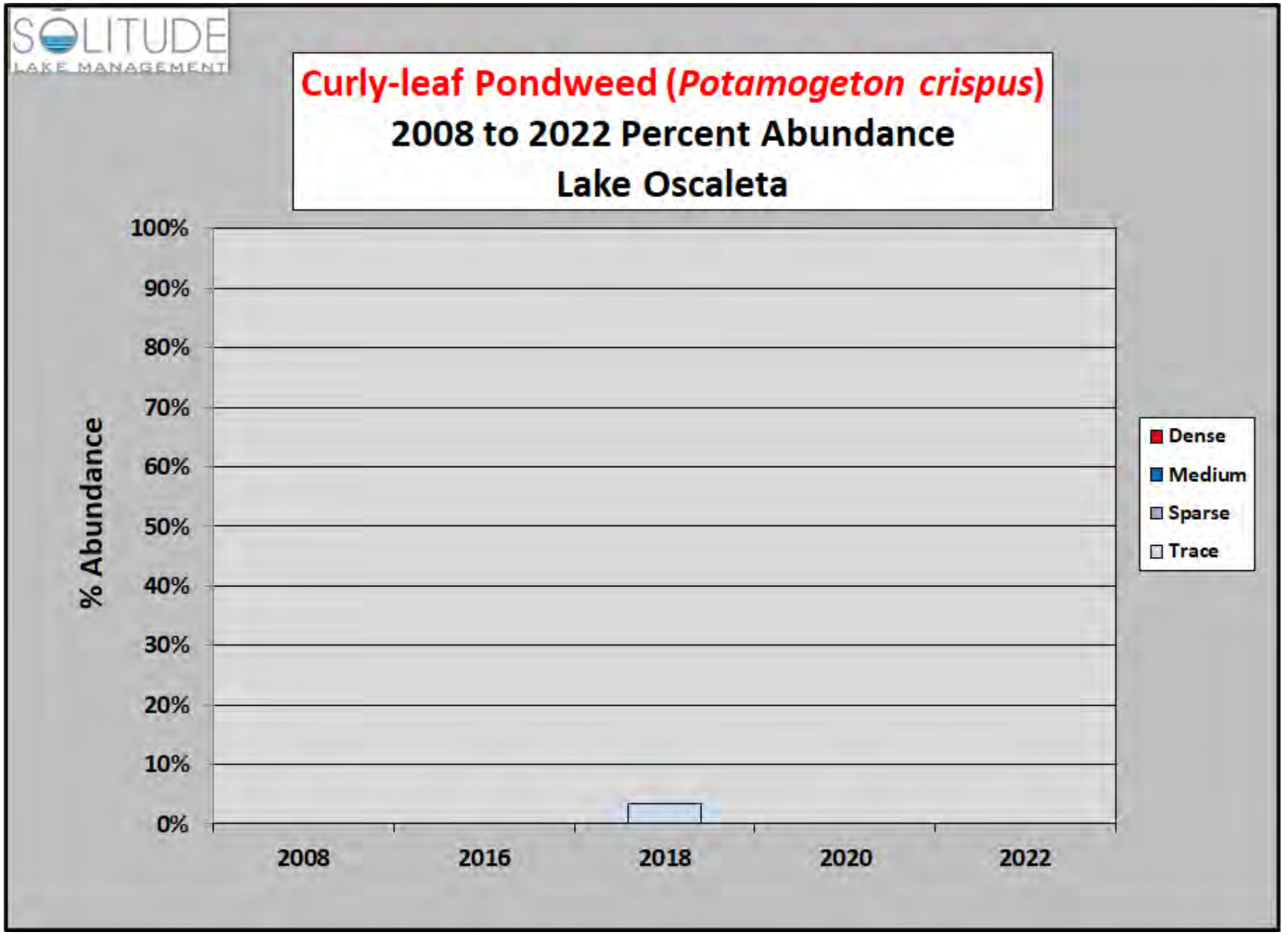
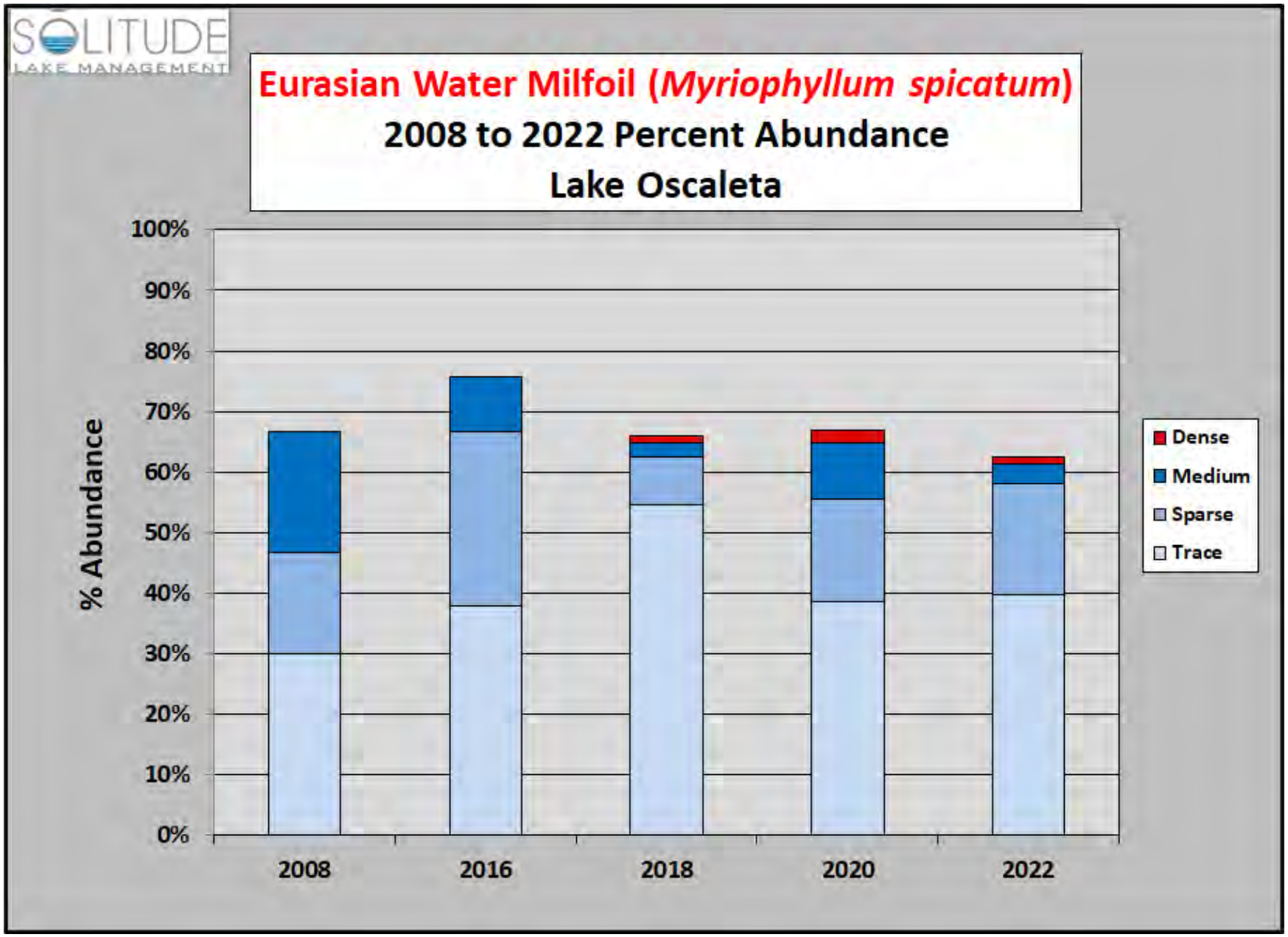

SOLITUDE
LAKE MANAGEMENT
Total Submersed Vegetation
2008 to 2022 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
2022
Dense
Medium
Sparse
Trace

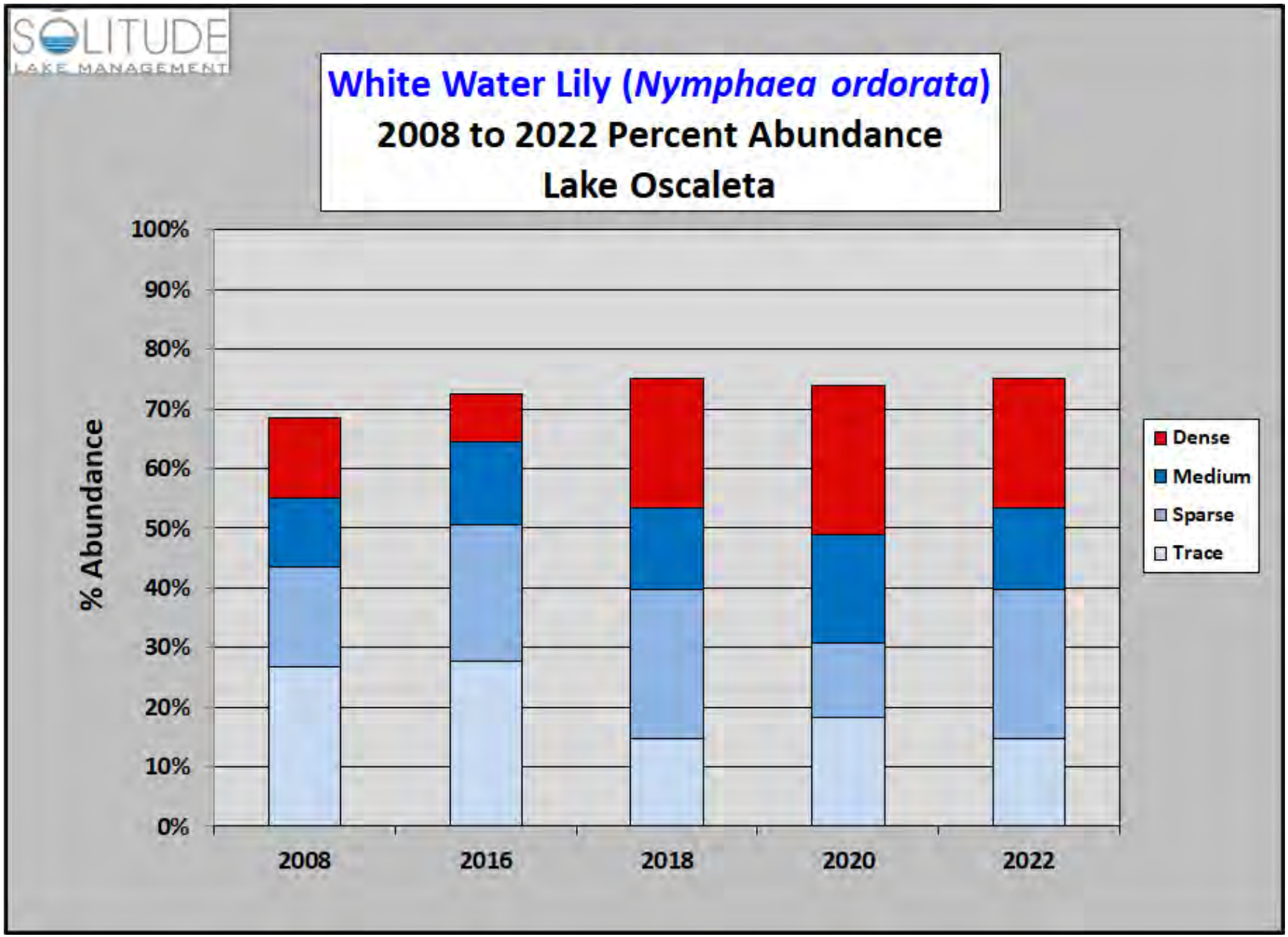

SOLITUDE
LAKE MANAGEMENT
Total Floating Vegetation
2008 to 2022 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
2022
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Brittle Naiad (Najas minor)
2008 to 2022 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
2022
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Coontail (Ceratophyllum demersum)
2008 to 2022 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
2022
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Curly-leaf Pondweed (Potamogeton crispus)
2008 to 2022 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
2022
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Eurasian Water Milfoil (Myriophyllum spicatum)
2008 to 2022 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
2022
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
White Water Lily (Nymphaea ordorata)
2008 to 2022 Percent Abundance
Lake Oscaleta
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
2022
Dense
Medium
Sparse
Trace

Lake Rippowam
Aquatic Macrophyte Abundance Distribution
July 20, 2022

	Total		Trace		Sparse		Medium		Dense	
	Sites	%	Sites	%	Sites	%	Sites	%	Sites	%
TOTAL SITES	60									
Total Submersed Abundance	31	52%	12	39%	14	45%	3	10%	2	6%
Eurasian Water Milfoil	31	52%	12	39%	14	45%	3	10%	2	6%
Benthic Filamentous Algae	2	3%	2	100%	0	0%	0	0%	0	0%
Bassweed	1	2%	1	100%	0	0%	0	0%	0	0%
Total Floating Abundance	31	52%	5	16%	7	23%	7	23%	12	39%
White Water Lily	28	47%	3	11%	8	29%	6	21%	11	39%
Floating Filamentous Algae	20	33%	17	85%	3	15%	0	0%	0	0%
Pickerel Weed	12	20%	12	100%	0	0%	0	0%	0	0%
Spatterdock	10	17%	0	0%	8	80%	0	0%	2	20%

Lake Rippowam
Aquatic Vegetation Survey
July 20, 2022

STATION	SAMPLE#	LATITUDE (NAD83)	LONGITUDE (NAD83)	Total Submersed Abundance	Total Floating Abundance	Bassweed	Benthic Filamentous Algae	EurasianWater Milfoil	Floating Filamentous Algae	Pickerel Weed	Spatterdock	White Water Lily
1	A			S	D			S				D
1	B			S	D			S				D
1	M	41.298832°	-73.556193°	S	D			S				D
2	A											
2	B											
2	M	41.299067°	-73.556191°									
3	A											
3	B											
3	M	41.299301°	-73.556172°									
4	A											
4	B											
4	M	41.299574°	-73.556189°									
5	A											
5	B											
5	M	41.299796°	-73.556151°									
6	A											
6	B											
6	M	41.299703°	-73.555894°									
7	A											
7	B											
7	M	41.299543°	-73.555882°									
8	A			S	D			S	T			D
8	B											
8	M	41.299302°	-73.555891°	T	S			T	T			S
9	A			M	D			M	T			D
9	B											
9	M	41.299058°	-73.555933°	S	S			S	T			S
10	A			T	M		T	T	T			M
10	B			T	M		T		T			M
10	M	41.29887°	-73.555941°	T	M		T	T	T			M
11	A				D				S		D	S
11	B				D				S		D	
11	M	41.299072°	-73.555714°		D				S		D	T
12	A			S	D			S	T		D	D
12	B			S	D			S	T		D	D
12	M	41.299315°	-73.555614°	S	D			S	T		D	D
13	A			T	D			T	T		S	D
13	B				D						S	D
13	M	41.299545°	-73.555627°	T	D			T	T		S	D
14	A			S				S				
14	B											
14	M	41.299993°	-73.556752°	T				T				
15	A											
15	B											
15	M	41.300221°	-73.557345°									
16	A											
16	B											
16	M	41.300423°	-73.557925°									
17	A											
17	B											
17	M	41.300512°	-73.558576°									
18	A											
18	B											
18	M	41.300586°	-73.559155°									
19	A											
19	B											
19	M	41.300819°	-73.559771°									
20	A											
20	B											
20	M	41.300985°	-73.560373°									
21	A											
21	B											
21	M	41.301046°	-73.560899°									
22	A											
22	B											
22	M	41.301051°	-73.561577°									
23	A											
23	B											
23	M	41.301076°	-73.562171°									
24	A				T					T		
24	B											
24	M	41.301189°	-73.562701°		T					T		
25	A											

Lake Rippowam
Aquatic Vegetation Survey
July 20, 2022

STATION	SAMPLE#	LATITUDE (NAD83)	LONGITUDE (NAD83)	Total Submersed Abundance	Total Floating Abundance	Bassweed	Benthic Filamentous Algae	EurasianWater Milfoil	Floating Filamentous Algae	Pickerel Weed	Spatterdock	White Water Lily
25	B											
25	M	41.301221°	-73.563398°									
26	A			S	T			S		T		T
26	B			S				S				
26	M	41.301225°	-73.563956°	S	T			S		T		T
27	A											
27	B											
27	M	41.30136°	-73.564581°									
28	A											
28	B											
28	M	41.301211°	-73.564572°									
29	A											
29	B											
29	M	41.300986°	-73.564585°									
30	A											
30	B											
30	M	41.300752°	-73.564585°									
31	A			M				M				
31	B			M				M				
31	M	41.30054°	-73.564566°	M				M				
32	A			S	D			S		T		D
32	B			T				T				
32	M	41.300333°	-73.564581°	S	S			S		T		S
33	A			T	D			T		T		D
33	B			S	D			S				D
33	M	41.300069°	-73.564593°	S	D			S		T		D
34	A			T	T			T		T		
34	B			T				T				
34	M	41.299809°	-73.56464°	T	T			T		T		
35	A			M				M				
35	B			M				M				
35	M	41.300062°	-73.564856°	M				M				
36	A			S	T			S				T
36	B			S				S				
36	M	41.300272°	-73.56489°	S	T			S				T
37	A											
37	B											
37	M	41.300488°	-73.56488°									
38	A			D				D				
38	B			D				D				
38	M	41.300741°	-73.564849°	D				D				
39	A			S	M			S				M
39	B			S	M			S				M
39	M	41.300919°	-73.564845°	S	M			S				M
40	A			D	M	S		D	S	T	S	M
40	B			D	S			D	S		S	T
40	M	41.301181°	-73.564852°	D	M	T		D	S	T	S	S
41	A			T	D			T	T		S	D
41	B			T	D			T			S	D
41	M	41.301363°	-73.564813°	T	D			T	T		S	D
42	A			T	D			T	T		S	D
42	B			T	D			T			S	D
42	M	41.301205°	-73.565047°	T	D			T	T		S	D
43	A			T	D			T	T		S	D
43	B			T	D			T			S	D
43	M	41.300922°	-73.565138°	T	D			T	T		S	D
44	A			T	D			T	T		S	D
44	B			T	D			T			S	D
44	M	41.300742°	-73.565191°	T	D			T	T		S	D
45	A			T	D			T	T		S	D
45	B			T	D			T			S	D
45	M	41.300497°	-73.565262°	T	D			T	T		S	D
46	A			M	D			M	S	T	S	D
46	B			M	D			M	T		S	D
46	M	41.300248°	-73.565216°	M	D			M	S	T	S	D
47	A			T	D			T	T	T		D
47	B			S	T			S				T
47	M	41.299366°	-73.564037°	S	M			S	T	T		M
48	A			S	M			S	T			M
48	B			S	M			S				M
48	M	41.299183°	-73.563376°	S	M			S	T			M
49	A			T	M			T	T	T		M
49	B			T	M			T				M

Lake Rippowam
Aquatic Vegetation Survey
July 20, 2022

STATION	SAMPLE#	LATITUDE (NAD83)	LONGITUDE (NAD83)	Total Submersed Abundance	Total Floating Abundance	Bassweed	Benthic Filamentous Algae	EurasianWater Milfoil	Floating Filamentous Algae	Pickerel Weed	Spatterdock	White Water Lily
49	M	41.299277°	-73.562771°	T	M			T	T	T		M
50	A				M				T	T		M
50	B											
50	M	41.299321°	-73.562111°		S				T	T		S
51	A				T					T		
51	B											
51	M	41.299524°	-73.561524°		T					T		
52	A											
52	B											
52	M	41.299557°	-73.560975°									
53	A											
53	B											
53	M	41.299495°	-73.560397°									
54	A			S	M			S	T	T		M
54	B			S	T			S	T			T
54	M	41.29923°	-73.5598°	S	S			S	T	T		S
55	A											
55	B											
55	M	41.298902°	-73.559187°									
56	A											
56	B											
56	M	41.298988°	-73.558609°									
57	A			S	S			S				S
57	B			S	T			S				T
57	M	41.299084°	-73.55796°	S	S			S				S
58	A			S	M			S	T			M
58	B											
58	M	41.299183°	-73.557414°	T	S			T	T			S
59	A			S	D			S				D
59	B			S	S		T	S				S
59	M	41.298989°	-73.556814°	S	M		T	S				M
60	A			S	D			S	T			D
60	B			S	D			S	T			D
60	M	41.298625°	-73.556833°	S	D			S	T			D

SAMPLE POINT LOCATION

SŌLITUDE LAKE MANAGEMENT

Lake Rippowam
Aquatic Vegetation Survey
July 20, 2022

Total Sample Sites: 60

SAMPLE POINT

N

0 250 500
Feet

TOTAL SUBMERSED ABUNDANCE

SOLITUDE LAKE MANAGEMENT

Lake Rippowam
Aquatic Vegetation Survey
July 20, 2022

Total Sample Sites: 60

Plant Density

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	31	52%
Trace	12	39%
Sparse	14	45%
Medium	3	10%
Dense	2	6%

N

0 250 500 Feet

TOTAL FLOATING ABUNDANCE

SOLITUDE LAKE MANAGEMENT

Lake Rippowam
Aquatic Vegetation Survey
July 20, 2022

Total Sample Sites: 60

Plant Density

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	31	52%
Trace	5	16%
Sparse	7	23%
Medium	7	23%
Dense	12	39%

N

0 250 500 Feet

BENTHIC FILAMENTOUS ALGAE DISTRIBUTION

SŌLITUDE LAKE MANAGEMENT

Lake Rippowam
Aquatic Vegetation Survey
July 20, 2022

Total Sample Sites: 60

Plant Density

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	2	3%
Trace	2	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

N

0 250 500 Feet

BASSWEED (*Potamogeton amplifolius*)
DISTRIBUTION

SOLITUDE LAKE MANAGEMENT

Lake Rippowam
Aquatic Vegetation Survey
July 20, 2022

Total Sample Sites: 60

Plant Density

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	1	2%
Trace	1	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

N

0 250 500 Feet

EURASIAN WATER MILFOIL (*Myriophyllum spicatum*) DISTRIBUTION

SOLITUDE LAKE MANAGEMENT

Lake Rippowam
Aquatic Vegetation Survey
July 20, 2022

Total Sample Sites: 60

Plant Density

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	31	52%
Trace	12	39%
Sparse	14	45%
Medium	3	10%
Dense	2	6%

N

0 250 500 Feet

FLOATING FILAMENTOUS ALGAE DISTRIBUTION

SOLITUDE LAKE MANAGEMENT

Lake Rippowam
Aquatic Vegetation Survey
July 20, 2022

Total Sample Sites: 60

Plant Density

- = No Plants
- = Trace Plants
- = Sparse Plants
- = Medium Plants
- = Dense Plants

Percent Distribution

Abundance	Sites	Percent
Total	20	33%
Trace	17	85%
Sparse	3	15%
Medium	0	0%
Dense	0	0%

N

0 250 500 Feet

PICKEREL WEED (*Pontederia cordata*) DISTRIBUTION

SOLITUDE LAKE MANAGEMENT

Lake Rippowam
Aquatic Vegetation Survey
July 20, 2022

Total Sample Sites: 60

Plant Density

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

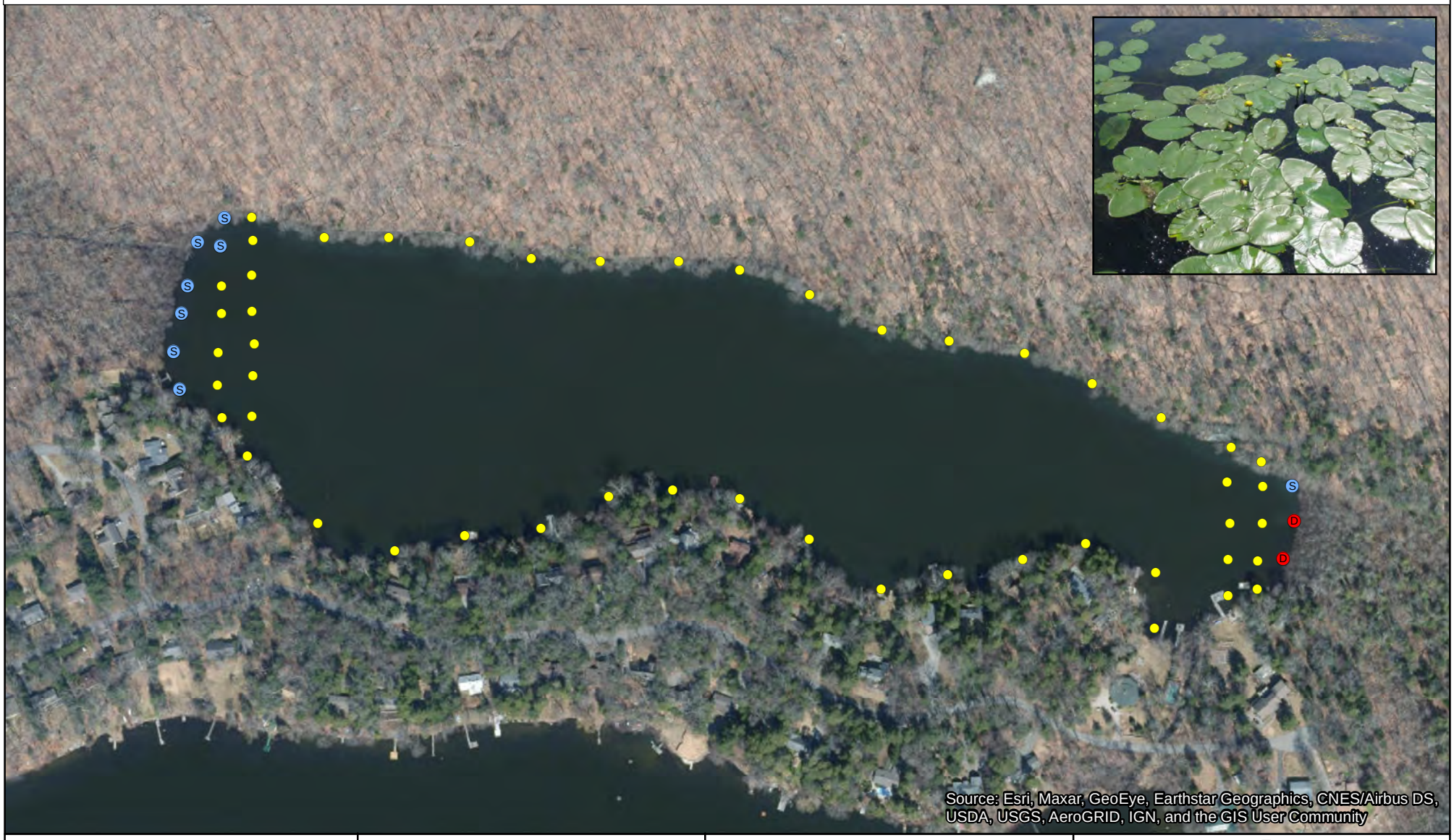
Abundance	Sites	Percent
Total	12	20%
Trace	12	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

N

0 250 500 Feet

SPATTERDOCK (*Nuphar variegata*)
DISTRIBUTION

SOLITUDE LAKE MANAGEMENT



Lake Rippowam
Aquatic Vegetation Survey
July 20, 2022

Total Sample Sites: 60

Plant Density

- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

Percent Distribution

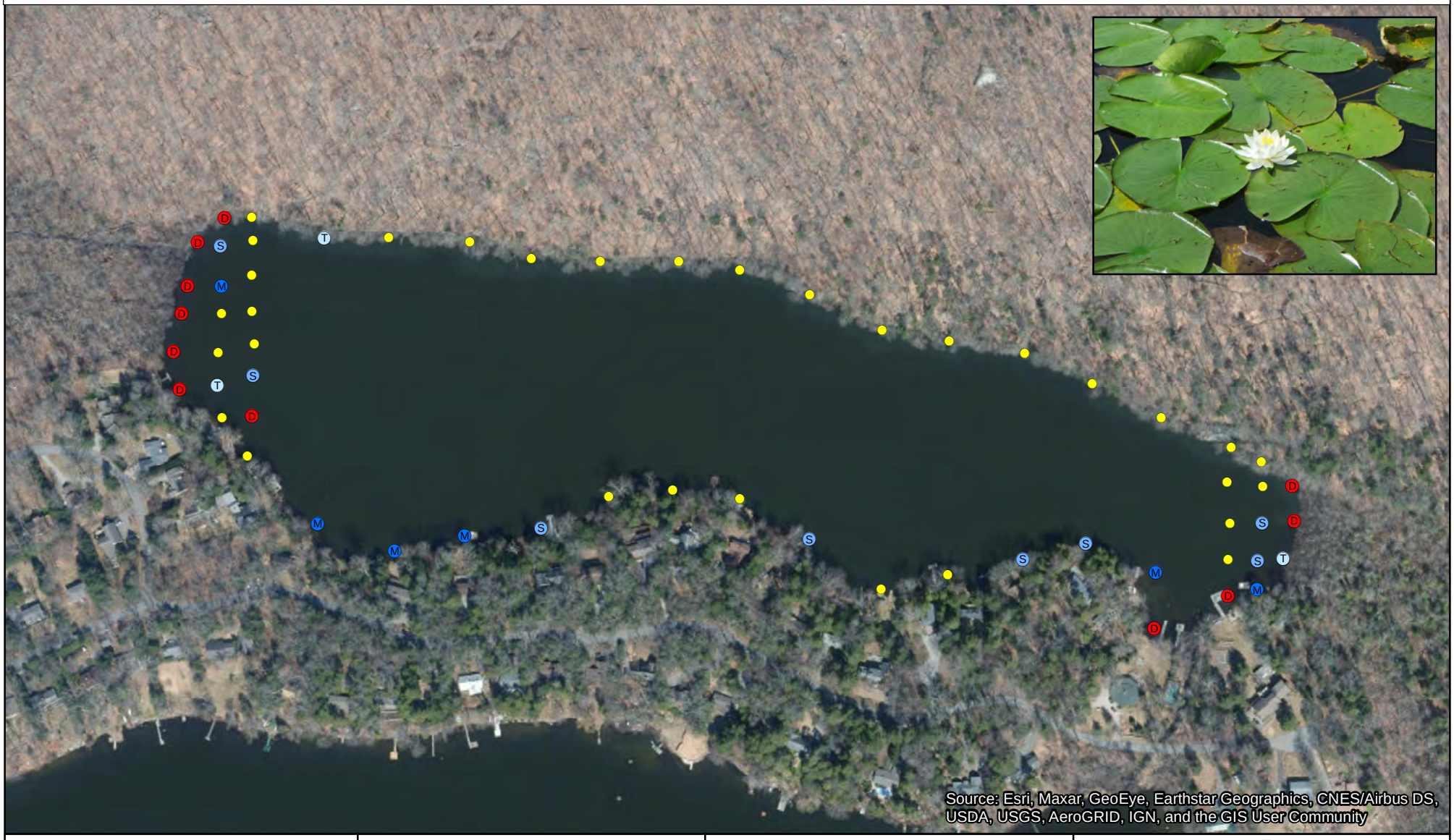
Abundance	Sites	Percent
Total	10	17%
Trace	0	0%
Sparse	8	80%
Medium	0	0%
Dense	2	20%

N

0 250 500 Feet

WHITE WATER LILY (*Nymphaea odorata*) DISTRIBUTION

SOLITUDE LAKE MANAGEMENT



Lake Rippowam
Aquatic Vegetation Survey
July 20, 2022

Total Sample Sites: 60

Plant Density

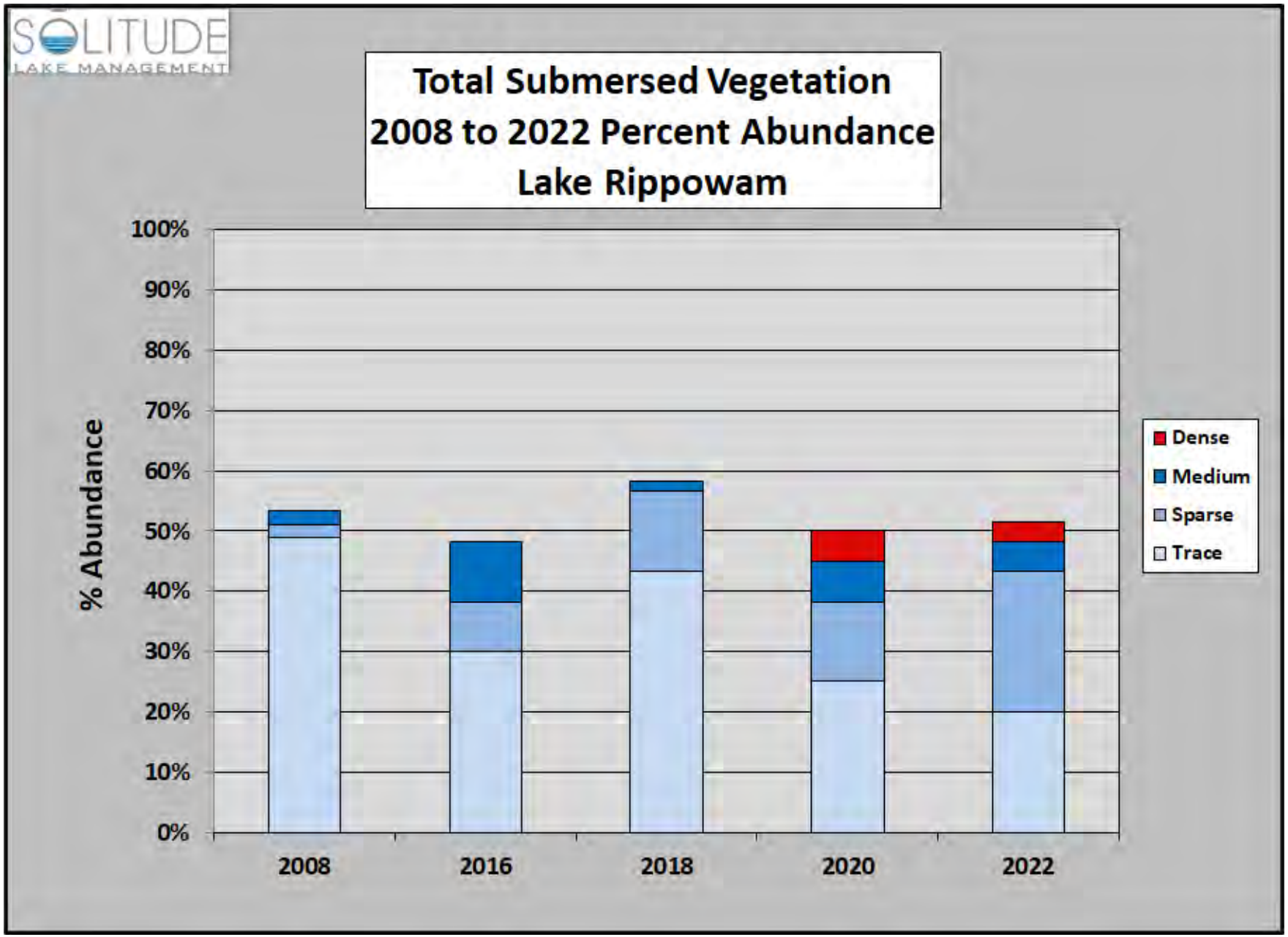
- = No Plants
- T = Trace Plants
- S = Sparse Plants
- M = Medium Plants
- D = Dense Plants

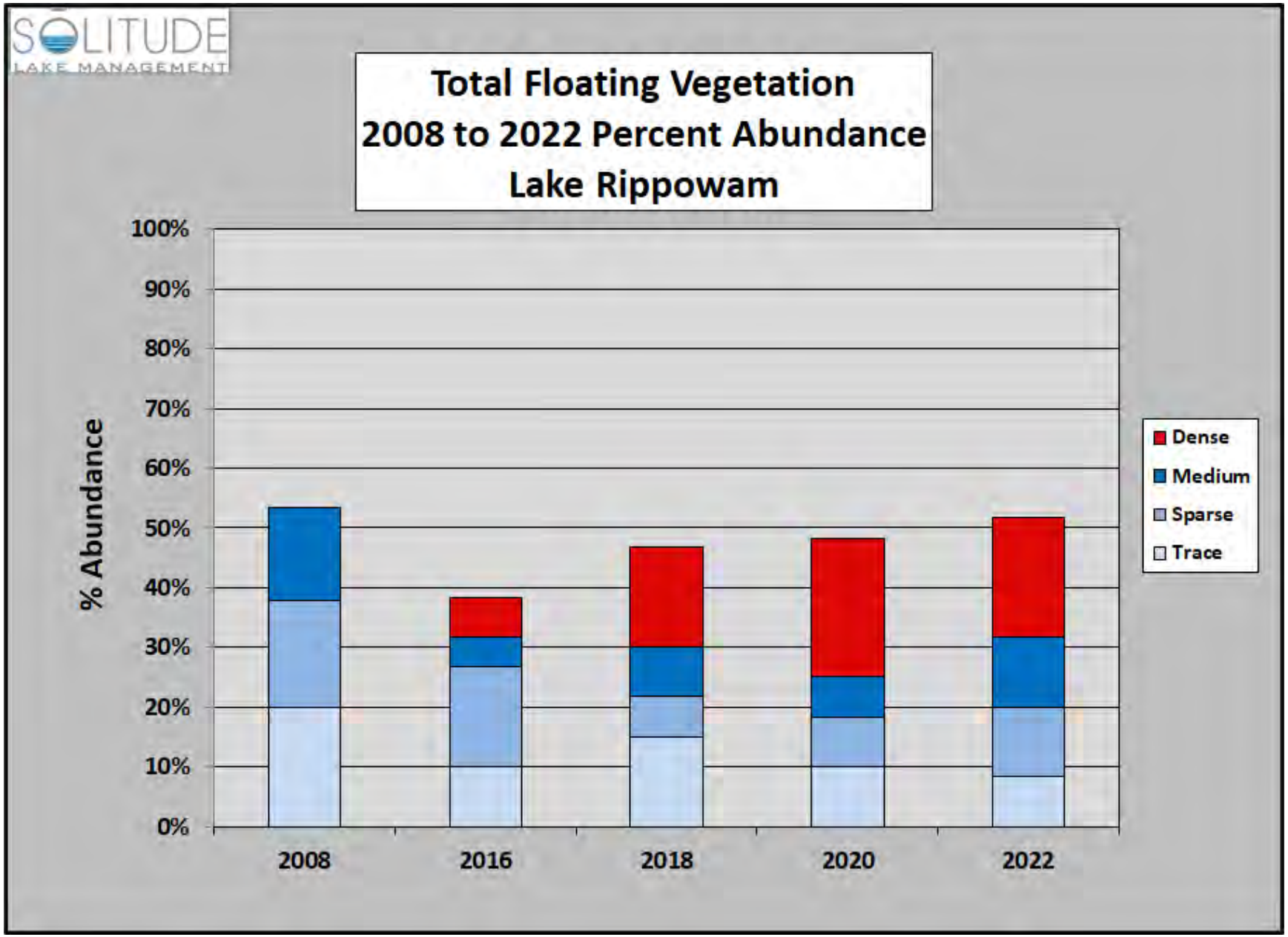
Percent Distribution

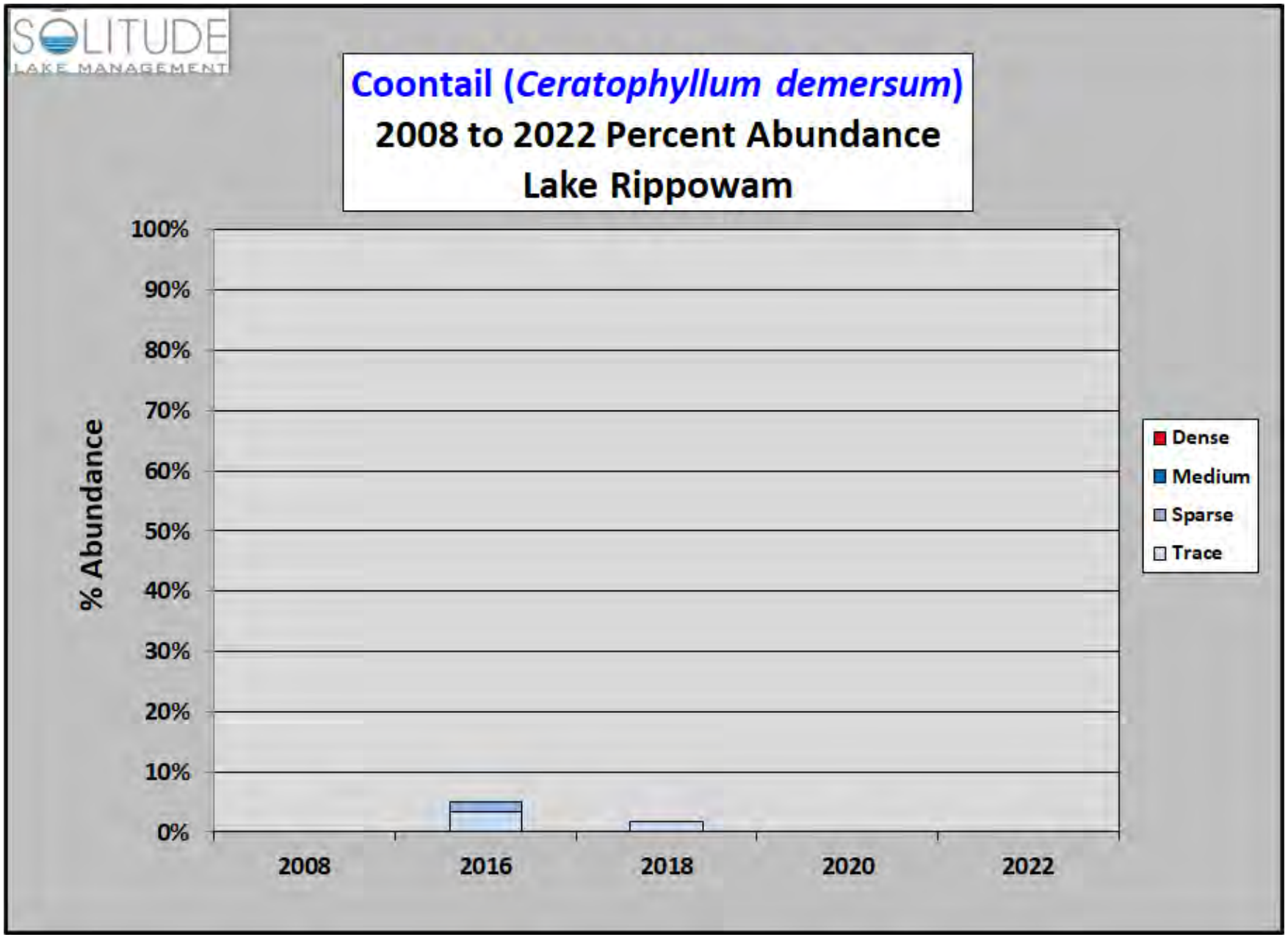
Abundance	Sites	Percent
Total	28	47%
Trace	3	11%
Sparse	8	29%
Medium	6	21%
Dense	11	39%

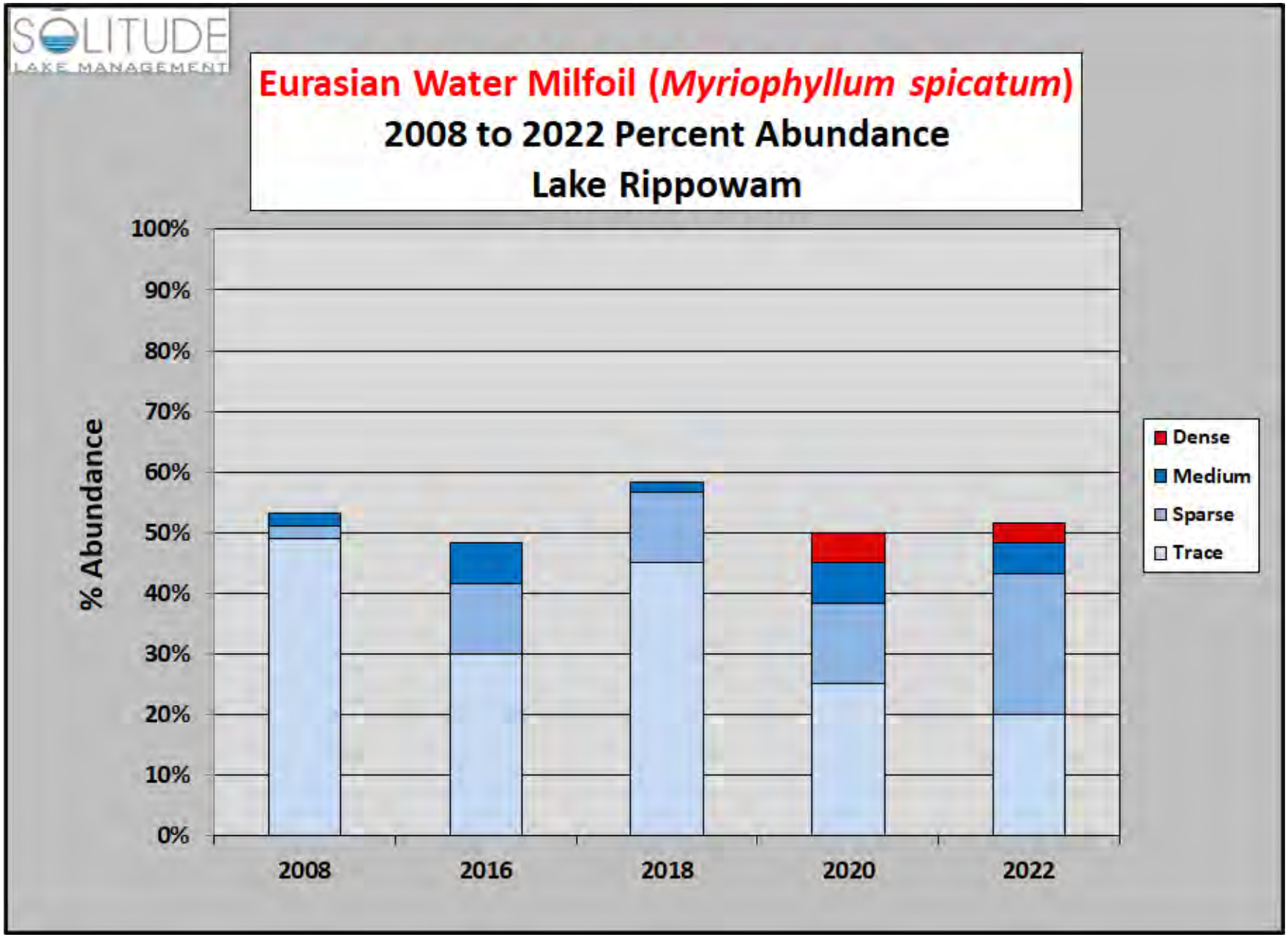
N

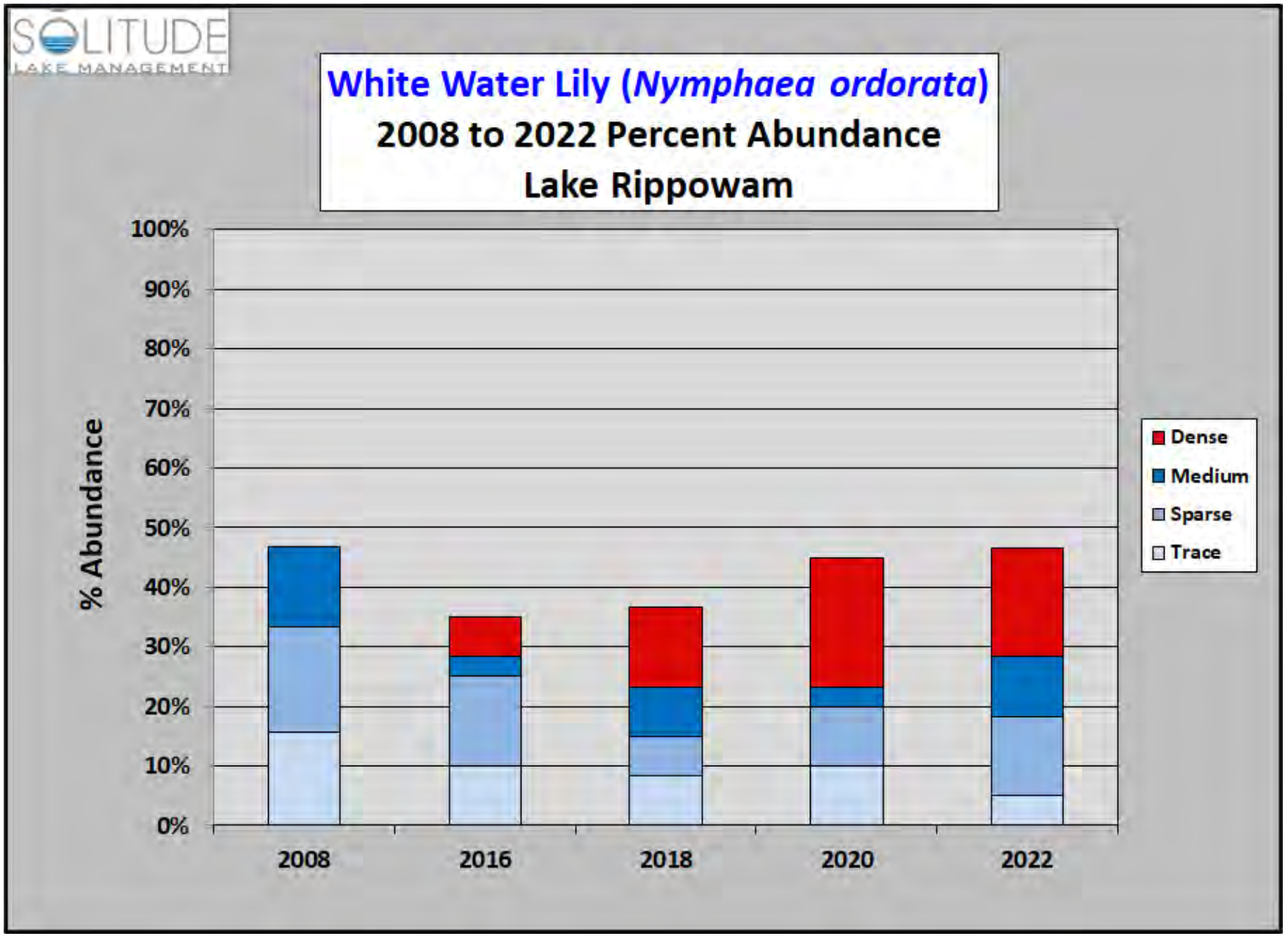
0 250 500 Feet


SOLITUDE
LAKE MANAGEMENT
Total Submersed Vegetation
2008 to 2022 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
2022
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Total Floating Vegetation
2008 to 2022 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
2022
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Coontail (Ceratophyllum demersum)
2008 to 2022 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
2022
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
Eurasian Water Milfoil (*Myriophyllum spicatum*)
2008 to 2022 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
2022
Dense
Medium
Sparse
Trace


SOLITUDE
LAKE MANAGEMENT
White Water Lily (Nymphaea ordorata)
2008 to 2022 Percent Abundance
Lake Rippowam
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2016
2018
2020
2022
Dense
Medium
Sparse
Trace