Lake Waccabuc

2017 Delineation of Submersed Aquatic Vegetation (SAV) in Lake Waccabuc

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Contents

2017 Delineation of Submersed Aquatic Vegetation (SAV) in Lake Waccabuc Report

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Lewisboro, New York

Introduction

Lake Waccabuc is one of a three-lake system located in Lewisboro, NY. A Brazilian elodea infestation was discovered in 2008 within Lake Waccabuc, where an intensive Diver-Assisted Suction Harvesting (DASH) program was implemented. Regrowth of Brazilian elodea has not been documented since 2011. With concern for the potential infestation from the two other waterbodies in the system (Lakes Oscaleta and Rippowam), in addition to the threat of other non-native aquatic growth, the Three Lakes Council contracted SŌLitude Lake Management (SŌLitude) to map the extent of aquatic plant growth throughout each system (in 2016), specifically to document the management efficacy for Brazilian waterweed (*Egeria densa*) and water chestnut (*Trapa natans*). Three other invasive species have been documented in Lake Waccabuc: Eurasian watermilfoil (*Myriophyllum spicatum*), curly-leaf pondweed (*Potamogeton crispus*), and brittle naiad (*Najas minor*). As invasive species, they can result in significant negative ecological, recreational, and economic impacts. In 2017, only Lake Waccabuc was surveyed.

The 138-acre waterbody has a maximum depth of 44 feet and receives inflow from the other two lakes in the system in addition to various inlets along the western half of the lake. The system flows out of Lake Waccabuc and into the Waccabuc River. The littoral zone reaches a depth of approximately 15 feet and is maintained at the shoreline; the open body of the lake is consistently deep and does not support macrophyte growth. Three coves support the majority of plant growth – North Cove, Northeast Cove, and the South Outlet Cove. The eastern portion of the lake contains the inlet channel from Lake Oscaleta. From previous surveys, the sediment type varies throughout the basin, but maintains soft, organic-rich sediment at the east end of the lake, and within the various coves. Some sections of sandy sediment, rocky shallows, and bedrock are present and scattered throughout the remaining littoral zone.

The following report will discuss: survey methodology, vegetation assemblages for Lake Waccabuc, conclusions, and recommendations concentrated on addressing ecosystem balance.

Methodology

Point Intercept Submersed Aquatic Plant Mapping

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. However, the littoral zone is restricted to the shoreline and various coves of Lake Waccabuc. The point-intercept locations within the pond were determined by a 40-m grid data layer placed over an orthophoto bathymetric map of the lake, and logged in the 2010 survey. The logged points from 2010 have been revisited annually.

A total of 120 sites were sampled in Lake Waccabuc on August 1 and 3, 2017. During the survey, each predetermined georeferenced point was accessed by boat or canoe in a feasible order. At each point, the real-time GPS coordinates of the sample location were recorded using a Trimble Geo 7X, a handheld GNSS system. **Three rake tosses** were executed at each site, as with the previous surveys, for enhanced detection of target species and other species occurring infrequently. Due to aquatic system characteristics, visual documentation was also used.

The Rake Toss 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. The tosses were conducted from opposite sides of the boat and were labeled and recorded A, B, and C respectively (Table 1). 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 defined by this methodology was used to categorize the observed macrophyte growth for each rake toss:

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 three 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), toss B was Sparse (2), and toss C was Medium (3) for the same macrophyte, the mean abundance would be Medium (4+2+3=9/3=3). Raw abundance data with mean calculations can be found in Appendix A.

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.

Results & Analysis

Due to the quantity of species identified at Lake Waccabuc, macrophyte descriptions are located in Appendix B, organized in alphabetical order. Distribution maps and macrophyte percent abundance data are located in Appendix C organized by 2017 frequency. A species richness map is also located in Appendix C.

Macrophyte Summary

In general, macrophyte growth was found consistent with the previous surveys performed at Lake Waccabuc. A total of twenty-three (23) macrophytes (including filamentous algae and floating-leaf species) were identified throughout the survey area (Table 1).

Table 1 includes: the presence of all species from each survey year, the 2017 percent frequency for each species, and overall change in Frequency of Occurrence (FOC). Graphs displaying the percent abundance data for each macrophyte for all sampling years are located in Appendix D in alphabetical order.

Table 1: Summary Table of Lake Waccabuc Aquatic Macrophytes 2008-2017

Common Name	Scientific Name	2008	2010	2011	2012	2013	2014	2015	2016	2017	%Frequency 2017	%FOC 2008-2017
Arrowhead (rosette)	*Sagittaria sp.*	X	X	X	X	X	X	X	X	X	5.8%	0.39%
Bassweed	*Potamogeton amplifolius*	X	X	X	X	X	X	X	X	X	29.1%	-0.19%
Benthic Filamentous Algae	Various species	X	X	X	X	X	X	X	X	X	35.8%	0.93%
Brazilian Elodea	*Egeria densa*	X									0.0%	0.10%
Brittle Naiad	*Najas minor*		X	X		X	X	X	X	X	2.5%	0.40%
Common Watermeal	*Wolffia columbiana*				X			X	X		0.0%	0.18%
Common Waterweed	*Elodea canadensis*	X	X	X	X	X	X	X	X	X	9.2%	0.47%
Coontail	*Ceratophyllum demersum*	X	X	X	X	X	X	X	X	X	35.8%	1.93%
Creeping Bladderwort	*Utricularia gibba*	X	X	X	X	X	X	X	X	X	5.8%	0.24%
Curly-leaf Pondweed	*Potamogeton crispus*	X		X		X	X	X	X	X	0.8%	0.11%
Dwarf Watermilfoil	*Myriophyllum tenellum*	X	X	X	X	X	X	X	X	X	0.8%	-0.09%
Eurasian Watermilfoil	*Myriophyllum spicatum*	X	X	X	X	X	X	X	X	X	83.3%	1.55%
Flat-stem Pondweed	*Potamogeton zosteriformis*	X									0.0%	-0.25%

Floating Bur-reed	*Sparganium sp.*							X		X	0.8%	0.05%
Floating Filamentous Algae	Various species	X	X	X	X	X	X	X	X	X	23.3%	1.46%
Greater Duckweed	*Spirodela polyrhiza*				X	X	X	X	X		0.0%	0.43%
Leafy Pondweed	*Potamogeton foliosus*	X	X	X	X	X	X	X	X	X	4.2%	0.26%
Quillwort	*Isoetes sp.*									X	0.8%	0.05%
Ribbon-leaf Pondweed	*Potamogeton epihydrus*		X	X	X	X	X	X	X	X	3.3%	0.59%
Robbin's Pondweed	*Potamogeton robbinsii*	X	X	X	X	X	X	X	X	X	5.8%	-0.86%
Slender Naiad	*Najas flexilis*			X						X	0.8%	0.03%
Small Duckweed	*Lemna minor*		X		X	X	X	X	X	X	2.5%	0.61%
Spatterdock	*Nuphar variegata*	X	X	X	X	X	X	X	X	X	18.3%	0.32%
Spiral-fruited Pondweed	*Potamogeton spirillus*	X	X	X	X	X					0.0%	-0.21%
Thin-leaf Pondweed	*Potamogeton sp.*						X	X	X	X	18.3%	2.58%
Water Chestnut	*Trapa natans*						X				0.0%	0.01%
Water Stargrass	*Zosterella dubia*		X	X	X	X	X	X	X	X	25%	1.87%
Watermoss	*Fontinalis sp.*				X	X					0.0%	-0.01%
Watershield	*Brasenia schreberi*	X	X	X	X	X	X	X	X	X	30.8%	-0.15%
White Waterlily	*Nymphaea odorata*	X	X	X	X	X	X	X	X	X	40.8%	2.02%

Red entries indicate invasive species

Twenty native species were documented during the survey, of which fourteen are submersed species, four are floating-leaf species, and two are classified as algae. However, average species richness was calculated at 3.8 species per sampling location in 2017, where species richness represents the number of species observed at a location.

Three non-native macrophytes were present during the 2017 survey: brittle naiad, curly-leaf pondweed, and Eurasian watermilfoil. Two other non-native species have been present in previous years; Brazilian elodea has not been documented since 2009 (2008 survey), and water chestnut was only documented in 2014. Over the survey years, all non-native species in Lake Waccabuc have a positive frequency of occurrence; non-native species appear to be gradually increasing within the lake. However, the calculated frequency for water chestnut and Brazilian elodea can be disregarded based on consistent absence from the surveyed locations.

Eurasian watermilfoil, a non-native, was documented as the most frequent submersed macrophyte and white waterlily was the most common floating-leaf macrophyte.

Observations were documented outside of the survey extent. Both great duckweed and watermeal were noted at approximately Sparse abundance at the launch site, and it is likely that these species were present at other locations outside of the surveyed locations. Bass weed appeared to be more abundant between the survey locations than in past years (pictured to right), however the recorded abundance from the survey points displays a decreased abundance and extent over the survey years (Appendix D). The clarity of the water column was suitable at approximately 6.5 feet, consistent with 2016.

Discussion

Macrophyte Abundance and Distribution

Lake Waccabuc was surveyed in early August for the presence of aquatic macrophytes, and specifically for the delineation of non-native aquatic species. Relative data and maps are located in the previously referenced appendices.

Based on the consistency of timing and annual-nature of the point-intercept survey, the aquatic macrophyte richness supported by Lake Waccabuc remains relatively consistent. The majority of both native and invasive macrophyte extent also appears to consistent, however, specific species are becoming more abundant. **Brazilian elodea and water chestnut appear to remain eradicated from Lake Waccabuc**.

2017 Survey Considerations

On August 1st & 3rd, 120 sites were surveyed at Lake Waccabuc. Submersed aquatic vegetation was documented at 106 of the 120 sites, representing 88% of potential littoral zone. 67 of the 120 sites supported floating-leaf vegetation. The majority of sites without macrophyte growth are located in either deeper locations or amidst rocky bottom substrates. At the time of the survey, the water clarity was visually around 6.5 feet, likely due to natural color, turbidity, and algae growth. Turbidity and water clarity can alter the photic zone within a waterbody, ultimately determining the extent of plant growth.

During the time of the survey, Lake Waccabuc supported an average species richness of 3.8 species. Vegetation was spread throughout the sample area (littoral zone) at an average of approximately four species. Point 10, near the eastern inlet of the lake, supported the highest richness across the lake with twelve different macrophytes. Point 72, located in the northwestern shoreline of the lake, also supported a high richness of eleven species. Each location supports

approximately half of all species were documented at Lake Waccabuc, sustaining many of the same macrophytes.

Eurasian watermilfoil was the most observed species documented at nearly all submersed aquatic vegetation sites, at 100 points (94.3% of the vegetated sites). While prominent, the majority of Eurasian watermilfoil sites are primarily Trace – at 51 (51%) of the sites. Approximately a fifth of the sites (19%) are considered at nuisance level (Medium or Dense), and were primarily located in the two humps of the northern cove and sporadically along the southern and northern shorelines. Based on methodology, performing and averaging three tosses per sample location tends to decrease the overall reported abundance; the primarily Trace abundance may have actuality of Sparse to Dense in the field.

The pervasiveness of Eurasian watermilfoil in the North Cove coincides with the DASH work that was performed in 2009 in order to manage the Brazilian elodea infestation. In general, disturbance creates a greater opportunity for non-native, invasive species to settle. Invasive species inherently establish quicker than native pioneer species. However, regardless of the management disturbance and Eurasian watermilfoil infestation, the North Cove supports aquatic species from four aquatic categories: submersed, floating-leaf, free-floating, and algae.

All other species documented in Lake Waccabuc fall below 50% of the sites and were relatively unchanged from the previous survey years. Notably, the other two non-native species, brittle naiad and curly-leaf pondweed, were both only documented at few locations throughout the lake – 3 sites (2.5%) and 1 site (0.8%), respectively – and only found at Trace abundance. The abundance of curly-leaf pondweed is expected to be sporatic over time due to the late nature of the survey. This plant has an early life cycle and usually dies back by early July. A wider distribution across the lake is likely earlier in the season. All other submersed and floating-leaf species are considered beneficial natives, especially when at balanced growth levels. A range of abundance levels within an aquatic system are natural and expected, and becomes concerning when growth is consistently at nuisance levels.

Coontail, bassweed, and water stargrass are the top three native submersed aquatic species supported in Lake Waccabuc, documented at 43 (36%), 35 (29%), and 30 (25%) of the overall sites, respectively. All three species are considered desirable natives, but can also be found at nuisance levels in unbalanced conditions. Generally, the North Cove supports the highest abundance of these species when compared with the rest of the lake. All three species were documented most commonly at Trace and Sparse abundance levels. Of their respective locations, few sites were documented at Medium or Dense levels: Coontail at 6 sites (14%), Bassweed at 10 sites (29%), and water stargrass at 1 site (3%).

The eastern portion of the lake, the inlet from the other two lakes, contained the highest species richness and supported the only occurrence of some species documented during the survey: creeping bladderwort, curly-leaf pondweed, floating bur-reed, and slender naiad. Creeping bladderwort was the only species that was documented at more than one location within the survey extent – at 7 sites (6%) in the eastern end of the lake. The majority of the sites supported Trace abundance, where only one site was categorized as Sparse growth of creeping bladderwort. The three other species were only found in one location and all at Trace abundance.

A thin-leaf pondweed species (*Potamogeton* sp.) was documented at 22 sites (18.3%), all of which were at Trace abundance. The thin-leaf pondweed has been unidentified since 2014 due to lack of identifying features such as seeds or floating leaves. The timing of the survey has not coincided with the maturation of the unidentified pondweed. However, it is likely that the unidentified pondweed is spiral-fruited pondweed (*Potamogeton spirillus*), considering no specimens have been documented since 2013. Multiple species are possible but unlikely based on the stipule characteristics and leaf size.

Notably, quillwort (*Isoetes* sp.) was documented for the first time within the extent of the data set at only one site – Point 110. Quillwort is a low-growing, shallow-water macrophyte that can get confused with the arrowhead rosette, depending on the quillwort species. Historically, quillwort has been documented at the Three Lakes (prior to surveys conducted by Allied Biological and SOLitude).

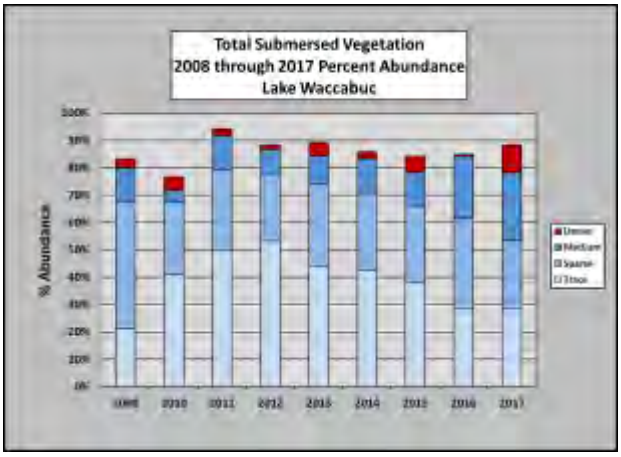
Lake Waccabuc supports relatively robust plant diversity considering the potential growth extent of non-native macrophytes. However, both watermeal and greater duckweed were noted at the launch site, which suggest that more species may be present outside the point-intercept method extent.

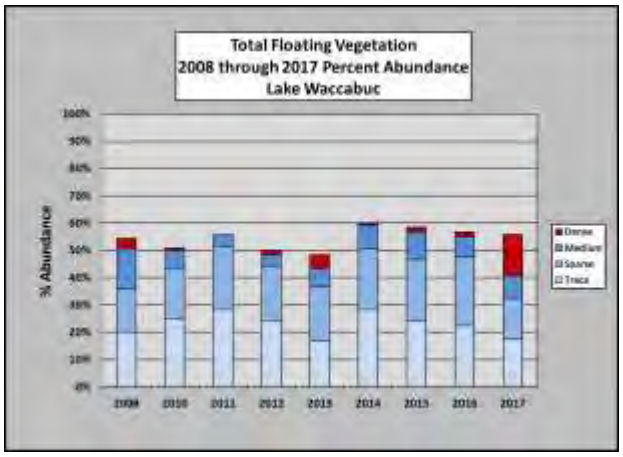
Historical Data Trends

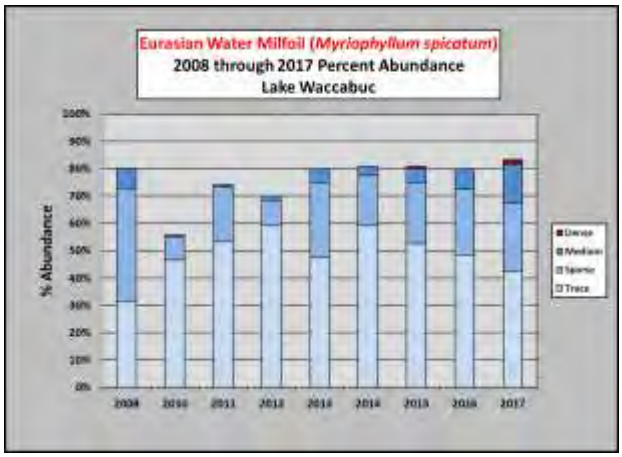
The presence or absence of aquatic plants within the lake is a meaningful and unbiased measure of how an aquatic plant assemblage changes from year to year. Due to variability of the environment and limitations of sampling methods, focus on overall trends rather than to specific changes at any one particular location is necessary. The changes over survey years are measured by total Frequency of Occurrence (%), and not weighted for the abundance scale (Trace – Dense).

Overall aquatic macrophyte balance can be understood through the dominance and commonality of each species, especially over time. Dominance is often spread across multiple species within balanced aquatic systems, where a level of macrophyte/richness health can be understood. Having few species that are dominant across a waterbody can indicate unbalanced growth. The documentation of macrophytes over time shows dominance fluctuation and eventually trends that can further indicate the health status of a plant assemblage.

The changes in overall and individual plant frequency appear insignificant. The frequency of total submersed and floating-leaf macrophytes are fairly consistent since the initial survey in 2008, where the overall change (or slope) is minimally increasing through to 2017 for both macrophyte classifications (Table 1). Graphs are listed on the following page, in addition to Appendix D.







While the overall frequency of the plant assemblage may be relatively consistent year-over-year, changes in abundance can be significant; changes in abundance from one year to the next can explain the succession of macrophyte populations and communities. Most notably, the total submersed vegetation present within Lake Waccabuc is trending towards higher abundance levels (Above, Appendix D). Since 2012, Trace abundance has decreased, while nuisance levels (Medium and Dense) have become more prevalent. Similarly, Eurasian watermilfoil population is beginning to trend towards nuisance levels based on abundance comparisons (Above, Appendix D). Since 2014, the population is decreasing in Trace growth, maintaining consistent Sparse growth, and increasing in Medium and Dense growth. However, the total submersed vegetation growth measurements are a direct reflection of the Eurasian watermilfoil growth since it has been commonly and consistently documented throughout the survey area. Abundance levels for all other submersed macrophytes vary from year to year.

Species diversity and richness can add another dimension to understanding the historic trends within a waterbody. Since no active management is being performed at Lake Waccabuc, consistency in diversity and richness, especially with presence of non-native species, is telling for waterbody health. Depending on waterbody characteristics, the presence of invasive species will cause a reduction in species diversity and alter species richness; species may become extirpated from the lake due to overgrowth of non-native, invasive species. In the case of Lake Waccabuc, diversity has been relatively unchanged since 2008. The eastern portion of the lake containing

the inlet continues to support the highest species richness. However, average species richness has decreased over the last three years: 4.33 in 2015, 4.01 in 2016, and 3.8 in 2017. This suggests that the slight increases (while appearing insignificant) in FOC for various species, such as Eurasian watermilfoil, may be negatively impacting the overall diversity of species in lake.

Summary of Findings

- Lake Waccabuc has maintained overall high species diversity, and supported a suitable water clarity of 6.5 feet.
- Both Brazilian elodea and water chestnut appear to remain eradicated. For the seventh consecutive year, no Brazilian elodea was collected or observed.
- Macrophyte diversity has remained relatively consistent since the 2008, but richness appears to be gradually decreasing.
- Three non-native macrophytes were documented during the 2017 survey: Eurasian watermilfoil, brittle naiad, and curly-leaf pondweed.
- The majority of macrophytes appear to maintain a similar extent from year to year, however, specific species are becoming more abundant – such as Eurasian watermilfoil and bassweed.
- The North Cove has maintained diverse aquatic plant species regardless of past management for Brazilian elodea and hardy establishment of Eurasian watermilfoil.
- Nearly all vegetated sites supported Eurasian watermilfoil growth and continues to be the most dominant macrophyte within Lake Waccabuc.
- Consistent with the past few survey years, white waterlily continues to be the dominant floating-leaf macrophyte within Lake Waccabuc.
- Displayed by common watermeal and great duckweed, more species may be present outside the point-intercept survey extent.

Management Recommendations

In 2018, we highly recommend a repetition of the SAV mapping within Lake Waccabuc and reinstating the surveys for both Lake Oscaleta and Lake Rippowam since monitoring was not conducted in 2017. Monitoring is important for examining and understanding the abundance and distribution of non-native and native macrophytes throughout the aquatic systems. If Brazilian elodea or water chestnut should re-infest Lake Waccabuc, the point-intercept survey will direct long-term management efforts in a cost-effective manner.

The point-intercept methodology is working well to monitor and quantify the growth of widely growing macrophytes in Lake Waccabuc. However, as shown by the documentation of watermeal and great duckweed outside the survey extent, not all plant growth is documented and some species may be overlooked as part of the nature of the survey methodology. Infestations do not

conform to the bounds of the survey and non-native growth can be overlooked, especially when an infestation is small or intermittent. We suggest the implementation of an additional diver survey in the North Cove specifically for Brazilian elodea.

While not a priority, the growth of Eurasian watermilfoil is concerning. Future management options should be deliberated in the event that the population becomes debilitating to the ecosystem and hazardous for the multiple recreation outlets.

Based off of 2017 SAV mapping, 2 to 3 days of vegetation monitoring is recommended at Lake Waccabuc in 2018. An additional two days are recommended for monitoring at both Lake Oscaleta and Lake Rippowam.

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Appendix A: Raw Data Tables

Lake Waccabuc
Aquatic Vegetation Survey
August 1 and 3, 2017

STATION	SAMPLE#	LATITUDE (NAD83)	LONGITUDE (NAD83)	2016 DEPTH (FT)	Total Submersed	Total Floating	Arrowhead	Bass Weed	Benthic Filamentous Algae	Brittle Naiad	Bur Reed	Common Bladderwort	Common Waterweed	Coontail	Curly-Leaf Pondweed	Dwarf Milfoil	Eurasian Water Milfoil	Floating Filamentous Algae	Leafy Pondweed	Pondweed sp.	Quillwort	Ribbon-Leaf Pondweed	Robbin's Pondweed	Slender Naiad	Small Duckweed	Spatterdock	Water Stargrass	Watershield	White Water Lily
Canal Sample Points																													
1	A	41.297713°	-73.571637°	2	M	S		T			S			S			T		T			M				S		T	T
2	A	41.297818°	-73.572004°	1.5	M	S			T					S			S		T			S			T	T			S
3	A	41.297919°	-73.572367°	1.5	S	S			T					S			T					T			T	S			S
4	A	41.298002°	-73.572754°	1.5	D	M						T		M			T		T			M				M		T	S
Lake Sample Points																													
5	A	41.297913°	-73.573074°		T	D						T					T									M		M	S
5	B	41.297913°	-73.573074°		T	D						T		T												S		M	M
5	C	41.297913°	-73.573074°		T	D								T			T									T		D	T
5	M	41.297913°	-73.573074°	1	T	D						T		T			T									S		M	S
6	A	41.29764°	-73.573063°		D			M	M			T		M			S												
6	B	41.29764°	-73.573063°		D	M		D						M			S									M			T
6	C	41.29764°	-73.573063°		M	S		M						S			T									S			
6	M	41.29764°	-73.573063°	4	D	S		M	T			T		M			S									S			T
7	A	41.297719°	-73.572773°		T	D						T		T				S										D	S
7	B	41.297719°	-73.572773°		S	D						S		T												T		D	T
7	C	41.297719°	-73.572773°		S	M						S						S										M	T
7	M	41.297719°	-73.572773°	1.2	S	D						S		T				T								T		D	T
8	A	41.297345°	-73.573038°		S	S		S	S								S											S	T
8	B	41.297345°	-73.573038°		T			T	T								T												
8	C	41.297345°	-73.573038°		S				S								S												
8	M	41.297345°	-73.573038°	2.5	S	T		T	S								S											T	T
9	A	41.297125°	-73.573167°		T	D	T					T						M										D	T
9	B	41.297125°	-73.573167°		S	M	T					T					T	S									S	M	M
9	C	41.297125°	-73.573167°		S	M						S					T	S									T	M	T
9	M	41.297125°	-73.573167°	1.5	S	M	T					T					T	S									T	M	S
10	A	41.297062°	-73.573482°		M	T	S						M				S			S			T				S	T	T
10	B	41.297062°	-73.573482°		M	S	T					T	S				S	S		S								S	T
10	C	41.297062°	-73.573482°		M	M						T	M	T			T	T								T	T	M	S
10	M	41.297062°	-73.573482°	1.0	M	S	T					T	M	T			S	T		T				T		T	T	S	T
11	A	41.297419°	-73.573428°		S	T		S						T			T									T			
11	B	41.297419°	-73.573428°		S	M		S	S								S									M		S	
11	C	41.297419°	-73.573428°		M	M		M	T					S			S									S		M	
11	M	41.297419°	-73.573428°	2.0	S	S		S	T					T			S									S		S	
12	A	41.297692°	-73.573421°		M			M	S				T																
12	B	41.297692°	-73.573421°		M			M	S																				
12	C	41.297692°	-73.573421°		D			D	T					T								T							
12	M	41.297692°	-73.573421°	4.5	M			M	S				T	T								T							
13	A	41.297941°	-73.573496°		M	M		M	T					T			M									M			
13	B	41.297941°	-73.573496°		M			T						M			T												
13	C	41.297941°	-73.573496°		M	M		T						T			T					T							M
13	M	41.297941°	-73.573496°	6	M	S		S	T					S			S					T				T			T
14	A	41.298244°	-73.573469°		T	D			T					T			T									D			
14	B	41.298244°	-73.573469°		T	D			T					T			T									D			
14	C	41.298244°	-73.573469°		T	D						T					T	T								D			
14	M	41.298244°	-73.573469°	5	T	D			T			T		T			T	T								D			
15	A	41.298473°	-73.573792°		S				S								S												
15	B	41.298473°	-73.573792°		T	M		T	T								T	T											M
15	C	41.298473°	-73.573792°		S	M			S								T	M											M
15	M	41.298473°	-73.573792°	3	S	S		T	S								T	T											S
16	A	41.298191°	-73.573794°		S	M			S																				M
16	B	41.298191°	-73.573794°		T			T	T								T												
16	C	41.298191°	-73.573794°		S				S								S												
16	M	41.298191°	-73.573794°	2.5	S	T		T	S								T												T
17	A	41.297884°	-73.573825°		D			D	T					S															
17	B	41.297884°	-73.573825°		D			M	S					M			S												
17	C	41.297884°	-73.573825°		M			M	T								T												
17	M	41.297884°	-73.573825°	2.5	D			M	T					S			T												
18	A	41.297623°	-73.573768°		M			T					M		T		T					T							
18	B	41.297623°	-73.573768°		S								S	T	T		T												
18	C	41.297623°	-73.573768°		S								T	S			S												
18	M	41.297623°	-73.573768°	5.0	S			T					S	T	T		T					T							
19	A	41.297417°	-73.573808°		M				S								M												
19	B	41.297417°	-73.573808°		T				T					T			T												
19	C	41.297417°	-73.573808°		T	S			T					T			T									S			
19	M	41.297417°	-73.573808°	5.5	S	T			T					T			S									T			
20	A	41.297134°	-73.573708°		T	S			T								T											S	S
20	B	41.297134°	-73.573708°		T	S		T																				S	S
20	C	41.297134°	-73.573708°		T	S			T								T											T	S
20	M	41.297134°	-73.573708°	1.5	T	S		T	T								T											S	S
21	A	41.297058°	-73.57418°		S	T			S					T			T											T	
21	B	41.297058°	-73.57418°		S	S			S					T				T										S	
21	C	41.297058°	-73.57418°		T	M								T			T	S		T								M	
21	M	41.297058°	-73.57418°	3.5	S	S			T					T			T	T		T								S	
22	A	41.297448°	-73.574157°		T				T																				
22	B	41.297448°	-73.574157°																										
22	C	41.297448°	-73.574157°		T				T																				
22	M	41.297448°	-73.574157°	8.5	T				T																				
23	A	41.297696°	-73.574235°		T				T																				
23	B	41.297696°	-73.574235°		T				T																				
23	C	41.297696°	-73.574235°																										
23	M	41.297696°	-73.574235°	13	T				T																				
24	A	41.297922°	-73.574122°		M				S					M			T												
24	B	41.297922°	-73.574122°		M				S					M															
24	C	41.297922°	-73.574122°		S				S																				
24	M	41.297922°	-73.574122°	10	M				S					S			T												
25	A	41.298234°	-73.574188°		M			M	S								T												
25	B	41.298234°	-73.574188°		S				S																				
25	C	41.298234°	-73.574188°		S				S																				
25	M	41.298234°	-73.574188°	6	S			T	S								T												
26	A	41.298519°	-73.574167°		M	D			M								M	D											M
26	B	41.298519°	-73.574167°		M	D			S								M	D											S
26	C	41.298519°	-73.574167°		S	M			S					S			T	S											M
26	M	41.298519°	-73.574167°	3.5	M	D			S					T			S	M											M
27	A	41.29852°	-73.574638°		M	M		T	S								M	M											S
27	B	41.29852°	-73.574638°		S	S		T									S	S											S

Lake Waccabuc
Aquatic Vegetation Survey
August 1 and 3, 2017

STATION	SAMPLE#	LATITUDE (NAD83)	LONGITUDE (NAD83)	2016 DEPTH (FT)	Total Submersed	Total Floating	Arrowhead	Bass Weed	Benthic Filamentous Algae	Brittle Naiad	Bur Reed	Common Bladderwort	Common Waterweed	Coontail	Curly-Leaf Pondweed	Dwarf Milfoil	Eurasian Water Milfoil	Floating Filamentous Algae	Leafy Pondweed	Pondweed sp.	Quillwort	Ribbon-Leaf Pondweed	Robbin's Pondweed	Slender Naiad	Small Duckweed	Spatterdock	Water Stargrass	Watershield	White Water Lily
27	C	41.29852°	-73.574638°		S	M		S	S								M												T
27	M	41.29852°	-73.574638°	4	S	M		T	T								S	M											S
28	A	41.298181°	-73.574559°		D				S					D															
28	B	41.298181°	-73.574559°		M				S					M															
28	C	41.298181°	-73.574559°		M				M					T			T												
28	M	41.298181°	-73.574559°	7.5	M				S					M			T												
29	A	41.296966°	-73.574516°		S				T								S												
29	B	41.296966°	-73.574516°		S	S			T								S											S	T
29	C	41.296966°	-73.574516°		S				T								T		T							S			
29	M	41.296966°	-73.574516°	2.5	S	T			T								S		T							T	T	T	T
30	A	41.297039°	-73.575209°		M									T			M		T										
30	B	41.297039°	-73.575209°		M				T								M									S			
30	C	41.297039°	-73.575209°		S				S				T				S									T			
30	M	41.297039°	-73.575209°	4.5	M				T				T	T			M		T							T			
31	A	41.296835°	-73.57609°		M			M									T												
31	B	41.296835°	-73.57609°		M			M	T																				
31	C	41.296835°	-73.57609°		D			D	S								T												
31	M	41.296835°	-73.57609°	4.5	M			M	T								T												
32	A	41.296643°	-73.576377°		S				S								S		T										
32	B	41.296643°	-73.576377°		S				T								S												
32	C	41.296643°	-73.576377°		M				S								M												
32	M	41.296643°	-73.576377°	2	S				S								S		T										
33	A	41.296586°	-73.576756°		T				T								T												
33	B	41.296586°	-73.576756°		T				T								T												
33	C	41.296586°	-73.576756°		S				S								S		T										
33	M	41.296586°	-73.576756°	5	T				T								T		T										
34	A	41.296564°	-73.577181°																										
34	B	41.296564°	-73.577181°																										
34	C	41.296564°	-73.577181°																										
34	M	41.296564°	-73.577181°	14																									
35	A	41.296606°	-73.577476°																										
35	B	41.296606°	-73.577476°																										
35	C	41.296606°	-73.577476°																										
35	M	41.296606°	-73.577476°	16																									
36	A	41.296282°	-73.5775°		S	T			S	T							T								T		T		
36	B	41.296282°	-73.5775°		M	T			M								T								T		T		
36	C	41.296282°	-73.5775°		M	S			M								S	T									S		
36	M	41.296282°	-73.5775°	15.5	M	T			M	T							T	T							T		T		
37	A	41.296255°	-73.57714°		T	S			T								T		T						S		S		
37	B	41.296255°	-73.57714°		T	S			T								T								T		S		
37	C	41.296255°	-73.57714°		T	S			T								T									T	S		
37	M	41.296255°	-73.57714°	3.0	T	S			T								T		T						T	T	S		
38	A	41.296273°	-73.576709°		S	S	S		T								T									T	S		
38	B	41.296273°	-73.576709°		T	T	T										T										T		
38	C	41.296273°	-73.576709°		T	S	T		T								T	S									T		
38	M	41.296273°	-73.576709°	4	T	S	T		T								T	T								T	T		
39	A	41.295993°	-73.576724°		T	T											T												T
39	B	41.295993°	-73.576724°		T	S		T									T												S
39	C	41.295993°	-73.576724°			S																							S
39	M	41.295993°	-73.576724°	2.0	T	S		T									T												S
40	A	41.296055°	-73.577133°		S	T			T					T			T									S	T		
40	B	41.296055°	-73.577133°		S	S	T										S		T						T		S		
40	C	41.296055°	-73.577133°		S	T	S							T			S								T	T			
40	M	41.296055°	-73.577133°	2.5	S	T	T		T					T			S		T						T	T	T		
41	A	41.295762°	-73.577017°		M	S		S		T				M			T									T			S
41	B	41.295762°	-73.577017°		D	S		M						M			S									S			S
41	C	41.295762°	-73.577017°		M	S								S			S		T							S			S
41	M	41.295762°	-73.577017°	1.0	M	S		S		T				M			S		T							S			S
42	A	41.296053°	-73.577429°		T	S	T																				S		S
42	B	41.296053°	-73.577429°		T	M	T										T	T									S		M
42	C	41.296053°	-73.577429°		T	D	T											D									S		T
42	M	41.296053°	-73.577429°	1.5	T	M	T										T	S									S		S
43	A	41.29636°	-73.577875°		T	T											T								T				
43	B	41.29636°	-73.577875°		T												T												
43	C	41.29636°	-73.577875°																										
43	M	41.29636°	-73.577875°	7.0	T	T											T								T				
44	A	41.296536°	-73.578542°			S																			S				
44	B	41.296536°	-73.578542°																										
44	C	41.296536°	-73.578542°		T												T												
44	M	41.296536°	-73.578542°	5.5	T	T											T								T				
45	A	41.296478°	-73.579316°		M				T								T												
45	B	41.296478°	-73.579316°		S				T								S												
45	C	41.296478°	-73.579316°																										
45	M	41.296478°	-73.579316°	7.0	S				T								T												
46	A	41.296412°	-73.580224°																										
46	B	41.296412°	-73.580224°		T												T												
46	C	41.296412°	-73.580224°																										
46	M	41.296412°	-73.580224°	6.0	T												T												
47	A	41.296542°	-73.581069°		D	T			T								D								T				
47	B	41.296542°	-73.581069°		M												M												
47	C	41.296542°	-73.581069°		S												S												
47	M	41.296542°	-73.581069°	6.5	M	T			T								M								T				
48	A	41.296511°	-73.581778°																										
48	B	41.296511°	-73.581778°		S												S												
48	C	41.296511°	-73.581778°		T												T												
48	M	41.296511°	-73.581778°	13.5	T												T												
49	A	41.296582°	-73.582606°		T												T												
49	B	41.296582°	-73.582606°																										
49	C	41.296582°	-73.582606°																										
49	M	41.296582°	-73.582606°	6.0	T												T												
50	A	41.296417°	-73.583399°			T																					T		
50	B	41.296417°	-73.583399°		T												T												
50	C	41.296417°	-73.583399°																										
50	M	41.296417°	-73.583399°	7.0	T	T											T										T		
51	A	41.296244°	-73.584188°			T																							T
51	B	41.296244°	-73.584188°																										
51	C	41.296244°	-73.584188°																										

Lake Waccabuc
Aquatic Vegetation Survey
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STATION	SAMPLE#	LATITUDE (NAD83)	LONGITUDE (NAD83)	2016 DEPTH (FT)	Total Submersed	Total Floating	Arrowhead	Bass Weed	Benthic Filamentous Algae	Brittle Naiad	Bur Reed	Common Bladderwort	Common Waterweed	Coontail	Curly-Leaf Pondweed	Dwarf Milfoil	Eurasian Water Milfoil	Floating Filamentous Algae	Leafy Pondweed	Pondweed sp.	Quillwort	Ribbon-Leaf Pondweed	Robbin's Pondweed	Slender Naiad	Small Duckweed	Spatterdock	Water Stargrass	Watershield	White Water Lily
51	M	41.296244°	-73.584188°	7.5		T																							T
52	A	41.295979°	-73.585063°		D			D	M					S			D		T										
52	B	41.295979°	-73.585063°		D												D												
52	C	41.295979°	-73.585063°		D	S		D																				T	S
52	M	41.295979°	-73.585063°	4.5	D	T		M	T					T			M		T									T	T
53	A	41.296512°	-73.586169°			S																						S	S
53	B	41.296512°	-73.586169°																										
53	C	41.296512°	-73.586169°																										
53	M	41.296512°	-73.586169°	9.5		T																						T	T
54	A	41.29675°	-73.586787°		M	S											M										T	S	T
54	B	41.29675°	-73.586787°		M	S											M			T								S	
54	C	41.29675°	-73.586787°		M	M											M										T	S	T
54	M	41.29675°	-73.586787°	4.0	M	S											M			T							T	S	T
55	A	41.296857°	-73.587467°		M	T		M						M			M											T	T
55	B	41.296857°	-73.587467°		M	S											M					T						S	S
55	C	41.296857°	-73.587467°		D	S		M						S			S										S	S	S
55	M	41.296857°	-73.587467°	3.5	M	S		S						S			M					T					T	S	S
56	A	41.296934°	-73.58833°																										
56	B	41.296934°	-73.58833°																										
56	C	41.296934°	-73.58833°																										
56	M	41.296934°	-73.58833°	6.0																									
57	A	41.296765°	-73.589146°		M	T											M											T	T
57	B	41.296765°	-73.589146°		M	T											M										S	T	T
57	C	41.296765°	-73.589146°		M	S											M	M										T	S
57	M	41.296765°	-73.589146°	5	M	T											M	T									T	T	T
58	A	41.296541°	-73.589935°		T												T												
58	B	41.296541°	-73.589935°																										
58	C	41.296541°	-73.589935°																										
58	M	41.296541°	-73.589935°	8.0	T												T												
59	A	41.296349°	-73.590817°			M																						S	M
59	B	41.296349°	-73.590817°		T	M											T											S	M
59	C	41.296349°	-73.590817°			M																						S	M
59	M	41.296349°	-73.590817°	4.5	T	M											T											S	M
60	A	41.29645°	-73.591649°																										
60	B	41.29645°	-73.591649°																										
60	C	41.29645°	-73.591649°		T				T								T										T		
60	M	41.29645°	-73.591649°	4.0	T				T								T										T		
61	A	41.296376°	-73.592372°																										
61	B	41.296376°	-73.592372°																										
61	C	41.296376°	-73.592372°																										
61	M	41.296376°	-73.592372°	12.5																									
62	A	41.296266°	-73.593276°			T																						T	T
62	B	41.296266°	-73.593276°																										
62	C	41.296266°	-73.593276°		S												S												
62	M	41.296266°	-73.593276°	6.5	T	T											T											T	T
63	A	41.296041°	-73.594035°		S	M			T								S										T	M	
63	B	41.296041°	-73.594035°		S	M		M									T										S	M	
63	C	41.296041°	-73.594035°		S	M		M									S											M	
63	M	41.296041°	-73.594035°	5.0	S	M		S	T								S										T	M	
64	A	41.295827°	-73.594979°		M	D								S			M											D	
64	B	41.295827°	-73.594979°		T	M											T	S										M	M
64	C	41.295827°	-73.594979°		S	D											S	M									T	D	M
64	M	41.295827°	-73.594979°	7.0	S	D								T			S	S									T	D	S
65	A	41.296354°	-73.595653°		M	M	T			T							S	T		S							T	T	M
65	B	41.296354°	-73.595653°		M	M											S											T	M
65	C	41.296354°	-73.595653°		S	M											S	T		S					M		T	T	
65	M	41.296354°	-73.595653°	6.0	M	M	T			T							S	T		T					T		T	T	S
66	A	41.296976°	-73.595741°		S	D											S			T							S		D
66	B	41.296976°	-73.595741°		M	D		M						M			S												D
66	C	41.296976°	-73.595741°		M	D											S	T											D
66	M	41.296976°	-73.595741°	4.0	M	D		T						T			S	T		T							T		D
67	A	41.297297°	-73.594999°		D	D		D						T														D	D
67	B	41.297297°	-73.594999°		M	D		M						T			T											D	D
67	C	41.297297°	-73.594999°		D	D		M						D			S											D	D
67	M	41.297297°	-73.594999°	4.5	D	D		M						S			T											D	D
68	A	41.297631°	-73.594181°		S	M											S										T	M	T
68	B	41.297631°	-73.594181°		S	M											T										S	M	S
68	C	41.297631°	-73.594181°		S	M											S										T	M	S
68	M	41.297631°	-73.594181°	2.5	S	M											S										T	M	S
69	A	41.298366°	-73.593558°		T	S											T	T		M								T	S
69	B	41.298366°	-73.593558°		T	S			T					T			T											T	M
69	C	41.298366°	-73.593558°		T	S			T								T	T											M
69	M	41.298366°	-73.593558°	5.0	T	S			T					T			T	T		T								T	M
70	A	41.298618°	-73.593°		M	M											M	S										T	M
70	B	41.298618°	-73.593°		M	M		M						T			S											T	M
70	C	41.298618°	-73.593°		M	M		M									M											M	M
70	M	41.298618°	-73.593°	7.0	M	M		S						T			M	T										S	M
71	A	41.29857°	-73.592166°		S	M											S	M										M	
71	B	41.29857°	-73.592166°		M	D								S			M	M										D	
71	C	41.29857°	-73.592166°		M	D								T			M	M										D	
71	M	41.29857°	-73.592166°	7.0	M	D								T			M	M										D	
72	A	41.298898°	-73.591659°		M	D		M						S		T	M	M									T	S	D
72	B	41.298898°	-73.591659°		M	D							T				M	M							M			S	D
72	C	41.298898°	-73.591659°		M	D		M	T								M	M									T	S	D
72	M	41.298898°	-73.591659°	1.5	M	D		S	T				T	T		T	M	M							T		T	S	D
73	A	41.298934°	-73.590831°																										
73	B	41.298934°	-73.590831°																										
73	C	41.298934°	-73.590831°																										
73	M	41.298934°	-73.590831°	19.0																									
74	A	41.298483°	-73.59016°																										
74	B	41.298483°	-73.59016°																										
74	C	41.298483°	-73.59016°																										
74	M	41.298483°	-73.59016°	11.0																									
75	A	41.298625°	-73.589103°		M	M											M	S											S
75	B	41.298625°	-73.589103°		S	M											S	S										S	M
75	C	41.298625°	-73.589103°		S	M											S											S	M
75	M	41.298625°	-73.589103°	8.0	S	M											S	T										T	M

Lake Waccabuc
Aquatic Vegetation Survey
August 1 and 3, 2017

STATION	SAMPLE#	LATITUDE (NAD83)	LONGITUDE (NAD83)	2016 DEPTH (FT)	Total Submersed	Total Floating	Arrowhead	Bass Weed	Benthic Filamentous Algae	Brittle Naiad	Bur Reed	Common Bladderwort	Common Waterweed	Coontail	Curly-Leaf Pondweed	Dwarf Milfoil	Eurasian Water Milfoil	Floating Filamentous Algae	Leafy Pondweed	Pondweed sp.	Quillwort	Ribbon-Leaf Pondweed	Robbin's Pondweed	Slender Naiad	Small Duckweed	Spatterdock	Water Stargrass	Watershield	White Water Lily
76	A	41.298849°	-73.588326°		S	S											S											S	
76	B	41.298849°	-73.588326°		M	S											M											S	
76	C	41.298849°	-73.588326°		M	S											M											S	
76	M	41.298849°	-73.588326°	9.5	M	S											M											S	
77	A	41.299055°	-73.587559°																										
77	B	41.299055°	-73.587559°		T												T												
77	C	41.299055°	-73.587559°																										
77	M	41.299055°	-73.587559°	7.5	T												T												
78	A	41.299327°	-73.586625°		T												T												
78	B	41.299327°	-73.586625°		T												T												
78	C	41.299327°	-73.586625°																										
78	M	41.299327°	-73.586625°	11	T												T												
79	A	41.299522°	-73.585825°		T												T												
79	B	41.299522°	-73.585825°		S												S												
79	C	41.299522°	-73.585825°		S												S												
79	M	41.299522°	-73.585825°	8.5	S												S												
80	A	41.299551°	-73.585034°		T												T												
80	B	41.299551°	-73.585034°		S												S												
80	C	41.299551°	-73.585034°		S												S												
80	M	41.299551°	-73.585034°	20.5	S												S												
81	A	41.29984°	-73.584129°																										
81	B	41.29984°	-73.584129°																										
81	C	41.29984°	-73.584129°																										
81	M	41.29984°	-73.584129°	18.5																									
82	A	41.299143°	-73.583351°		T												T												
82	B	41.299143°	-73.583351°		T												T												
82	C	41.299143°	-73.583351°																										
82	M	41.299143°	-73.583351°	7.0	T												T												
83	A	41.299347°	-73.582934°		M												M												
83	B	41.299347°	-73.582934°		M												M												
83	C	41.299347°	-73.582934°		M												M												
83	M	41.299347°	-73.582934°	8.5	M												M												
84	A	41.299375°	-73.582604°		S												S												
84	B	41.299375°	-73.582604°		T	M											T	T											M
84	C	41.299375°	-73.582604°			T																							M
84	M	41.299375°	-73.582604°	6.5	T	T											T	T											S
85	A	41.299073°	-73.58251°		M												M												
85	B	41.299073°	-73.58251°		S												S												
85	C	41.299073°	-73.58251°																										
85	M	41.299073°	-73.58251°	6.5	S												S												
86	A	41.298926°	-73.582887°		S												S												
86	B	41.298926°	-73.582887°		S												S												
86	C	41.298926°	-73.582887°		S												S												
86	M	41.298926°	-73.582887°	6.0	S												S												
87	A	41.298883°	-73.583351°		M			S									M												
87	B	41.298883°	-73.583351°		S			S									S												
87	C	41.298883°	-73.583351°		S												S												
87	M	41.298883°	-73.583351°	4.0	S			T									S												
88	A	41.300246°	-73.583392°																										
88	B	41.300246°	-73.583392°																										
88	C	41.300246°	-73.583392°																										
88	M	41.300246°	-73.583392°	19.0																									
89	A	41.300647°	-73.582293°																										
89	B	41.300647°	-73.582293°																										
89	C	41.300647°	-73.582293°																										
89	M	41.300647°	-73.582293°	15.0																									
90	A	41.300876°	-73.581731°																										
90	B	41.300876°	-73.581731°																										
90	C	41.300876°	-73.581731°																										
90	M	41.300876°	-73.581731°	11.5																									
91	A	41.301002°	-73.581321°		D	D		D					T	S			S	D											
91	B	41.301002°	-73.581321°		D	D							M	S			M	D		M									
91	C	41.301002°	-73.581321°		D	D		S					M				M	D											
91	M	41.301002°	-73.581321°	10.5	D	D		S					S	T			M	D		T									
92	A	41.301026°	-73.581062°		D	D		D						M				D											S
92	B	41.301026°	-73.581062°		D	D		D						M			T	S											
92	C	41.301026°	-73.581062°		D	D		D						M			T	D											
92	M	41.301026°	-73.581062°	5.5	D	D		D						M			T	M											T
93	A	41.300993°	-73.580658°		D	D			D				M	S			M	D											
93	B	41.300993°	-73.580658°		D	D			M				M				M	D											
93	C	41.300993°	-73.580658°		D	D							T	S			D	D								T			
93	M	41.300993°	-73.580658°	6.0	D	D			S				S	T			M	D								T			
94	A	41.300914°	-73.580279°		D	D								T			T	S											D
94	B	41.300914°	-73.580279°		S	D							T	T			S	S											D
94	C	41.300914°	-73.580279°		S	D							T	T			S												D
94	M	41.300914°	-73.580279°	2.0	M	D							T	T			S	T											D
95	A	41.300743°	-73.580272°		M	D		S									M	M								S			D
95	B	41.300743°	-73.580272°		M	D		T					S	S			M	M								S			D
95	C	41.300743°	-73.580272°		M	D		S						T			M	S											
95	M	41.300743°	-73.580272°	1.5	M	D		S					T	T			M	M								T			M
96	A	41.300518°	-73.580674°		D	D		M					S	D			S											M	D
96	B	41.300518°	-73.580674°		T	D											T												D
96	C	41.300518°	-73.580674°		D	D		M									S												D
96	M	41.300518°	-73.580674°	3.0	M	D		S					T	T			S											T	D
97	A	41.300782°	-73.580769°		D	T								T			D												T
97	B	41.300782°	-73.580769°		D												D									M			
97	C	41.300782°	-73.580769°		D			S					T				D			T									
97	M	41.300782°	-73.580769°	8.0	D	T		T					T	T			D			T						T		T	
98	A	41.300204°	-73.581088°		D	D		M						M			S			T					T	S	D		
98	B	41.300204°	-73.581088°		S	D											S									M	D		
98	C	41.300204°	-73.581088°		S	D											S									M	D		
98	M	41.300204°	-73.581088°	7.5	M	D		T						T			S			T					T	M	D		
99	A	41.300485°	-73.581057°		M									M			S												
99	B	41.300485°	-73.581057°		T									T						T									
99	C	41.300485°	-73.581057°		S												S												
99	M	41.300485°	-73.581057°	12.0	S									T			T			T									
100	A	41.300814°	-73.581077°																										

Lake Waccabuc
Aquatic Vegetation Survey
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STATION	SAMPLE#	LATITUDE (NAD83)	LONGITUDE (NAD83)	2016 DEPTH (FT)	Total Submersed	Total Floating	Arrowhead	Bass Weed	Benthic Filamentous Algae	Brittle Naiad	Bur Reed	Common Bladderwort	Common Waterweed	Coontail	Curly-Leaf Pondweed	Dwarf Milfoil	Eurasian Water Milfoil	Floating Filamentous Algae	Leafy Pondweed	Pondweed sp.	Quillwort	Ribbon-Leaf Pondweed	Robbin's Pondweed	Slender Naiad	Small Duckweed	Spatterdock	Water Stargrass	Watershield	White Water Lily
100	B	41.300814°	-73.581077°																										
100	C	41.300814°	-73.581077°																										
100	M	41.300814°	-73.581077°	13.5																									
101	A	41.300772°	-73.581508°																										
101	B	41.300772°	-73.581508°																										
101	C	41.300772°	-73.581508°																										
101	M	41.300772°	-73.581508°	19.5																									
102	A	41.300546°	-73.581475°																										
102	B	41.300546°	-73.581475°																										
102	C	41.300546°	-73.581475°		T												T												
102	M	41.300546°	-73.581475°	22.5	T												T												
103	A	41.300214°	-73.581383°		D	T		M						D			M	T					S				T		
103	B	41.300214°	-73.581383°		D			S						M			M										T		
103	C	41.300214°	-73.581383°		D			M						D													T		
103	M	41.300214°	-73.581383°	5.0	D			M						D			S	T					T				T		
104	A	41.299838°	-73.581605°		D			D						S			M						M						
104	B	41.299838°	-73.581605°		D			D									M										T		
104	C	41.299838°	-73.581605°		D			M									D												
104	M	41.299838°	-73.581605°	4.5	D			D						T			M						T				T		
105	A	41.299473°	-73.581707°		S												S												
105	B	41.299473°	-73.581707°																										
105	C	41.299473°	-73.581707°		S												S												
105	M	41.299473°	-73.581707°	10.0	T												T												
106	A	41.299371°	-73.581071°		S												S												
106	B	41.299371°	-73.581071°																										
106	C	41.299371°	-73.581071°			T																							T
106	M	41.299371°	-73.581071°	12.0	T	T											T												T
107	A	41.299203°	-73.580142°		M												M												
107	B	41.299203°	-73.580142°		M												M												
107	C	41.299203°	-73.580142°		S												S												
107	M	41.299203°	-73.580142°	12.0	M												M												
108	A	41.29929°	-73.579378°		M				M								S			S							S		
108	B	41.29929°	-73.579378°		S				S								S												
108	C	41.29929°	-73.579378°		S				S								S		T								T		
108	M	41.29929°	-73.579378°	17	S				S								S		T	T							T		
109	A	41.29928°	-73.578785°		D		D	T																					
109	B	41.29928°	-73.578785°		S	T											S										T		T
109	C	41.29928°	-73.578785°		S												S										T		
109	M	41.29928°	-73.578785°	4.0	M	T	T	T									T										T		T
110	A	41.299198°	-73.578561°		S	T																					S		T
110	B	41.299198°	-73.578561°		S				T																		S		
110	C	41.299198°	-73.578561°		S															T							S		
110	M	41.299198°	-73.578561°	1.5	S	T			T											T							S		T
111	A	41.299005°	-73.578469°		S																						S		
111	B	41.299005°	-73.578469°		T				T											T							T		
111	C	41.299005°	-73.578469°		S																						S		
111	M	41.299005°	-73.578469°	2.5	S				T											T							S		
112	A	41.298784°	-73.57864°		T				T								T												
112	B	41.298784°	-73.57864°		T																						T		
112	C	41.298784°	-73.57864°		T																						T		
112	M	41.298784°	-73.57864°	4.5	T				T								T										T		
113	A	41.299112°	-73.578739°																										
113	B	41.299112°	-73.578739°		T									T			S			T									
113	C	41.299112°	-73.578739°																										
113	M	41.299112°	-73.578739°	8.0	T									T			T			T									
114	A	41.298589°	-73.578812°		D			S									D						T				S		
114	B	41.298589°	-73.578812°		D												D			T			S						
114	C	41.298589°	-73.578812°		D												D												
114	M	41.298589°	-73.578812°	3.5	D			T									D			T			T				T		
115	A	41.298193°	-73.57897°		S												S												
115	B	41.298193°	-73.57897°		S												S												
115	C	41.298193°	-73.57897°																										
115	M	41.298193°	-73.57897°	9.5	T												T												
116	A	41.298049°	-73.578477°		S												S												
116	B	41.298049°	-73.578477°																										
116	C	41.298049°	-73.578477°																										
116	M	41.298049°	-73.578477°	12.5	T												T												
117	A	41.298274°	-73.577818°		D	D											D									S			D
117	B	41.298274°	-73.577818°			D																				S			D
117	C	41.298274°	-73.577818°		S	D											S									S			D
117	M	41.298274°	-73.577818°	7.5	S	D											S									S			D
118	A	41.298222°	-73.576921°		S												S												
118	B	41.298222°	-73.576921°																										
118	C	41.298222°	-73.576921°																										
118	M	41.298222°	-73.576921°	11.0	T												T												
119	A	41.298329°	-73.576048°		T	T											T			T									T
119	B	41.298329°	-73.576048°			T																							T
119	C	41.298329°	-73.576048°																										
119	M	41.298329°	-73.576048°	3.5	T	T											T			T									T
120	A	41.298473°	-73.575102°		M	D		M	M								S	D								D			D
120	B	41.298473°	-73.575102°		M	D		S									M	D											D
120	C	41.298473°	-73.575102°		D	D		D									M	D											D
120	M	41.298473°	-73.575102°	5.0	M	D		M	T								M	D								T			D

Appendix B: Macrophyte Descriptions

AQUATIC MACROPHYTE PICTURE LIBRARY WITH SUMMARIES

Table of Contents

Arrowhead – submersed rosette (*Sagittara* 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 also 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

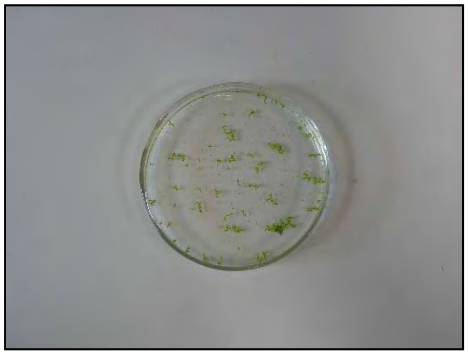
Brazilian Elodea Invasive: Brazilian elodea is an aggressive exotic invasive submersed plant that originated from South America. It was introduced via the aquarium hobby trade, and is a top selling plant used as an oxygenator. The stems can be several meters long, and the strap-like leaves are situated 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.

Common Watermeal (*Wolffia columbiana*)



Common Watermeal Native: Common watermeal appears as pale green globes of vegetative matter without roots, stems or true leaves. Its 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.

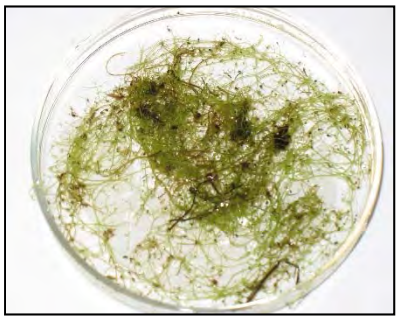
Coontail (*Ceratophyllum demersum*)

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 braches 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 are capable of producing 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 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*)

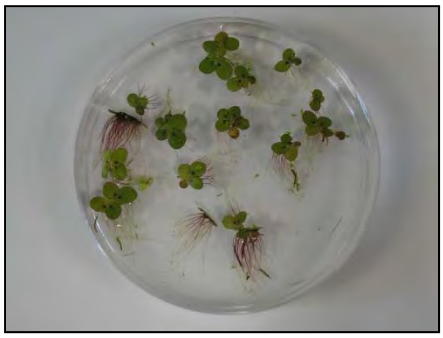
Flat-stem Pondweed Native: Flat-stem pondweed is freely branched, emerging from a delicate rhizome system. The stems are strongly flattened with an angled appearance. The long leaves are stiff and linear with a prominent midvein, and numerous fine parallel veins. This prominent midvein distinguishes 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 sp.*)

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's 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.

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 over winter green. 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 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's also consumed by muskrat, beaver and fish, and dense mats of duckweed can actually inhibit mosquito breeding.

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 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 ½" 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 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, and can 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 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 and source of stored nutrients. The leaf stalks are attached to the middle of the leaf, creating a bull's eye effect, hence its name water target. 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. Watershield prefers soft-water lakes and ponds in 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.

Appendix C: Abundance Table & Distribution Maps

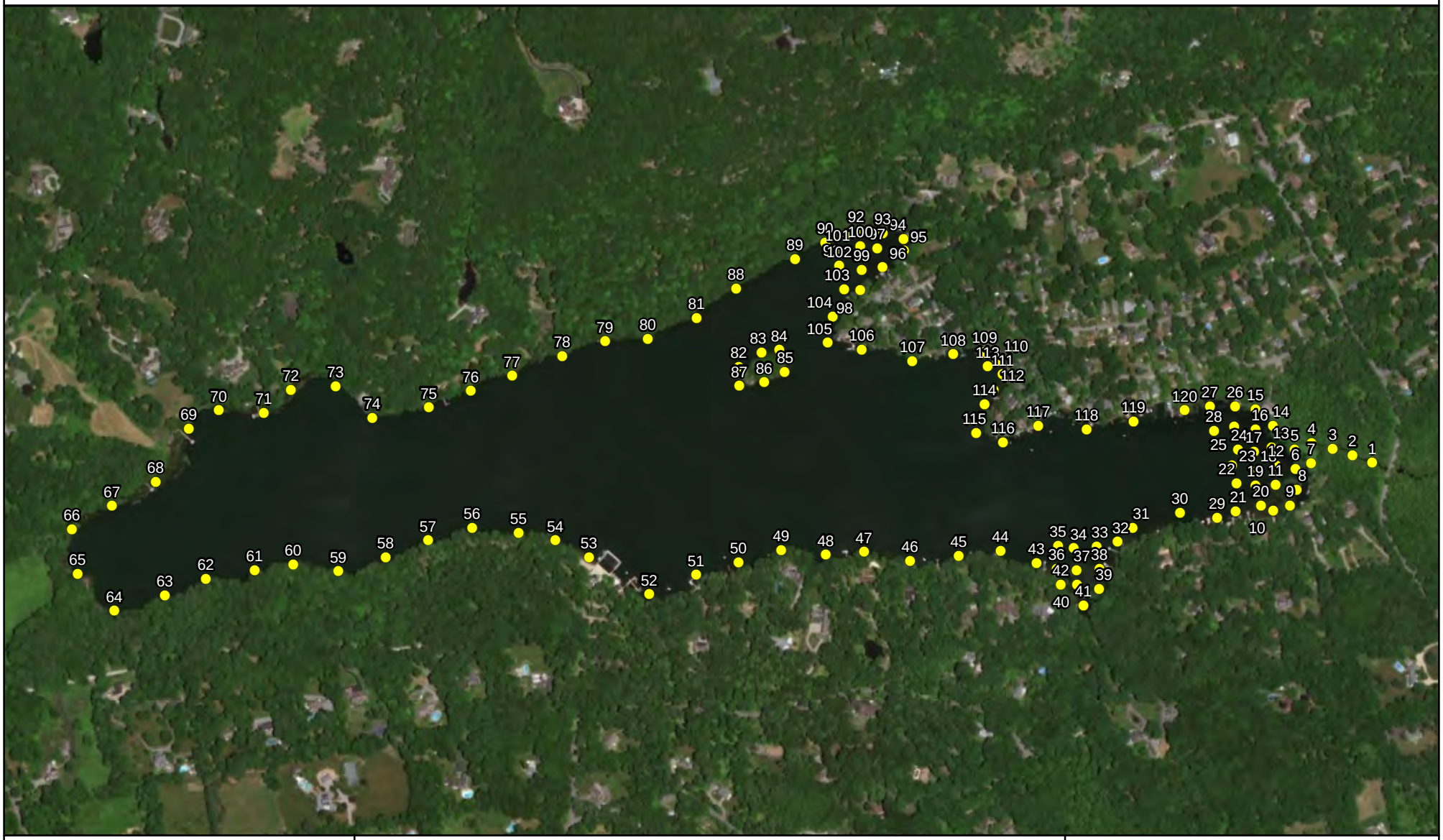
Lake Waccabuc
Aquatic Vegetation Survey
August 1 and 3, 2017

Lake Waccabuc
Aquatic Macrophyte Abundance Distribution
August 1 & 3, 2017

	Total		Trace		Sparse		Medium		Dense	
	Sites	%	Sites	%	Sites	%	Sites	%	Sites	%
TOTAL SITES	120									
Total Submersed	106	88%	34	32%	30	28%	30	28%	12	11%
Eurasian Water Milfoil	100	83%	51	51%	30	30%	17	17%	2	2%
Benthic Filamentous Algae	43	36%	31	72%	11	26%	1	2%	0	0%
Coontail	43	36%	29	67%	8	19%	5	12%	1	2%
Bass Weed	35	29%	15	43%	10	29%	8	23%	2	6%
Water Stargrass	30	25%	26	87%	3	10%	1	3%	0	0%
Floating Filamentous Algae	28	23%	16	57%	3	11%	6	21%	3	11%
Pondweed sp.	22	18%	22	100%	0	0%	0	0%	0	0%
Common Waterweed	11	9%	7	64%	3	27%	1	9%	0	0%
Arrowhead	7	6%	7	100%	0	0%	0	0%	0	0%
Creeping Bladderwort	7	6%	6	86%	1	14%	0	0%	0	0%
Robbin's Pondweed	7	6%	7	100%	0	0%	0	0%	0	0%
Leafy Pondweed	5	4%	5	100%	0	0%	0	0%	0	0%
Ribbon-Leaf Pondweed	4	3%	1	25%	1	25%	2	50%	0	0%
Brittle Naiad	3	3%	3	100%	0	0%	0	0%	0	0%
Bur Reed	1	1%	0	0%	1	100%	0	0%	0	0%
Curly-Leaf Pondweed	1	1%	1	100%	0	0%	0	0%	0	0%
Dwarf Milfoil	1	1%	1	100%	0	0%	0	0%	0	0%
Quillwort	1	1%	1	100%	0	0%	0	0%	0	0%
Slender Naiad	1	1%	1	100%	0	0%	0	0%	0	0%
Total Floating	67	56%	21	31%	18	27%	10	15%	18	27%
White Water Lily	49	41%	20	41%	16	33%	6	12%	7	14%
Watershield	37	31%	16	43%	12	32%	4	11%	5	14%
Spatterdock	22	18%	14	64%	6	27%	1	5%	1	5%
Small Duckweed	3	3%	3	100%	0	0%	0	0%	0	0%

Point Intercept Locations

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Sample Point Locations

0 500 1,000 Feet

Species Richness

Three Lakes: Lake Waccabuc

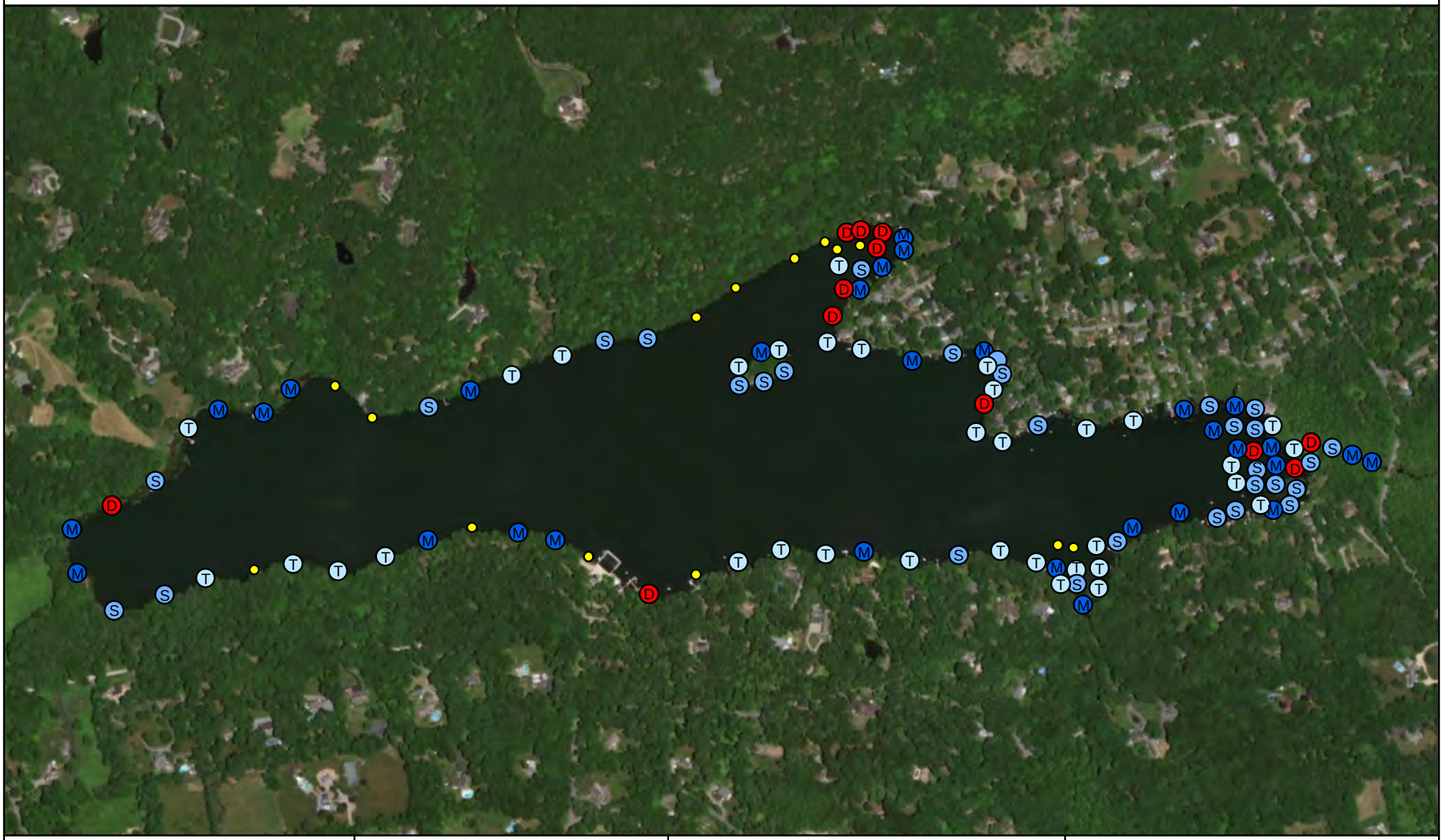
Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Species Richness per Location

0 500 1,000 Feet

Total Submersed Aquatic Vegetation Abundance

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

Abundance	Sites	Percent
Total	106	88%
Trace	34	32%
Sparse	30	28%
Medium	30	28%
Dense	12	11%

0 500 1,000 Feet

Eurasian Watermilfoil (*Myriophyllum spicatum*) Distribution

SOLITUDE LAKE MANAGEMENT

Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

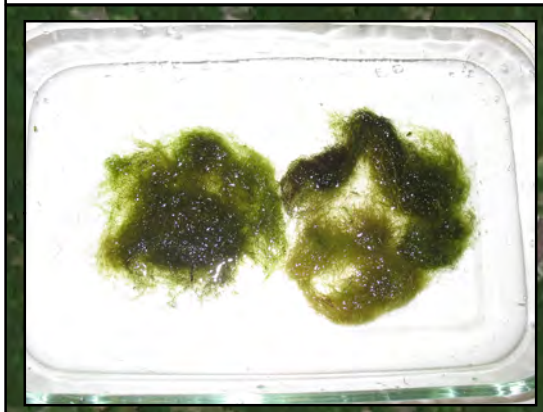
Abundance	Sites	Percent
Total	100	83%
Trace	51	51%
Sparse	30	30%
Medium	17	17%
Dense	2	2%

N

0 500 1,000 Feet

Benthic Filamentous Algae (various species) Distribution

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

Abundance	Sites	Percent
Total	43	36%
Trace	31	72%
Sparse	11	26%
Medium	1	2%
Dense	0	0%

N

0 500 1,000 Feet

Coontail (*Ceratophyllum demersum*) Distribution

SOLITUDE LAKE MANAGEMENT

Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

Abundance	Sites	Percent
Total	43	36%
Trace	29	67%
Sparse	8	19%
Medium	5	12%
Dense	1	2%

N

0 500 1,000 Feet

Bass Weed (*Potamogeton amplifolius*) Distribution

SOLITUDE LAKE MANAGEMENT

Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

Abundance	Sites	Percent
Total	35	29%
Trace	15	43%
Sparse	10	29%
Medium	8	23%
Dense	2	6%

N

0 500 1,000 Feet

Water Stargrass (*Zosterella dubia*) Distribution

SOLITUDE LAKE MANAGEMENT

Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

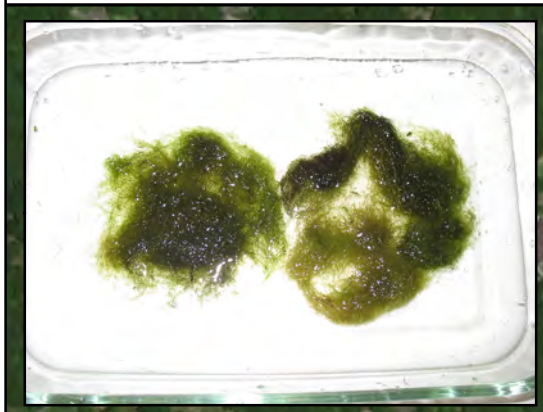
Abundance	Sites	Percent
Total	30	25%
Trace	26	87%
Sparse	3	10%
Medium	1	3%
Dense	0	0%

N

0 500 1,000 Feet

Floating Filamentous Algae (Various species) Distribution

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

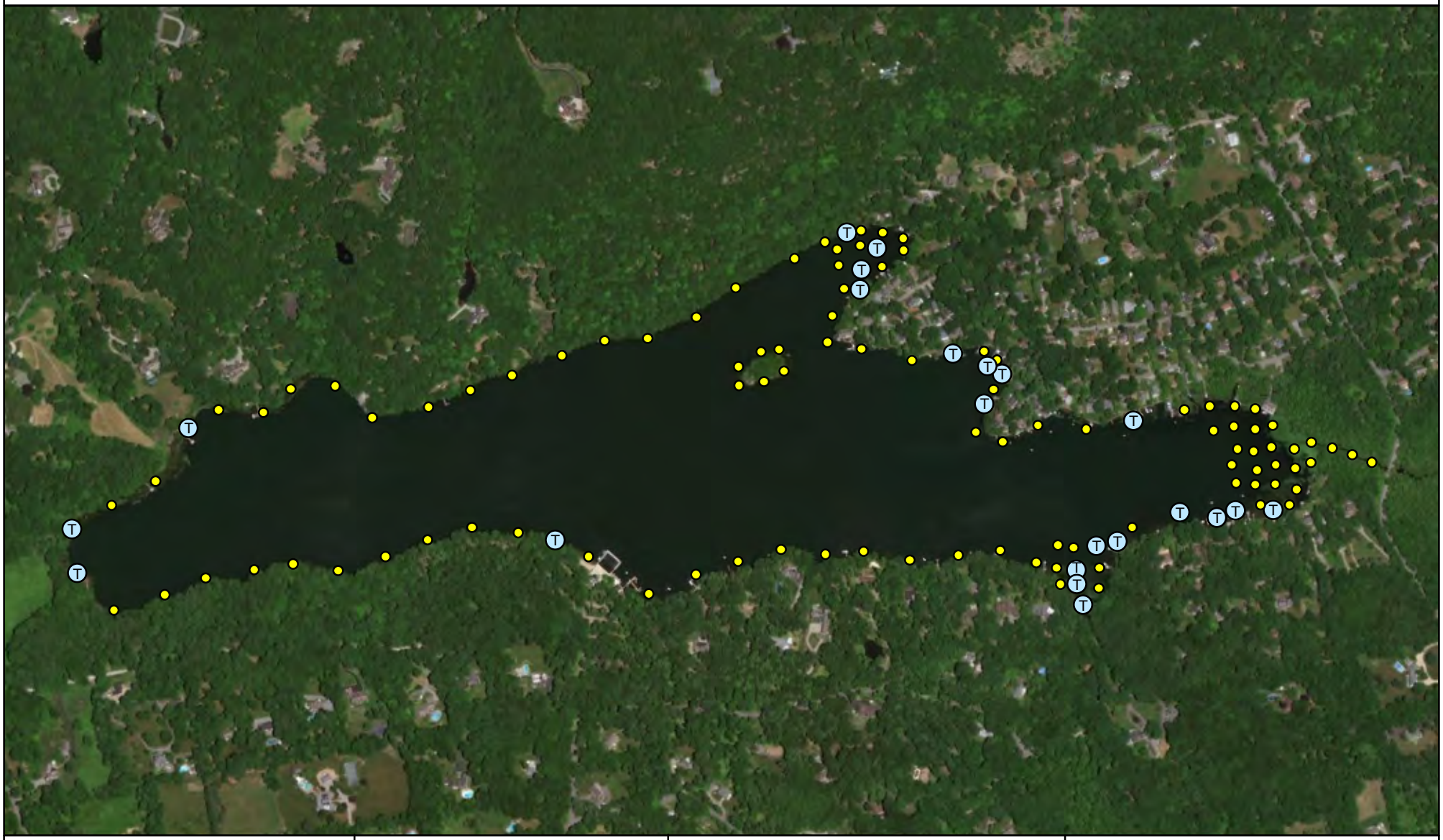
Abundance	Sites	Percent
Total	28	23%
Trace	16	57%
Sparse	3	11%
Medium	6	21%
Dense	3	11%

N

0 500 1,000 Feet

Thin-leaf Pondweed (*Potamogeton sp.*) Distribution

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

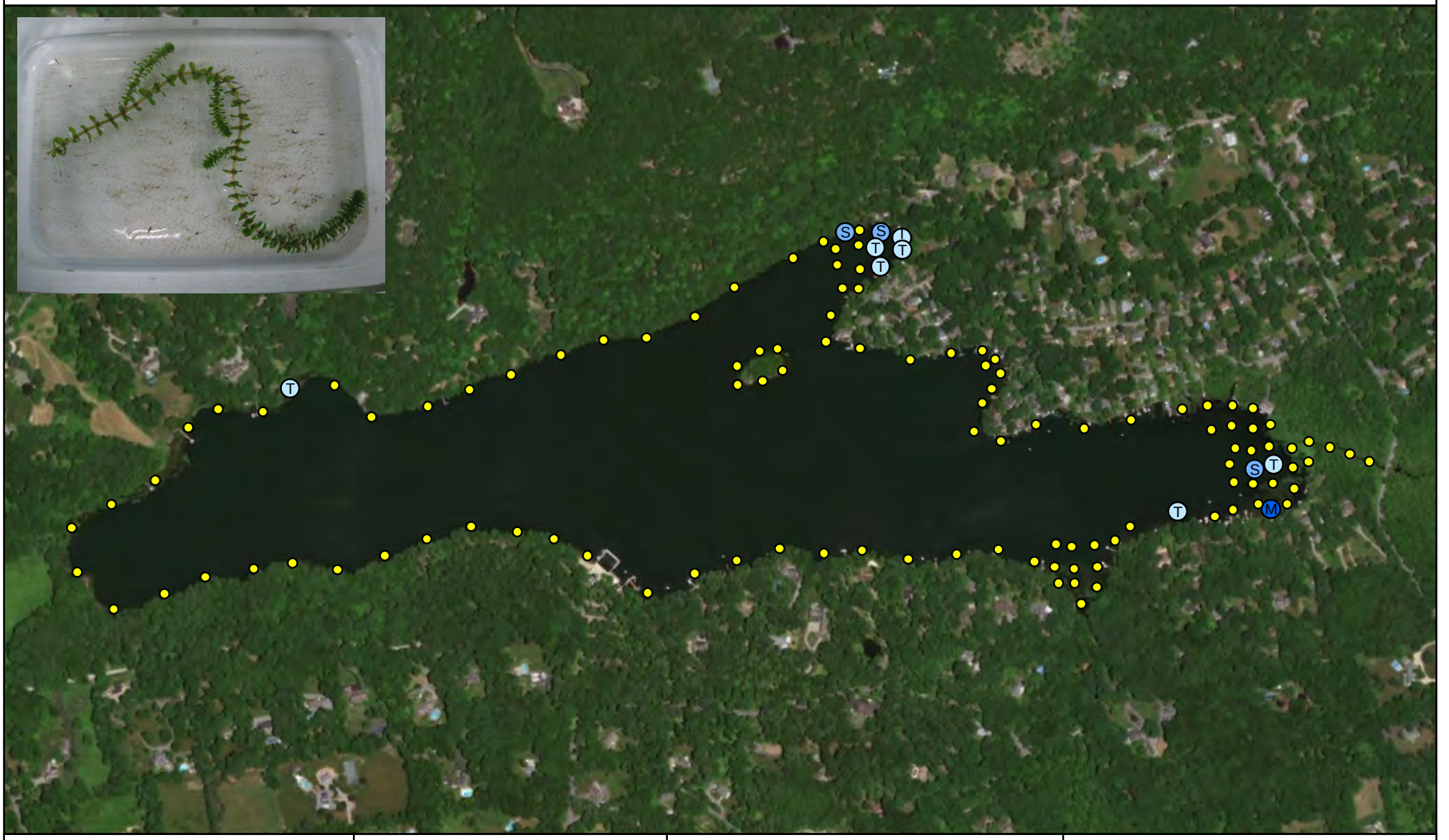
Abundance	Sites	Percent
Total	22	18%
Trace	22	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

N

0 500 1,000 Feet

Common Waterweed (*Elodea canadensis*) Distribution

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

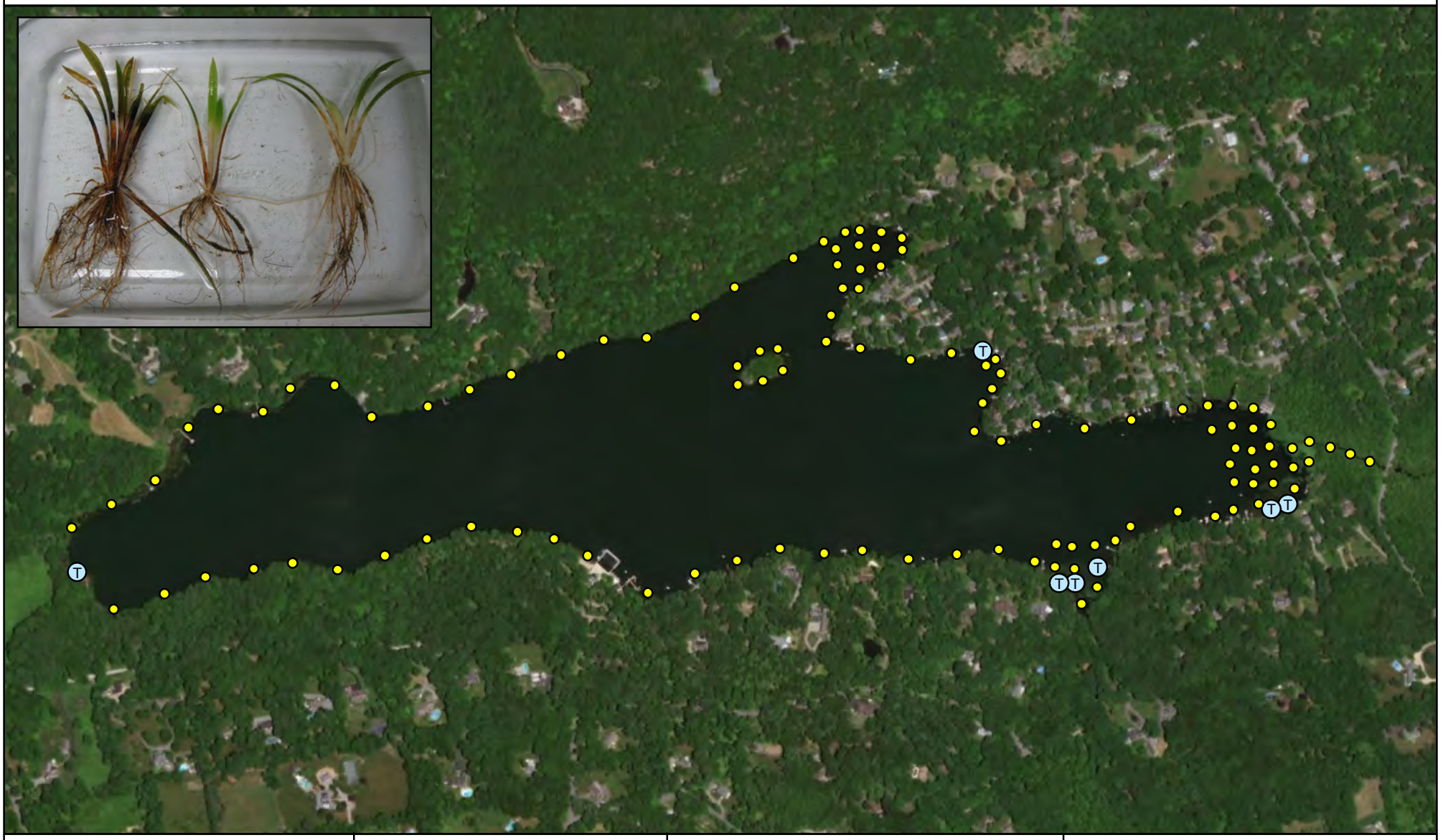
Abundance	Sites	Percent
Total	11	9%
Trace	7	64%
Sparse	3	27%
Medium	1	9%
Dense	0	0%

N

0 500 1,000 Feet

Arrowhead (*Sagittaria sp.*) Distribution

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

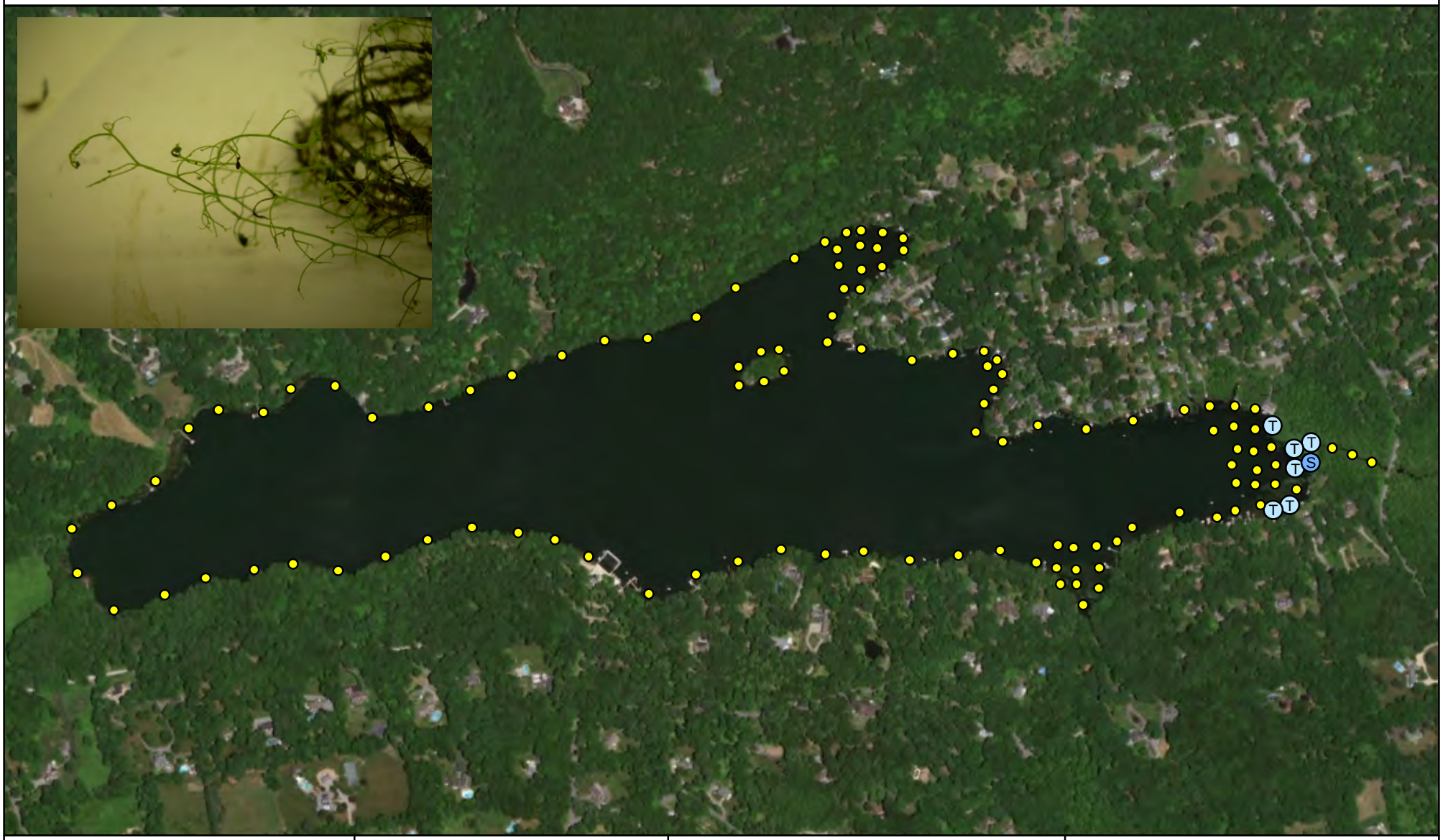
Plant Distribution

Abundance	Sites	Percent
Total	7	6%
Trace	7	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

0 500 1,000 Feet

Creeping Bladderwort (*Utricularia gibba*) Distribution

SŌLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

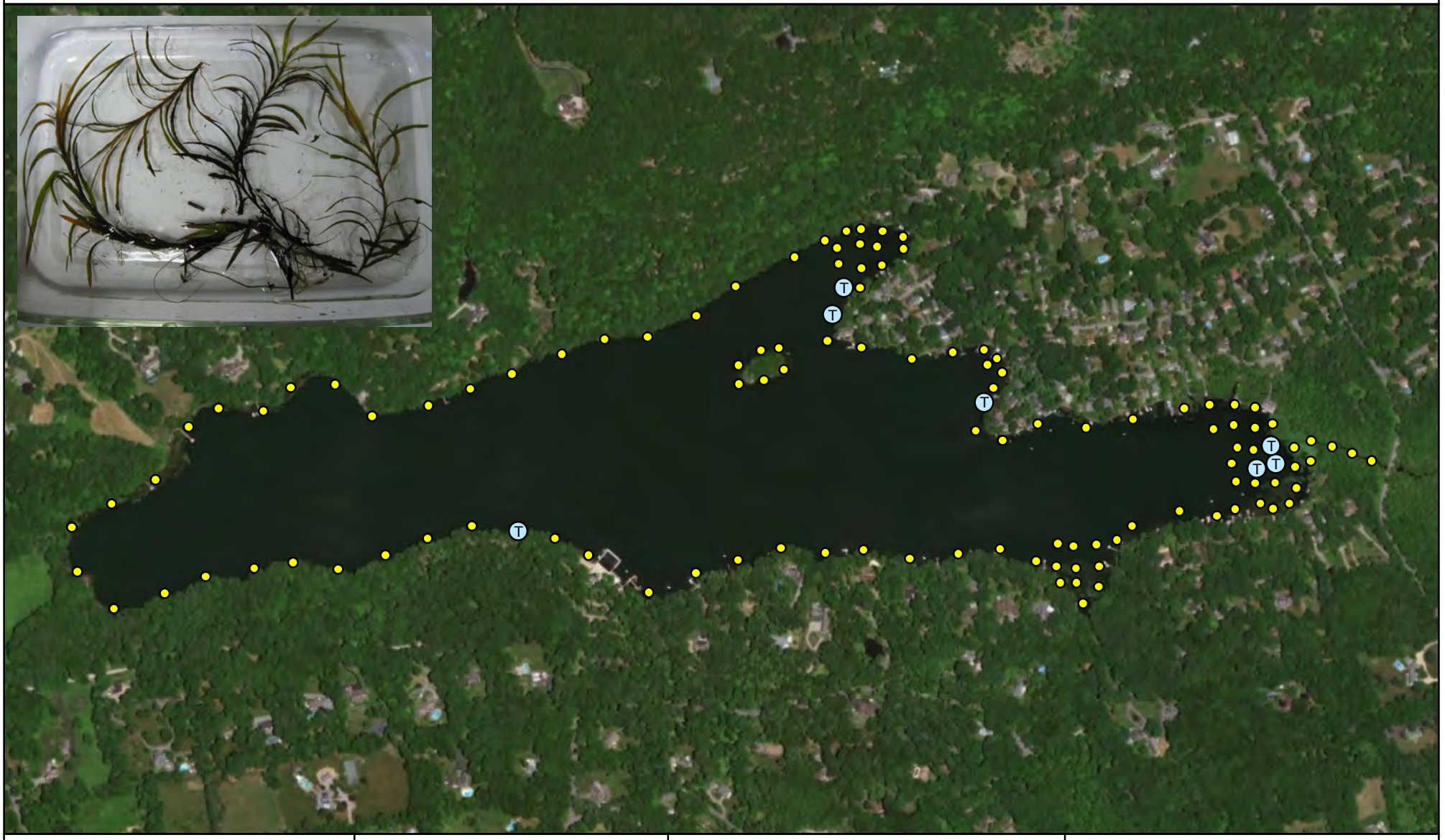
Abundance	Sites	Percent
Total	7	6%
Trace	6	86%
Sparse	1	14%
Medium	0	0%
Dense	0	0%

N

0 500 1,000 Feet

Robbin's Pondweed (*Potamogeton robbinsii*) Distribution

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

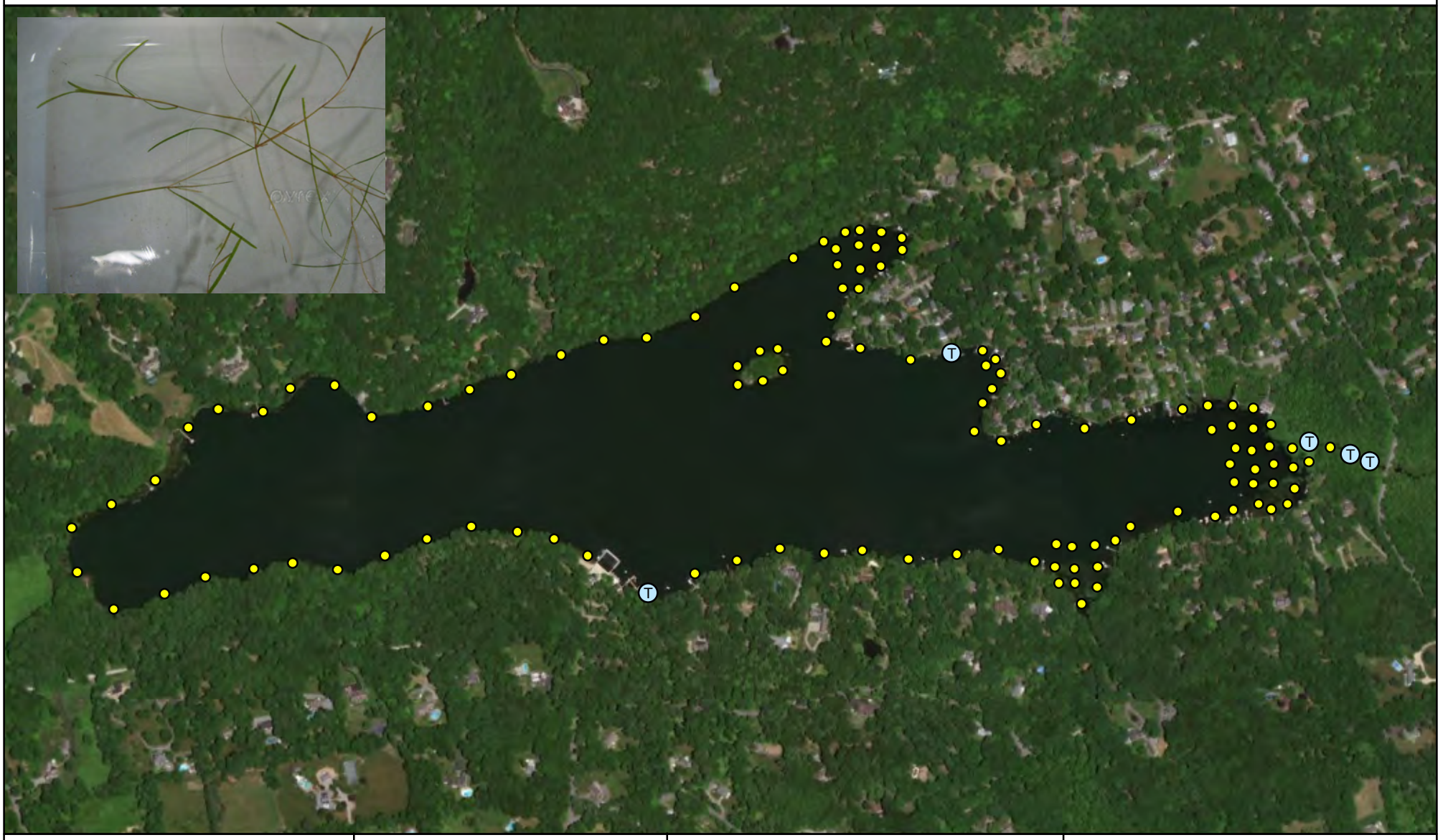
Abundance	Sites	Percent
Total	7	6%
Trace	7	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

N

0 500 1,000 Feet

Leafy Pondweed (*Potamogeton foliosus*) Distribution

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

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

N

0 500 1,000 Feet

Ribbon-leaf Pondweed (*Potamogeton epihydrus*) Distribution

SOLITUDE LAKE MANAGEMENT

Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

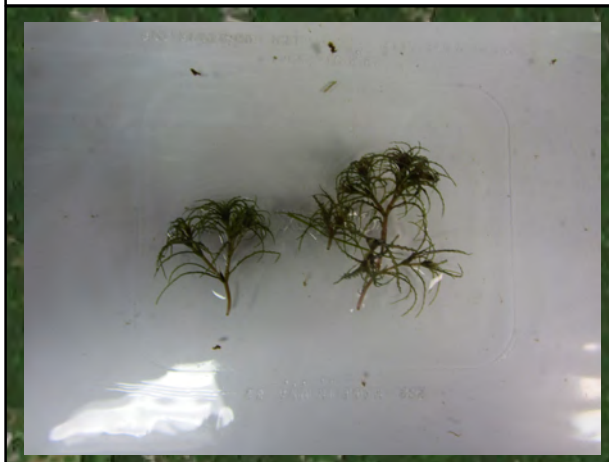
Abundance	Sites	Percent
Total	4	3%
Trace	1	25%
Sparse	1	25%
Medium	2	50%
Dense	0	0%

N

0 500 1,000 Feet

Brittle Naiad (*Najas minor*) Distribution

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

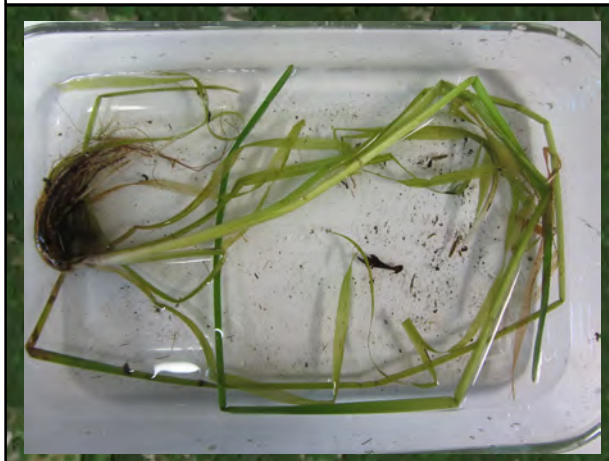
Abundance	Sites	Percent
Total	3	3%
Trace	3	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

N

0 500 1,000 Feet

Floating Bur-reed (*Sparganium sp.*) Distribution

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

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

N

0 500 1,000 Feet

Curly-leaf Pondweed (*Potamogeton crispus*) Distribution

SOLITUDE LAKE MANAGEMENT

Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

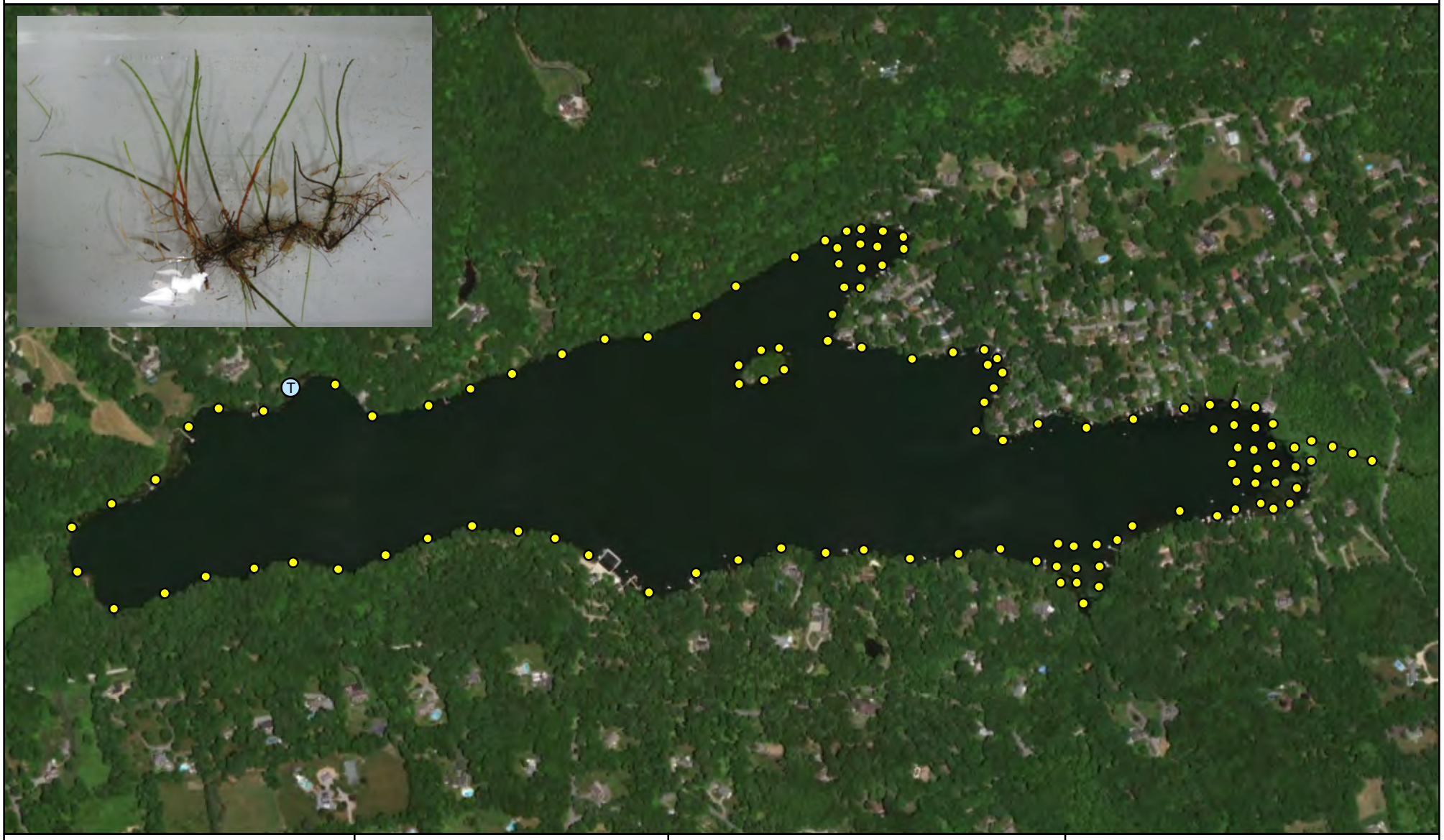
Abundance	Sites	Percent
Total	1	1%
Trace	1	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

N

0 500 1,000 Feet

Dwarf Milfoil (*Myriophyllum tenellum*) Distribution

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

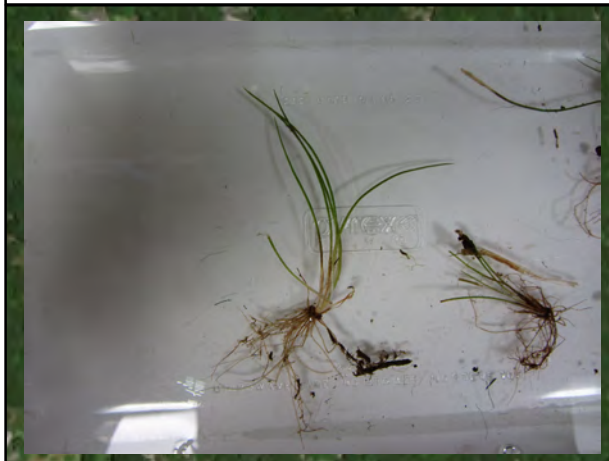
Abundance	Sites	Percent
Total	1	1%
Trace	1	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

N

0 500 1,000 Feet

Quillwort (*Isoetes sp.*) Distribution

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

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

N

0 500 1,000 Feet

Slender Naiad (*Najas flexilis*) Distribution

SOLITUDE LAKE MANAGEMENT

Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

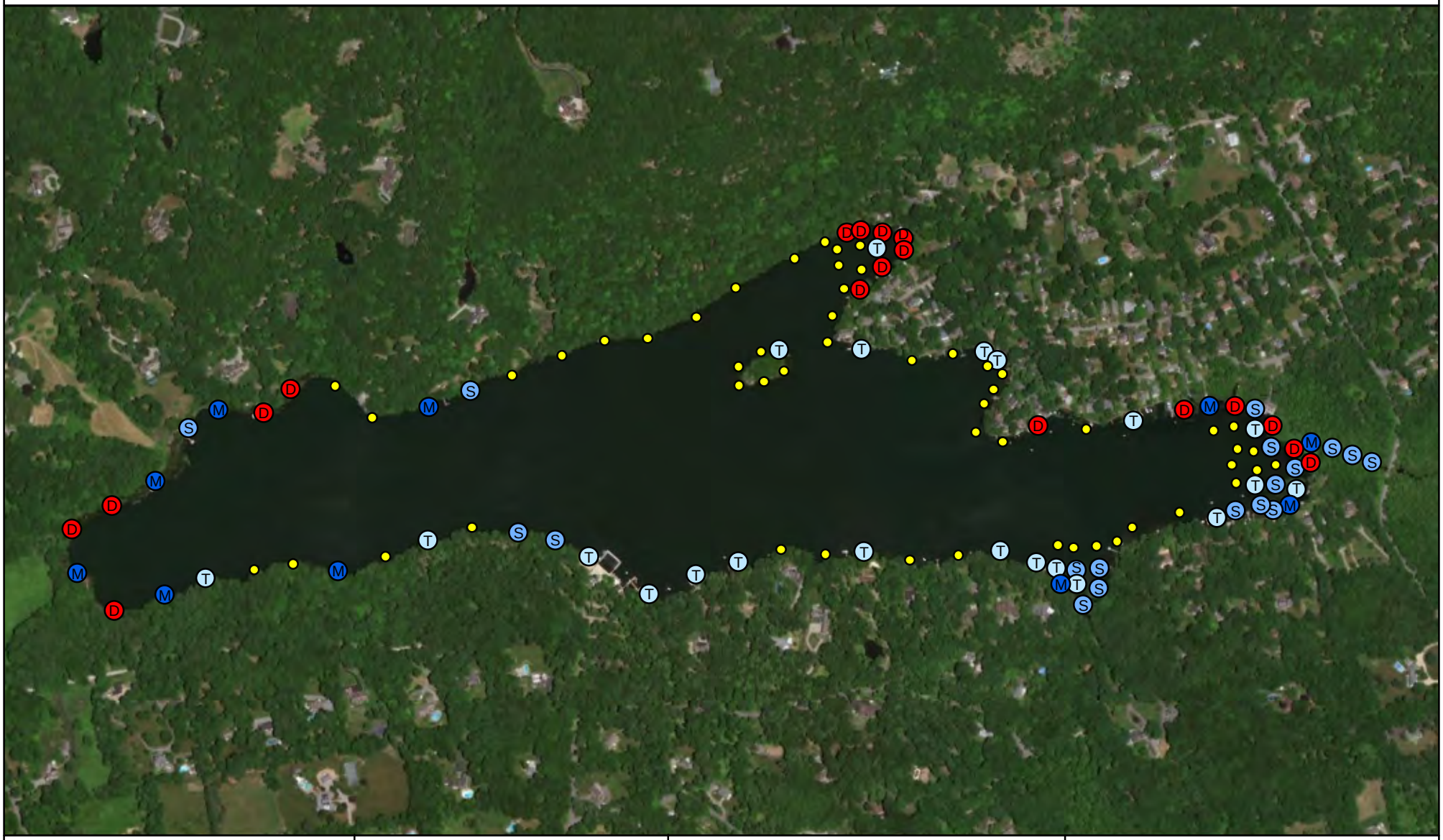
Abundance	Sites	Percent
Total	1	1%
Trace	1	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

N

0 500 1,000 Feet

Total Floating Aquatic Vegetation Abundance

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

Abundance	Sites	Percent
Total	67	56%
Trace	21	31%
Sparse	18	27%
Medium	10	15%
Dense	18	27%

N

0 500 1,000 Feet

White Waterlily (*Nymphaea odorata*) Distribution

SOLITUDE LAKE MANAGEMENT

Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

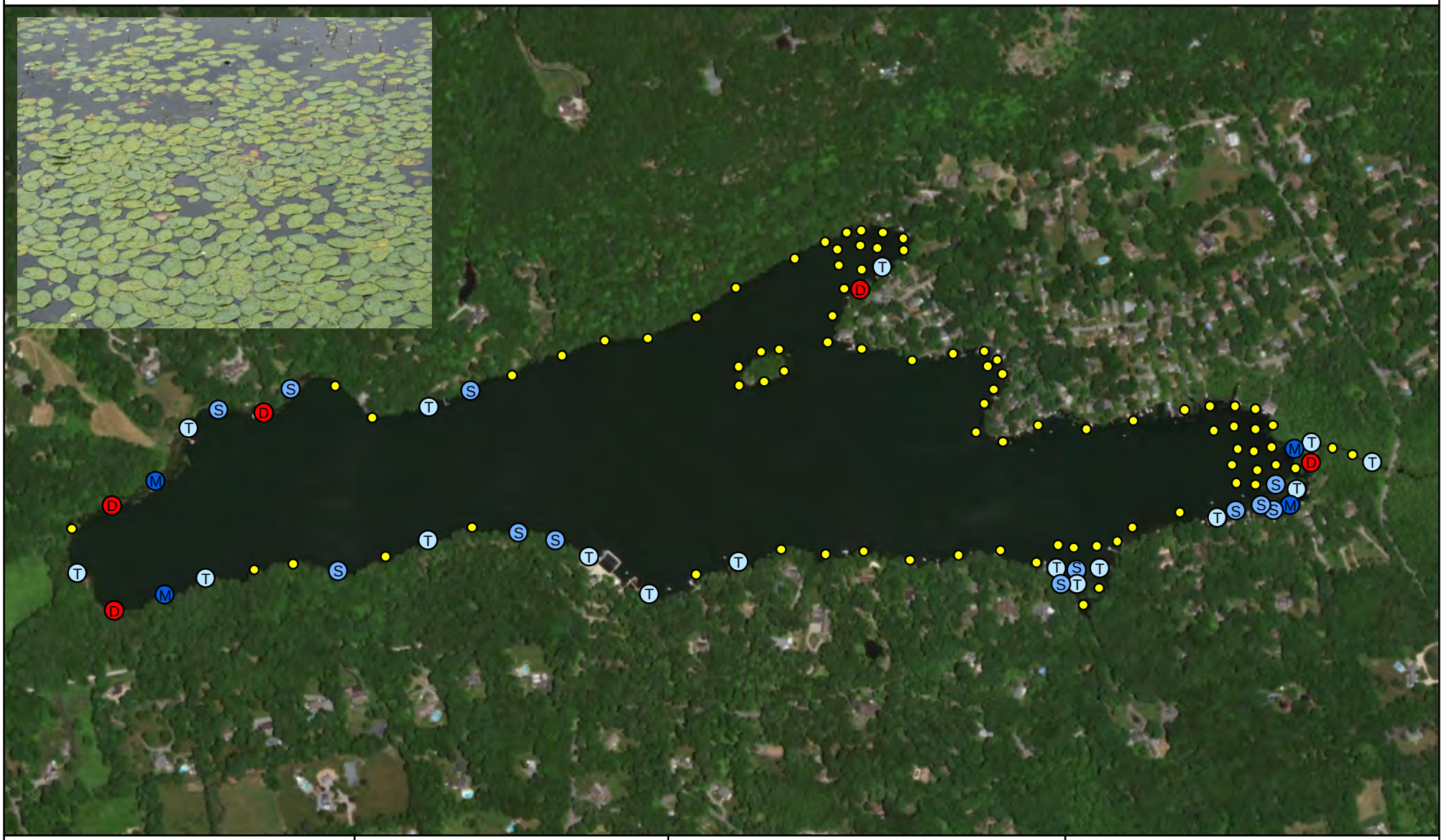
Abundance	Sites	Percent
Total	49	41%
Trace	20	41%
Sparse	16	33%
Medium	6	12%
Dense	7	14%

N

0 500 1,000 Feet

Watershield (*Brasenia schreberi*) Distribution

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

Abundance	Sites	Percent
Total	37	31%
Trace	16	43%
Sparse	12	32%
Medium	4	11%
Dense	5	14%

N

0 500 1,000 Feet

Spatterdock (*Nuphar variegata*) Distribution

SOLITUDE LAKE MANAGEMENT

Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

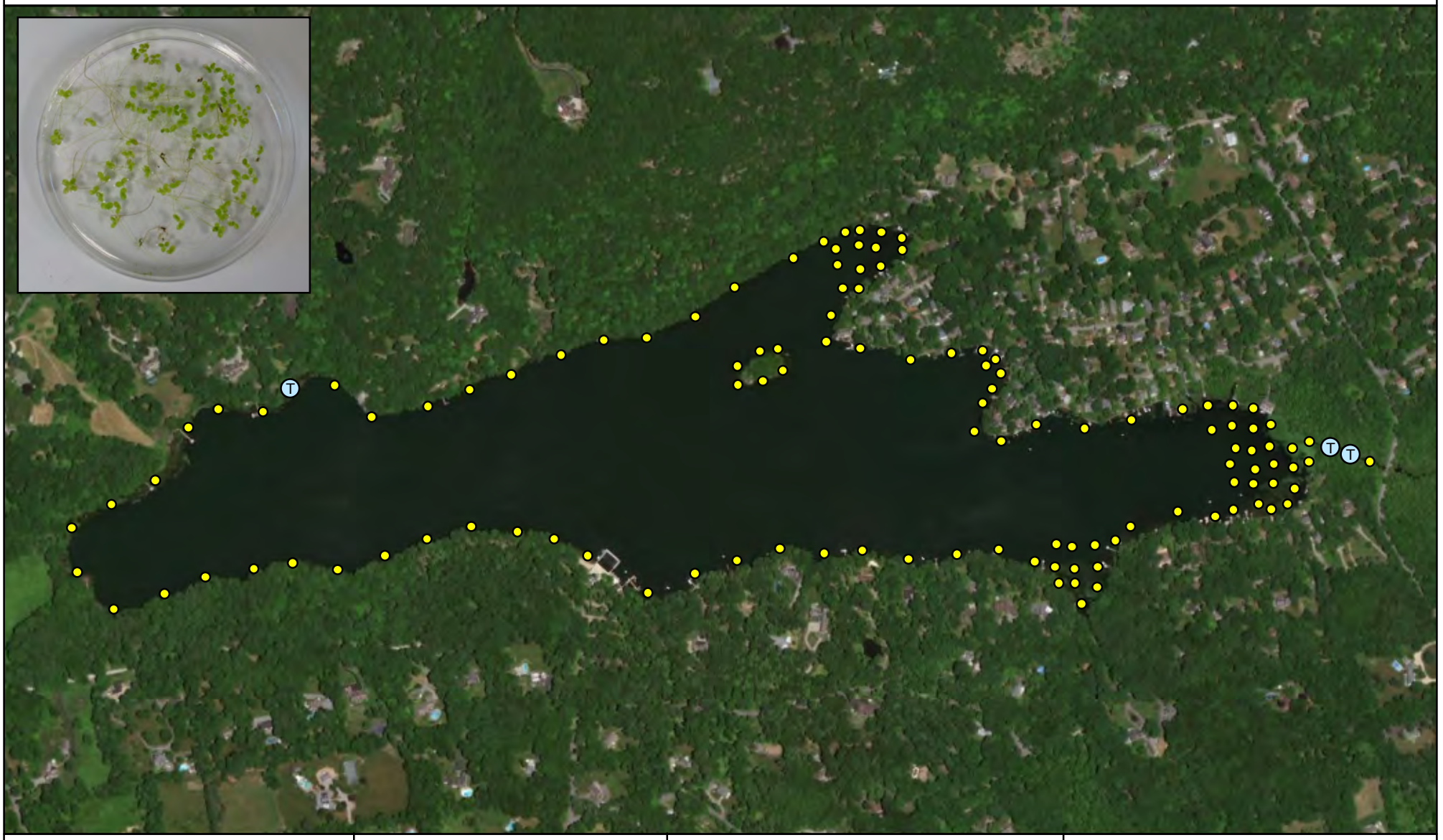
Abundance	Sites	Percent
Total	22	18%
Trace	14	64%
Sparse	6	27%
Medium	1	5%
Dense	1	5%

N

0 500 1,000 Feet

Small Duckweed (*Lemna minor*) Distribution

SOLITUDE LAKE MANAGEMENT



Three Lakes: Lake Waccabuc

Aquatic Vegetation Survey
August 1 & 3, 2017
120 Sites

Plant Density Legend

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

Plant Distribution

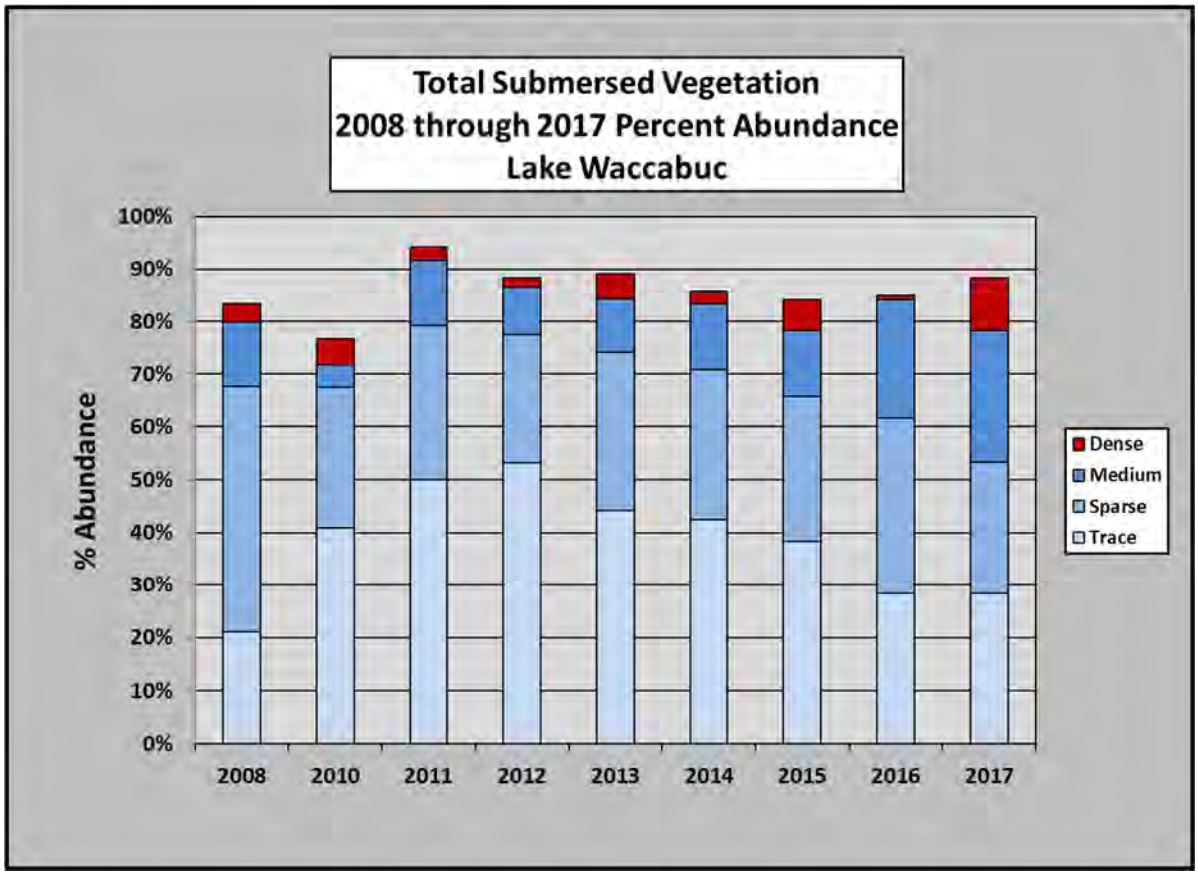
Abundance	Sites	Percent
Total	3	3%
Trace	3	100%
Sparse	0	0%
Medium	0	0%
Dense	0	0%

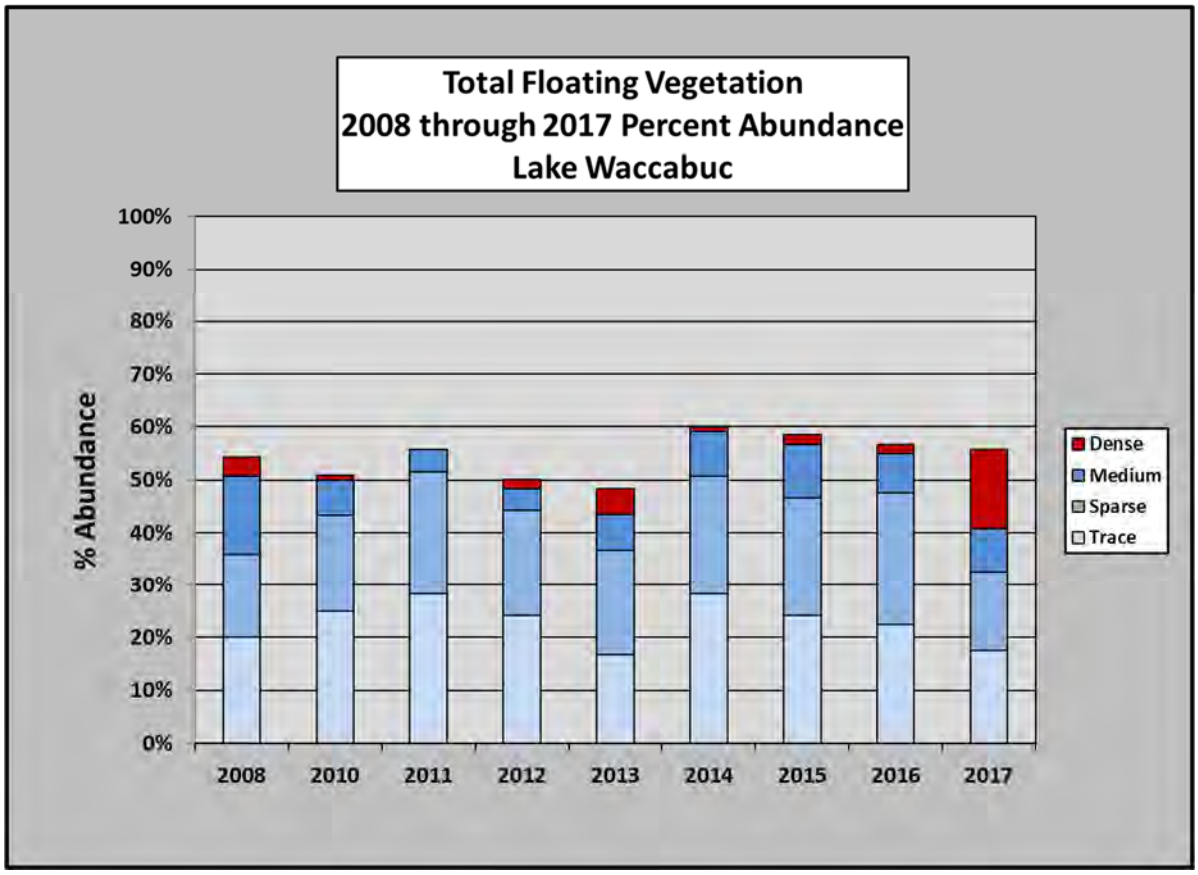
N

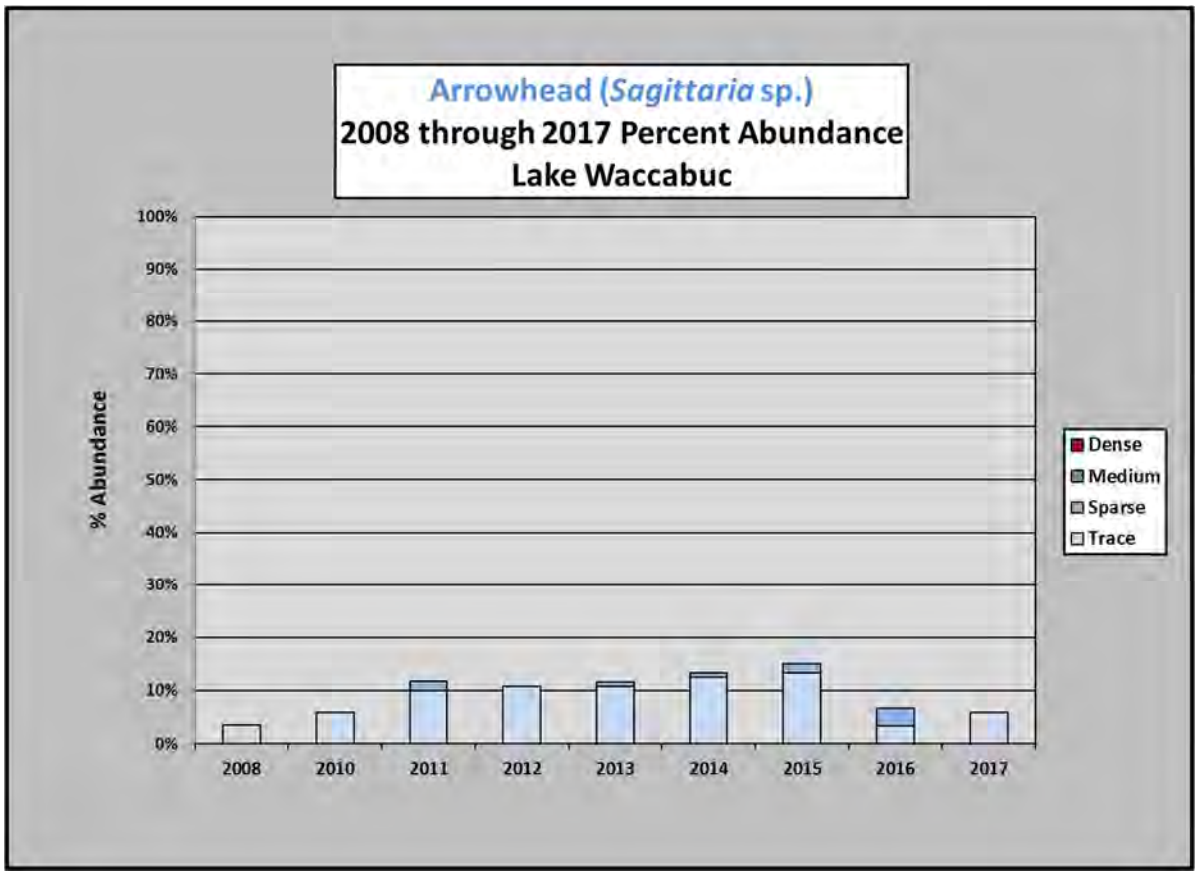
0 500 1,000 Feet

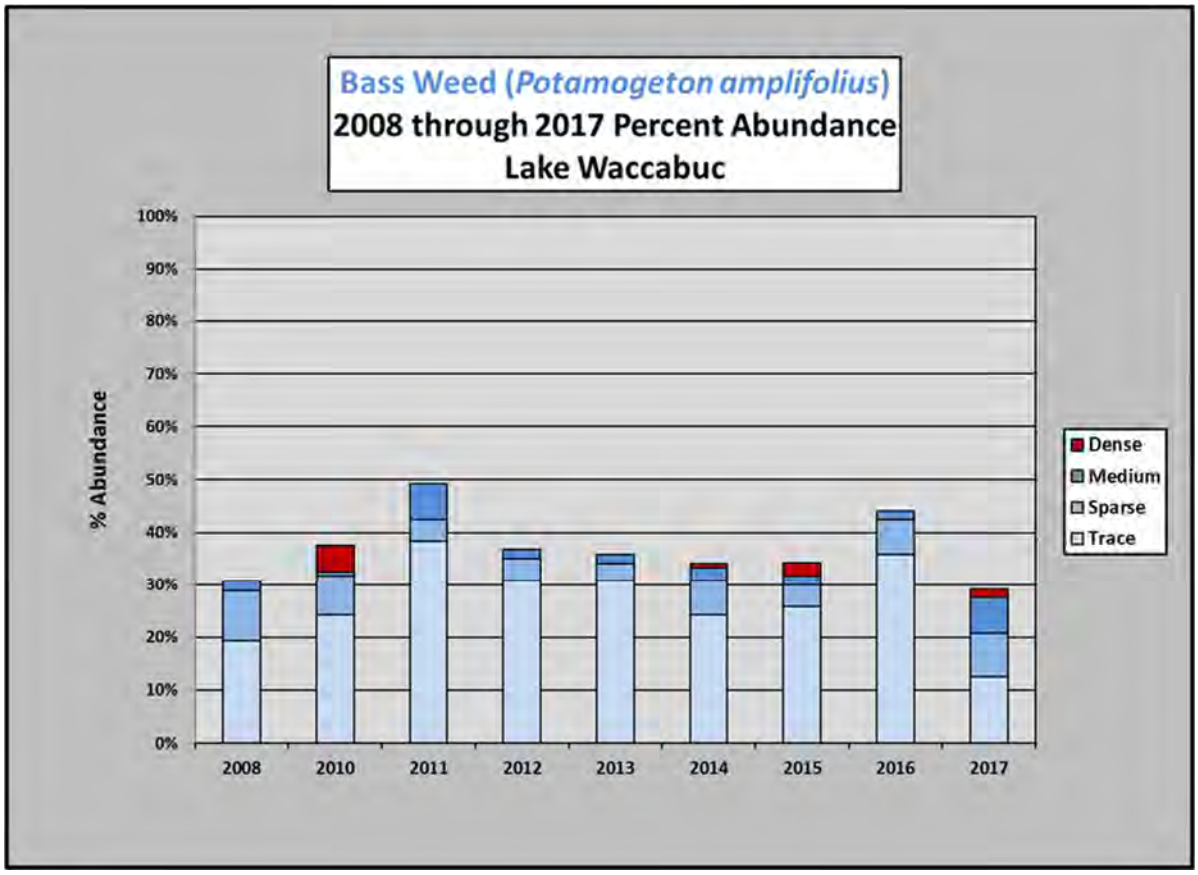
Appendix D: Comparative Macrophyte Abundance Graphs

Lake Waccabuc
Aquatic Macrophyte Mapping
August 1 & 3, 2017
Appendix D: Comparative Macrophyte Abundance Graphs






Arrowhead (*Sagittaria* sp.)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2010
2011
2012
2013
2014
2015
2016
2017
Dense
Medium
Sparse
Trace


Bass Weed (*Potamogeton amplifolius*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
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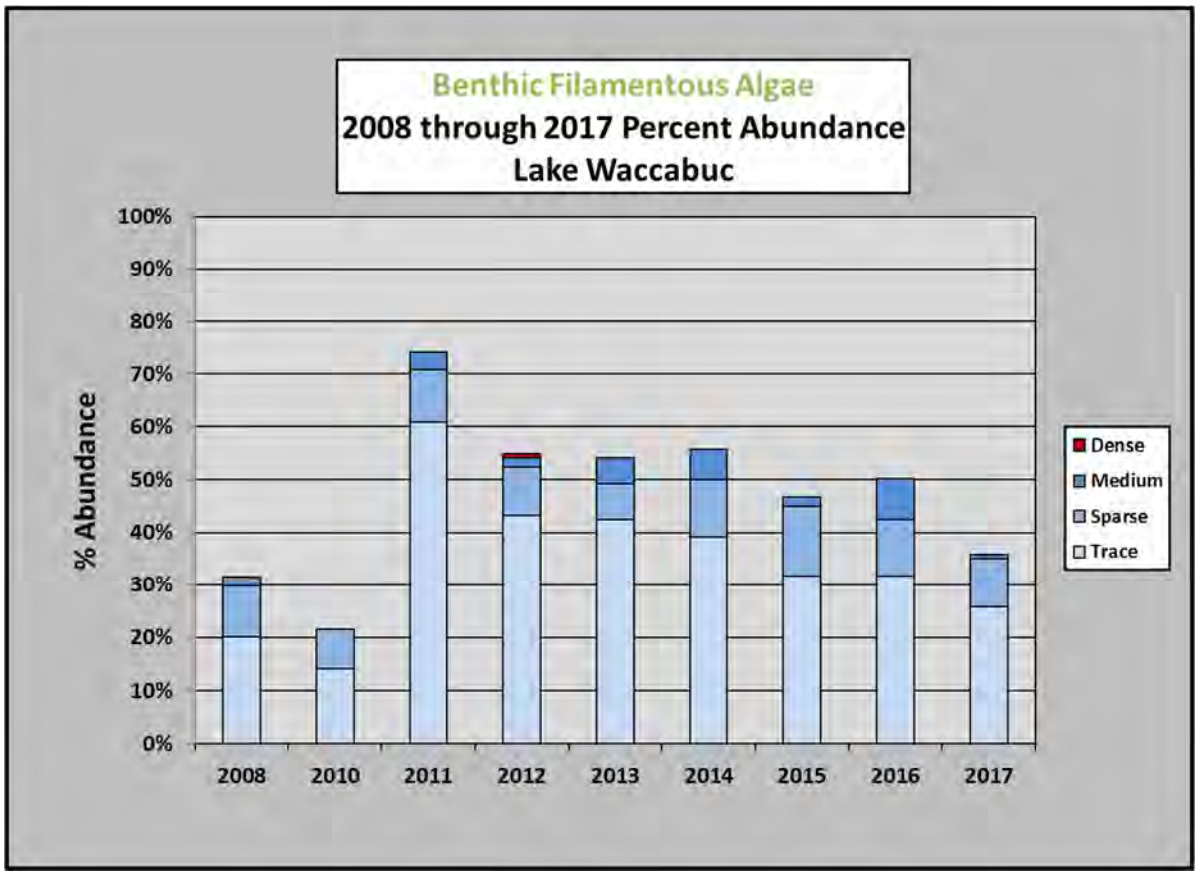
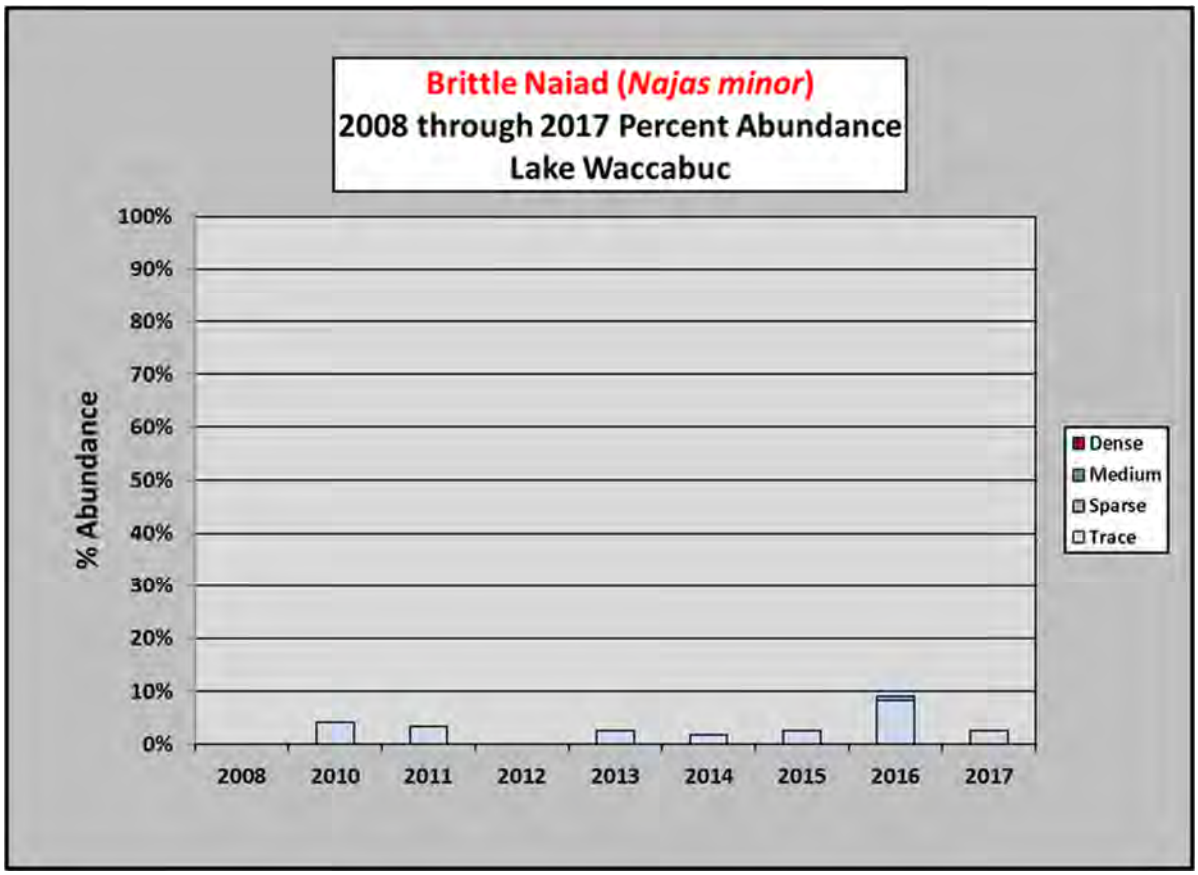
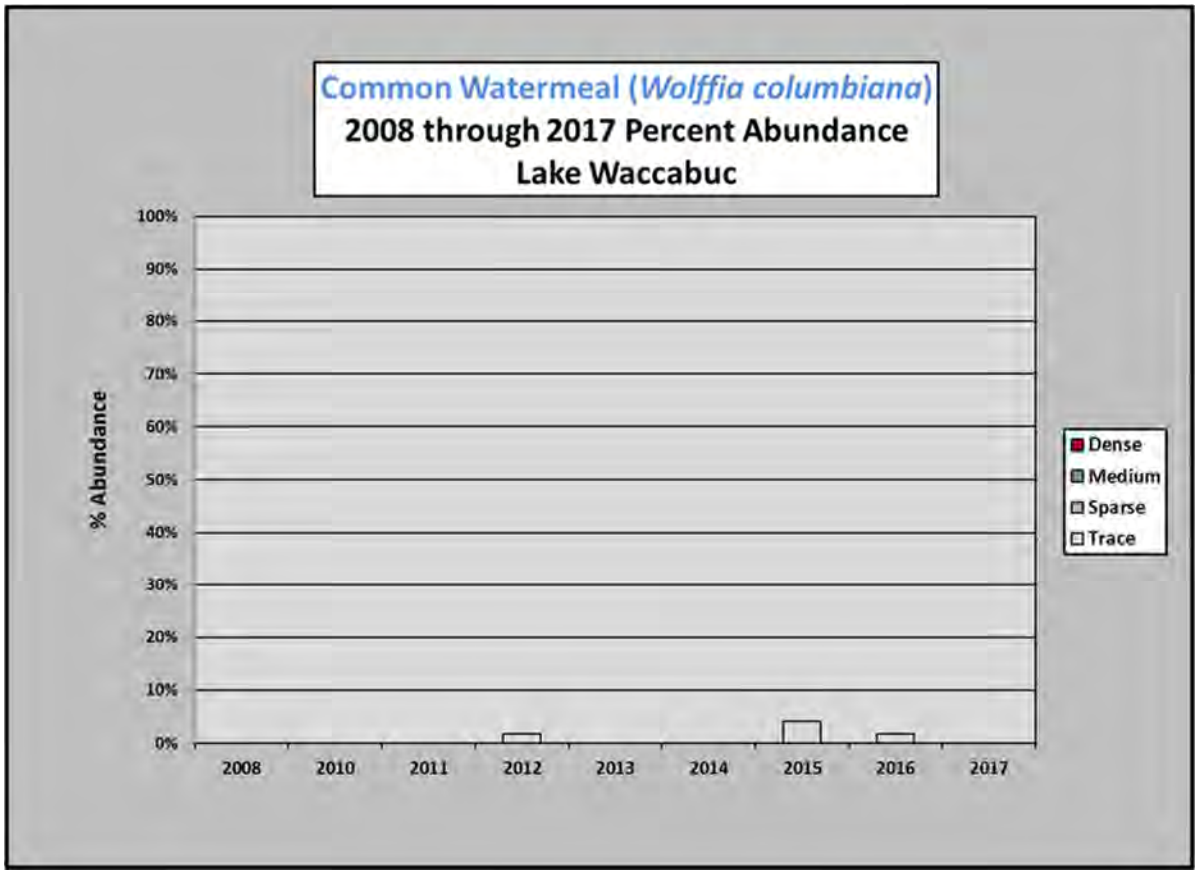
2011
2012
2013
2014
2015
2016
2017
Dense
Medium
Sparse
Trace


Benthic Filamentous Algae
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2010
2011
2012
2013
2014
2015
2016
2017
Dense
Medium
Sparse
Trace


Brazilian Elodea (*Egeria densa*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2010
2011
2012
2013
2014
2015
2016
2017
Dense
Medium
Sparse
Trace


Brittle Naiad (*Najas minor*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2010
2011
2012
2013
2014
2015
2016
2017
Dense
Medium
Sparse
Trace


Common Watermeal (*Wolffia columbiana*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2010
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2012
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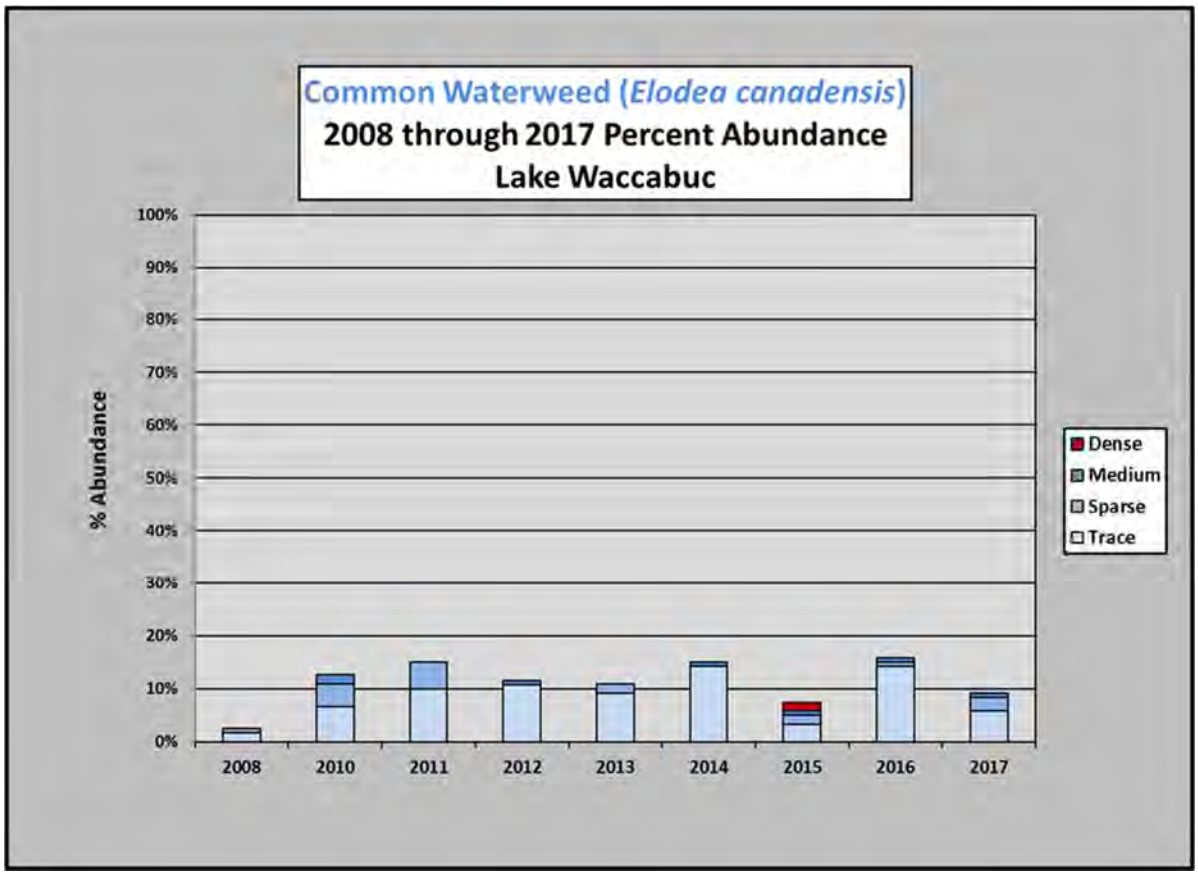
2016
2017
Dense
Medium
Sparse
Trace


Common Waterweed (*Elodea canadensis*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
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2014
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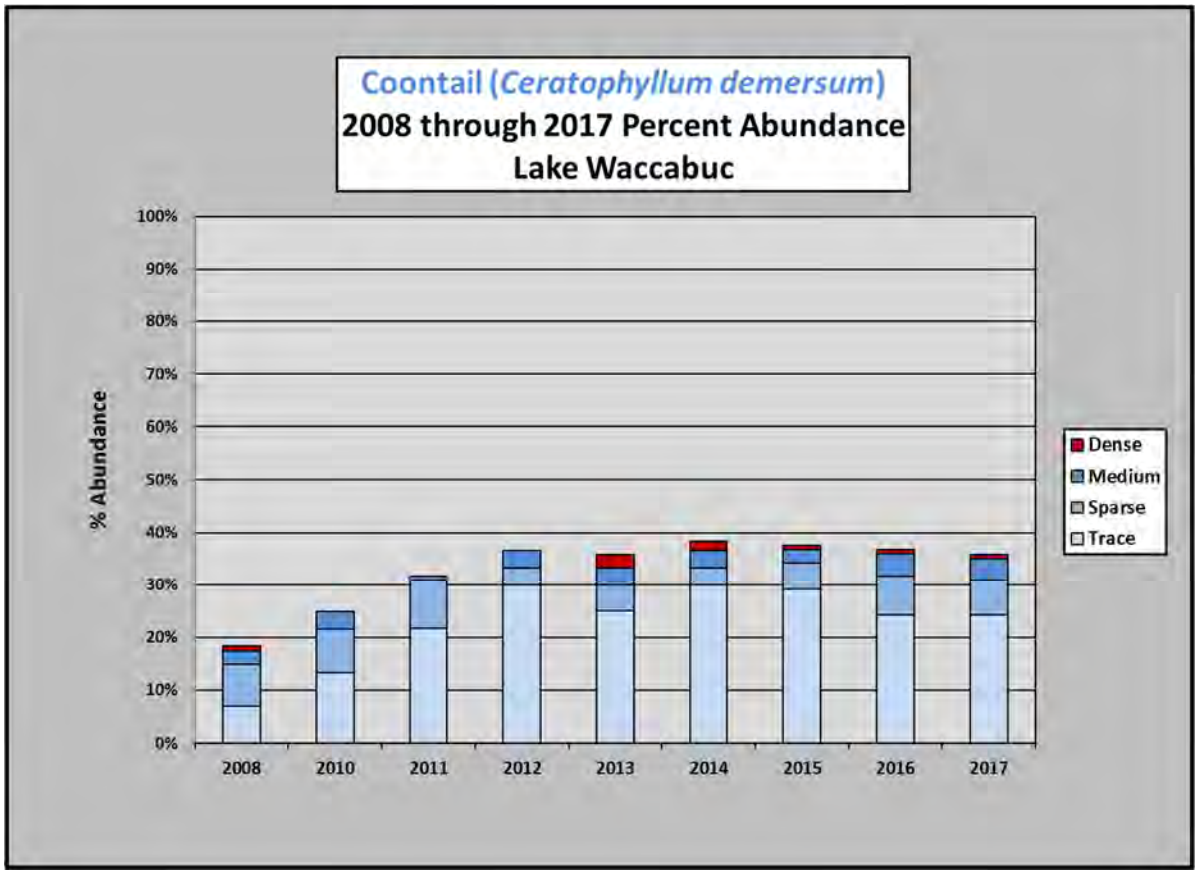
2016
2017
Dense
Medium
Sparse
Trace


Coontail (*Ceratophyllum demersum*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2010
2011
2012
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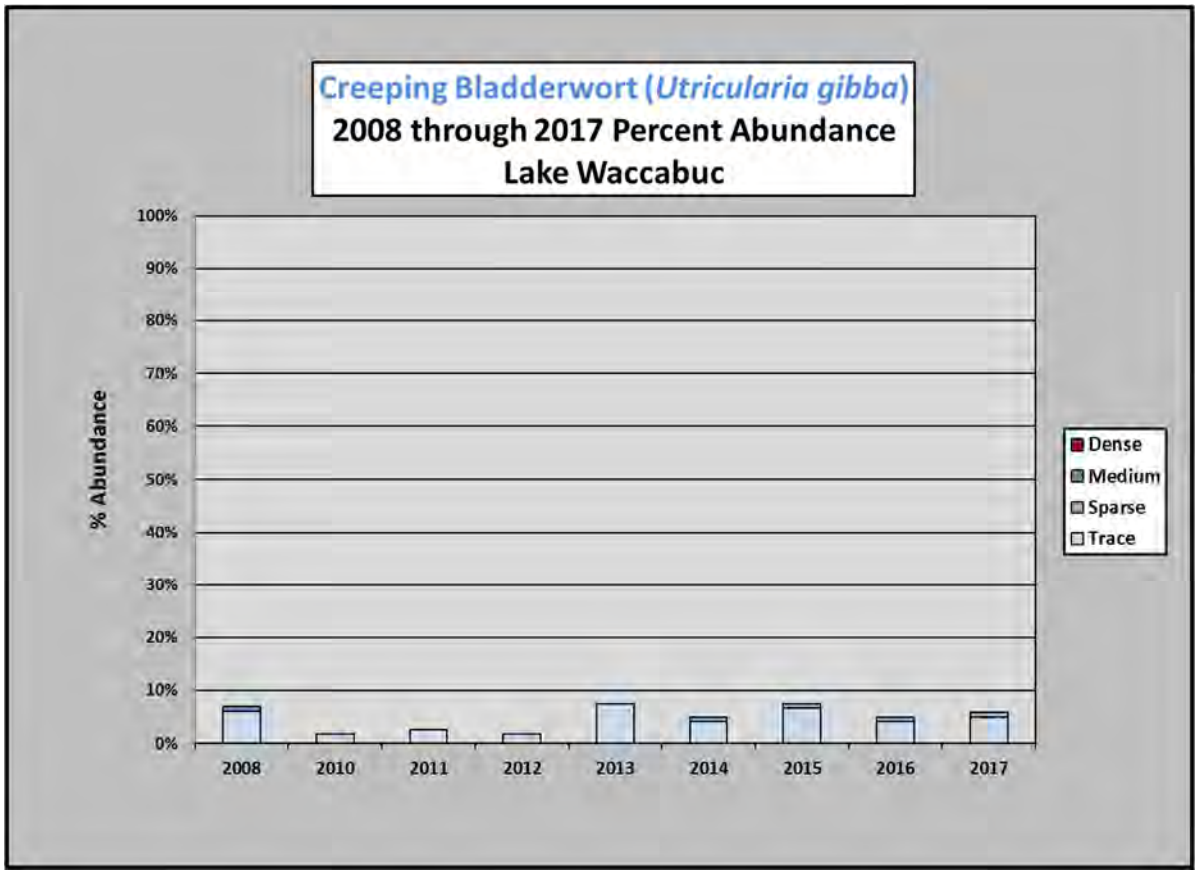
2015
2016
2017
Dense
Medium
Sparse
Trace


Creeping Bladderwort (*Utricularia gibba*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
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2012
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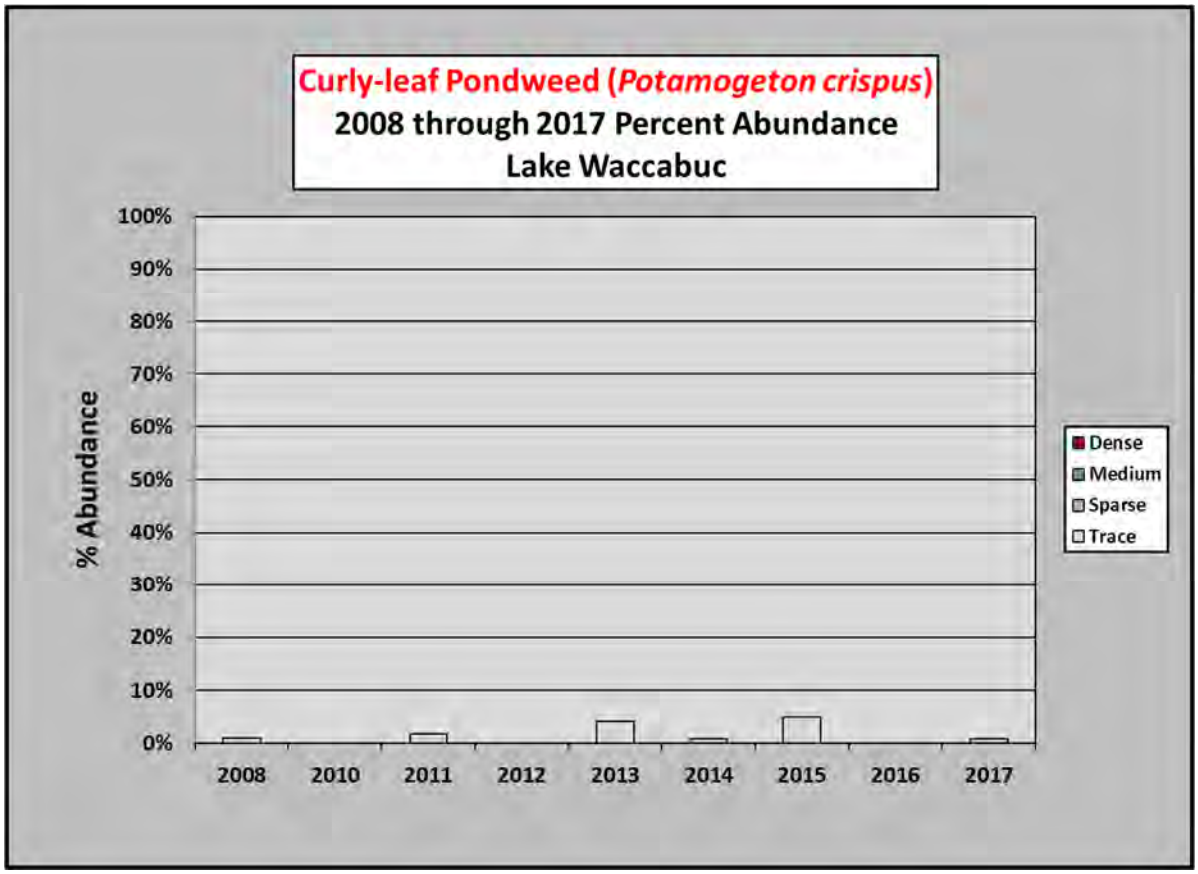
2016
2017
Dense
Medium
Sparse
Trace


Curly-leaf Pondweed (*Potamogeton crispus*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
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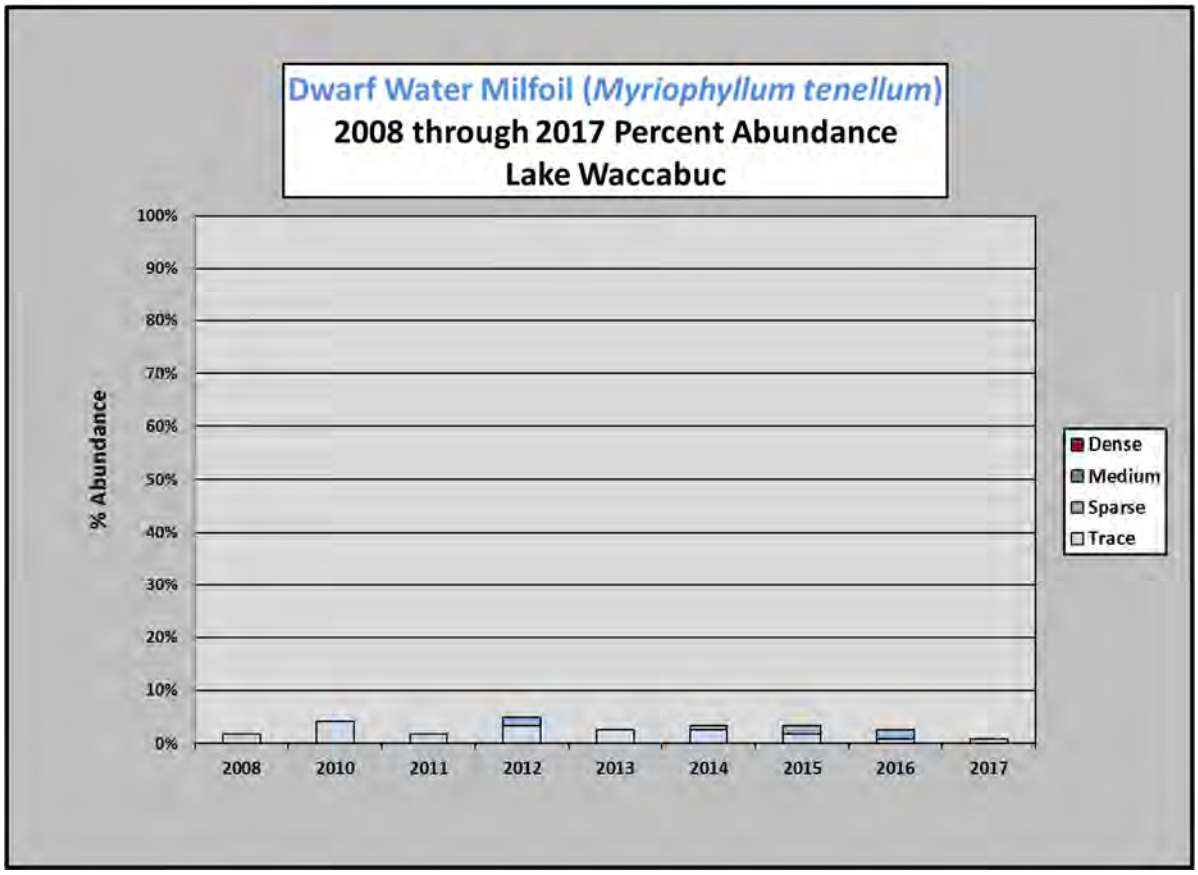
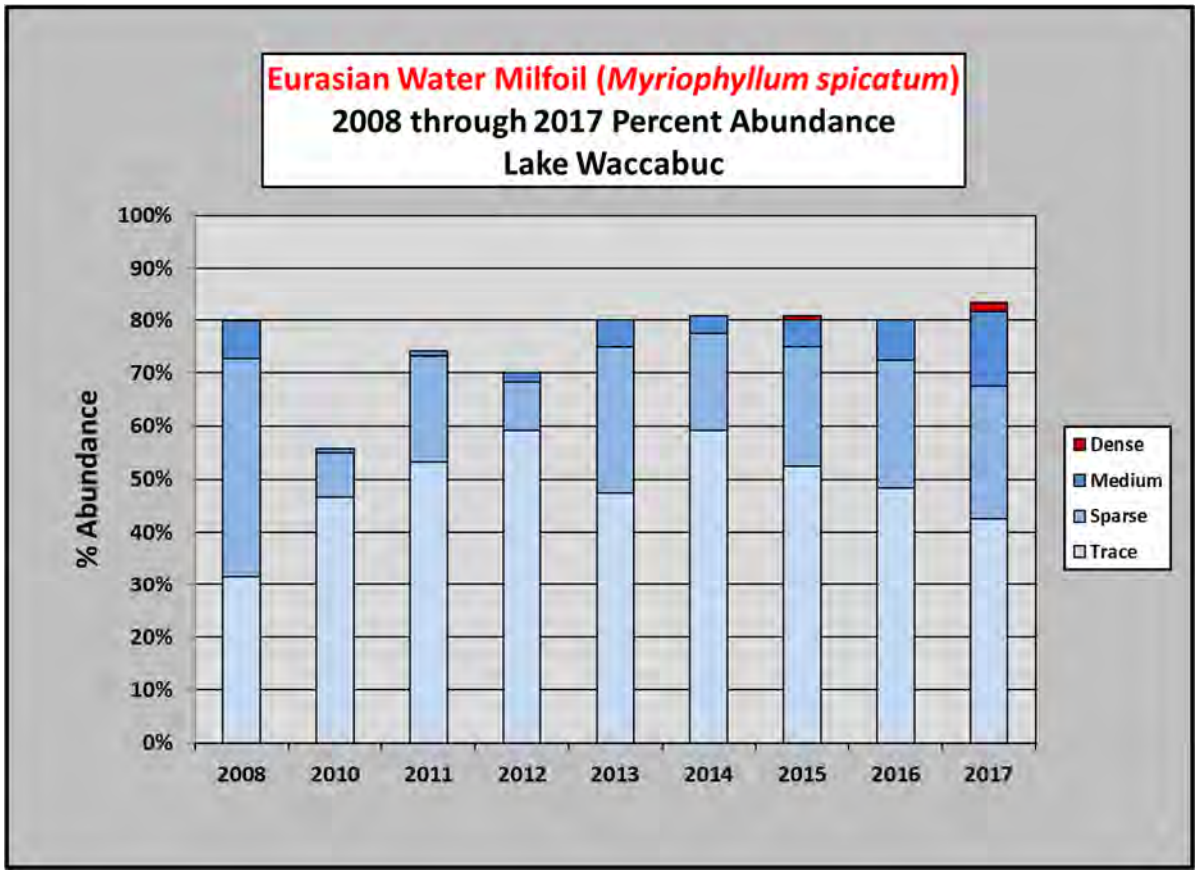
2016
2017
Dense
Medium
Sparse
Trace


Dwarf Water Milfoil (*Myriophyllum tenellum*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
2010
2011
2012
2013
2014
2015
2016
2017
Dense
Medium
Sparse
Trace


Eurasian Water Milfoil (*Myriophyllum spicatum*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
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10%
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2008
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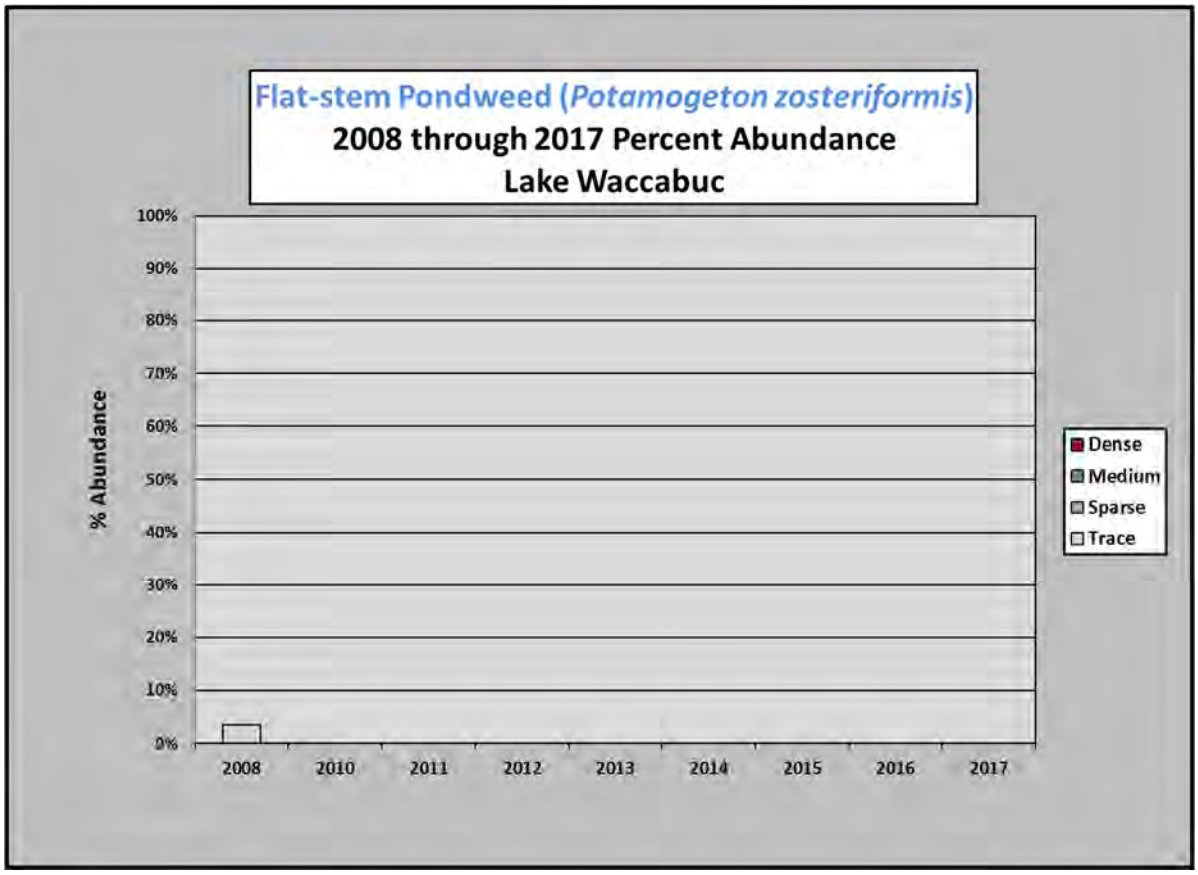
2017
Dense
Medium
Sparse
Trace


Flat-stem Pondweed (*Potamogeton zosteriformis*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2008
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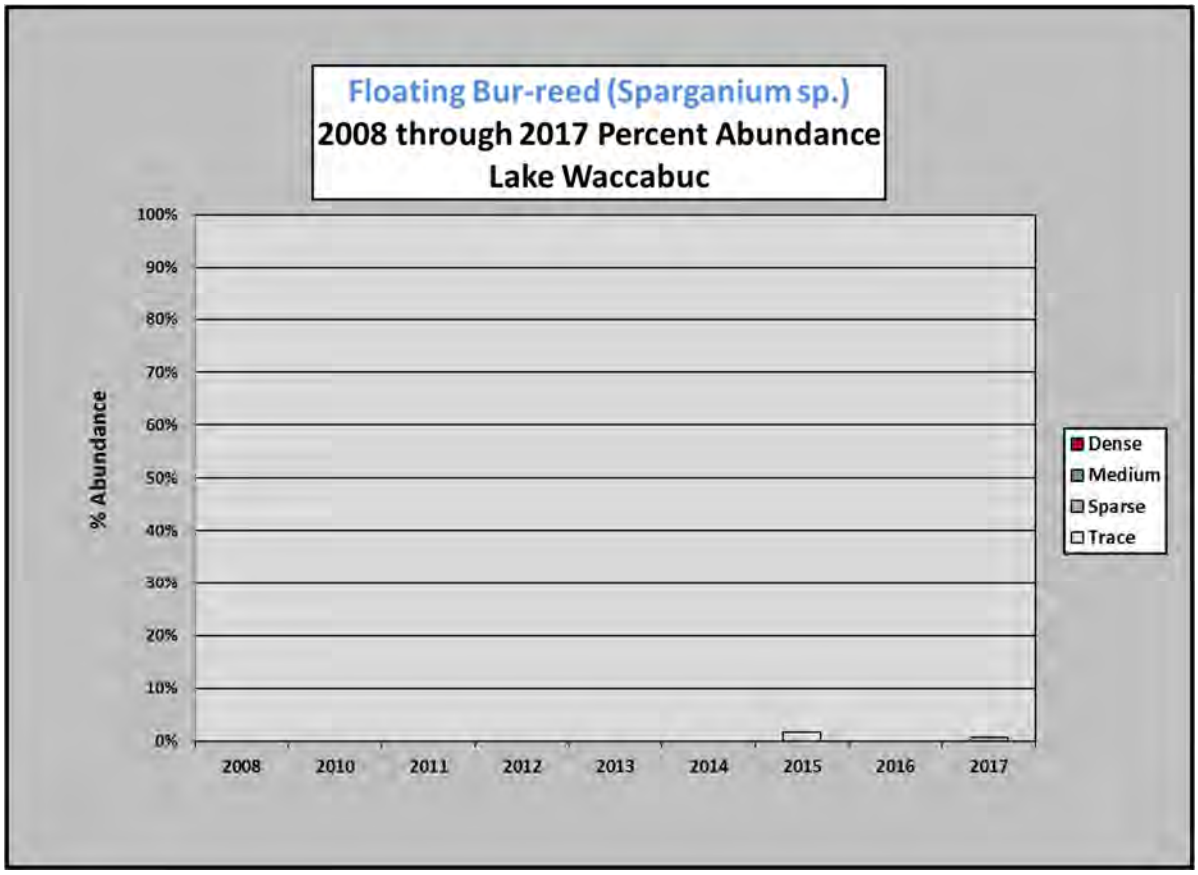
2016
2017
Dense
Medium
Sparse
Trace


Floating Bur-reed (Sparganium sp.)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
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0%
2008
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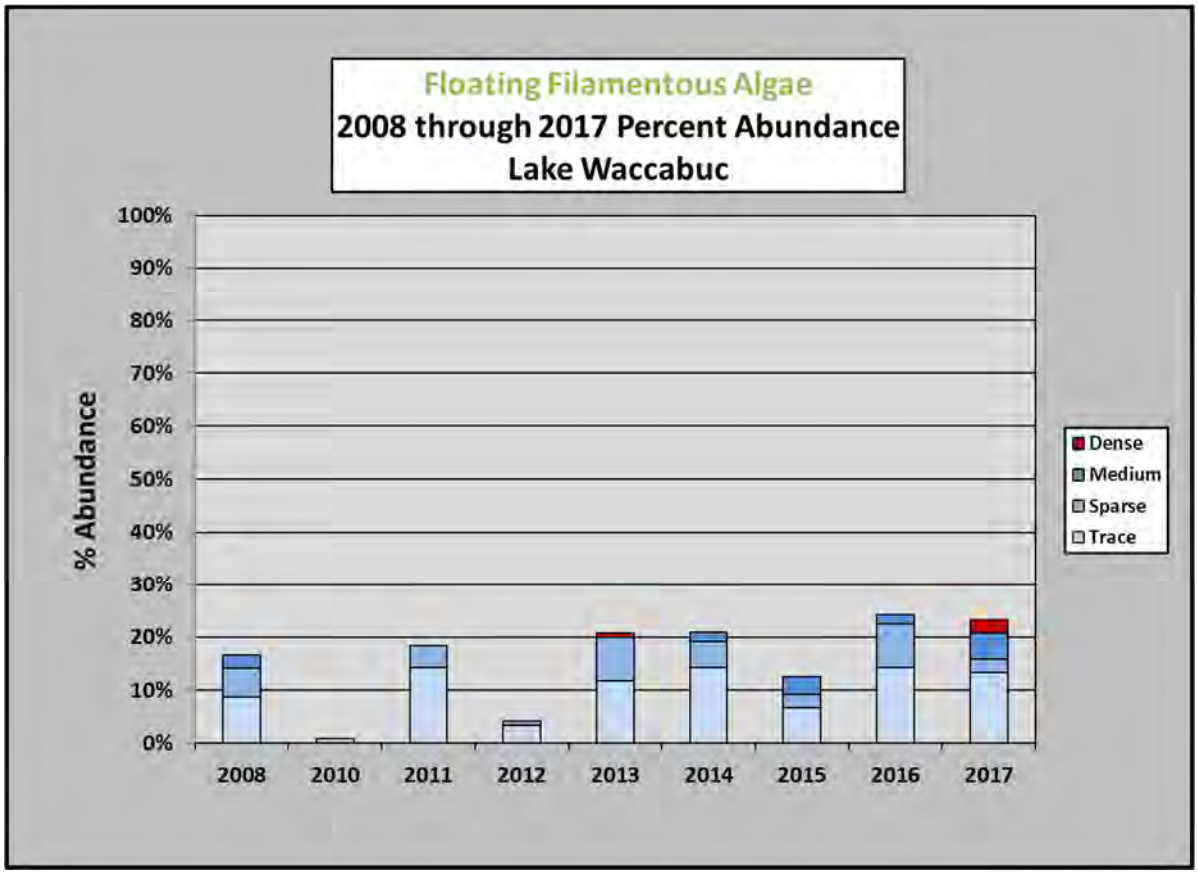
2017
Dense
Medium
Sparse
Trace


Floating Filamentous Algae
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
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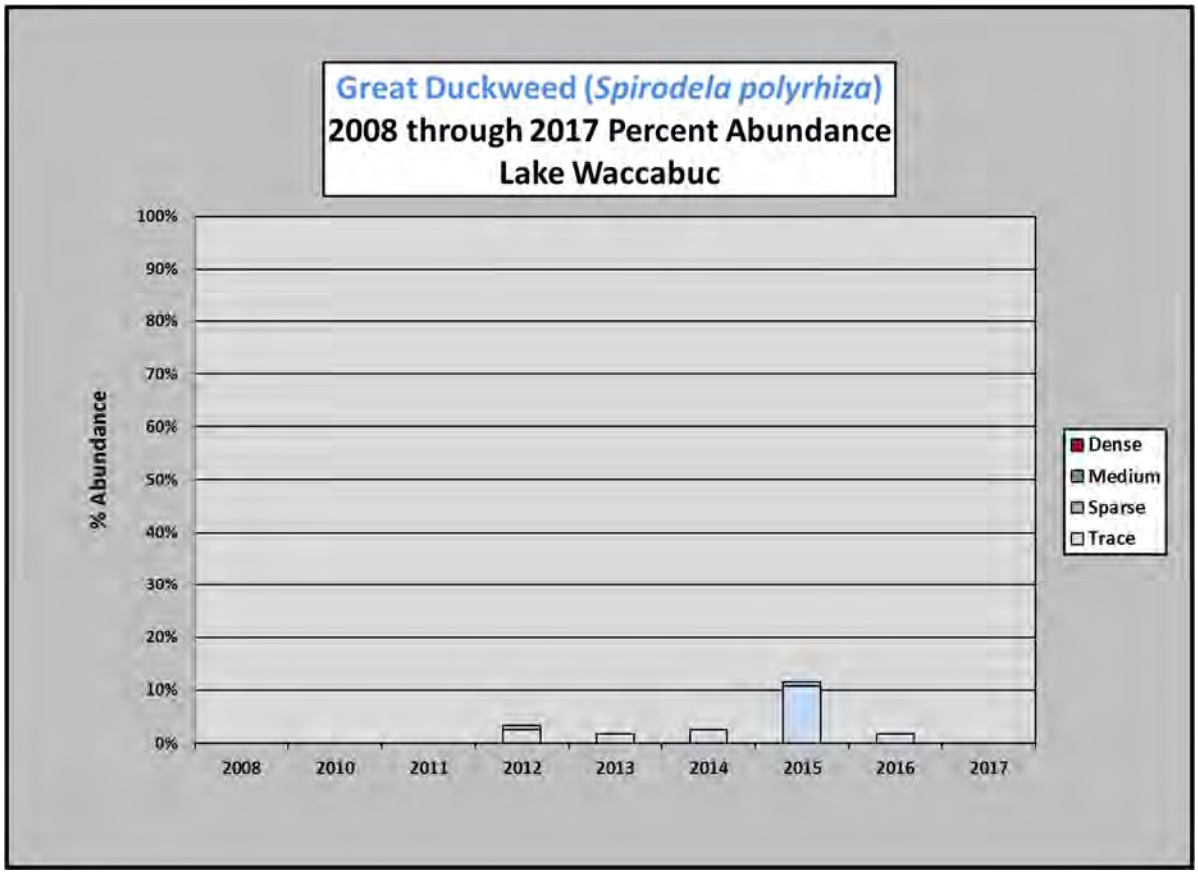
2017
Dense
Medium
Sparse
Trace


Great Duckweed (*Spirodela polyrhiza*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
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2008
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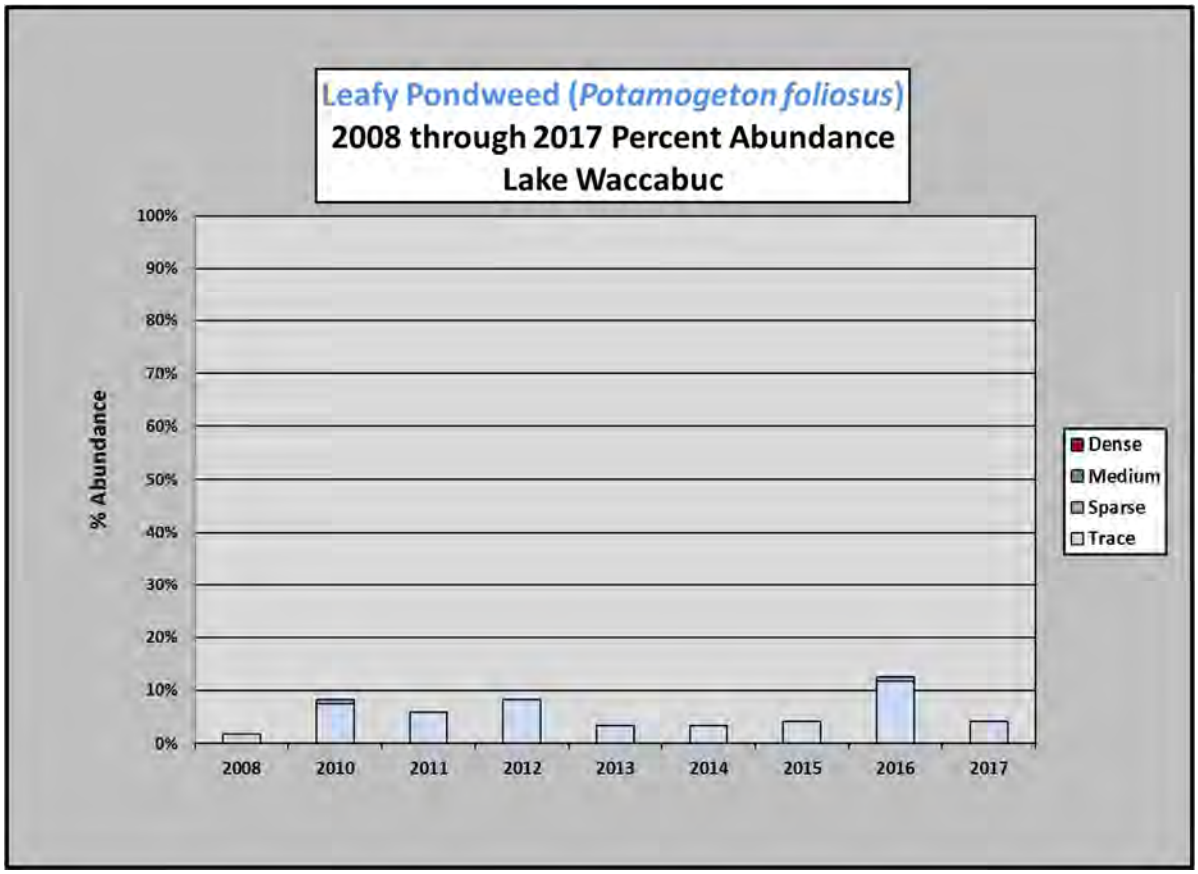
Trace


Leafy Pondweed (*Potamogeton foliosus*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
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10%
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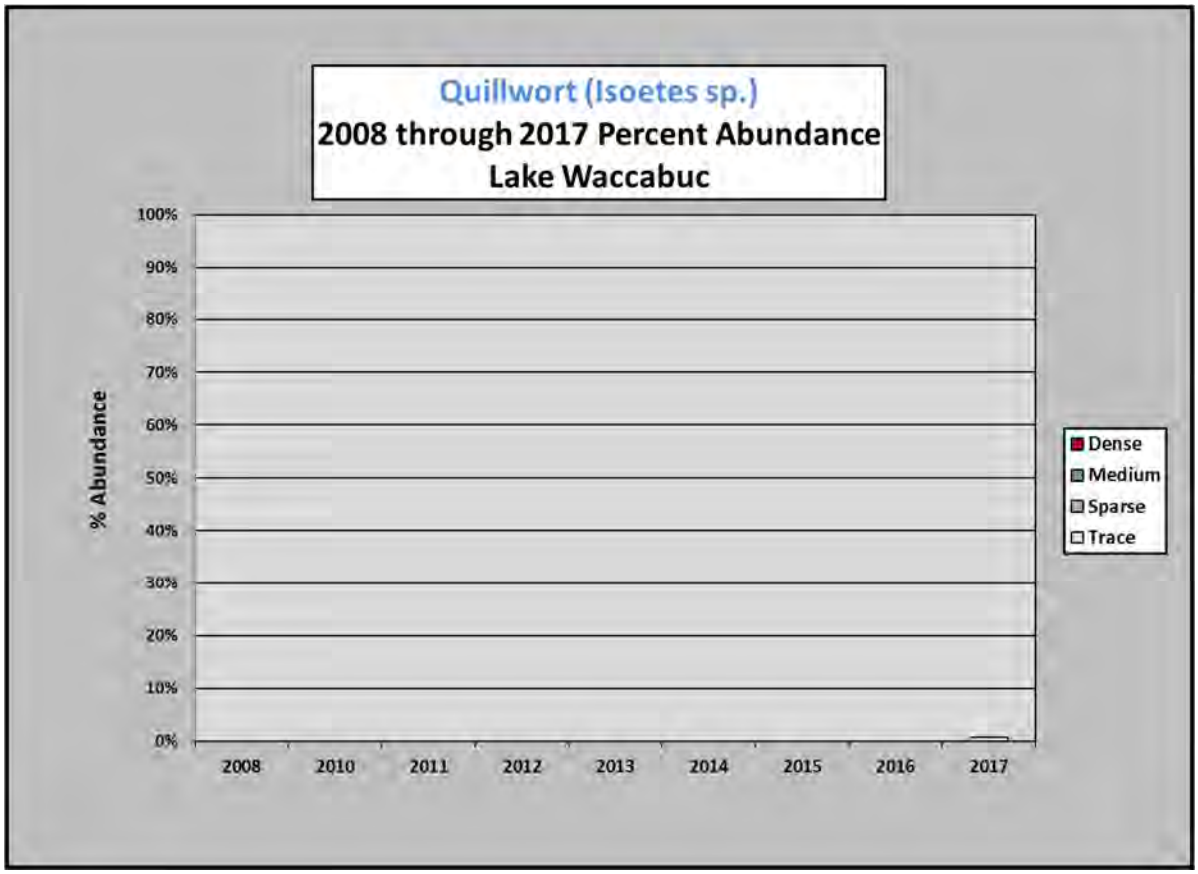
Quillwort (Isoetes sp.)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
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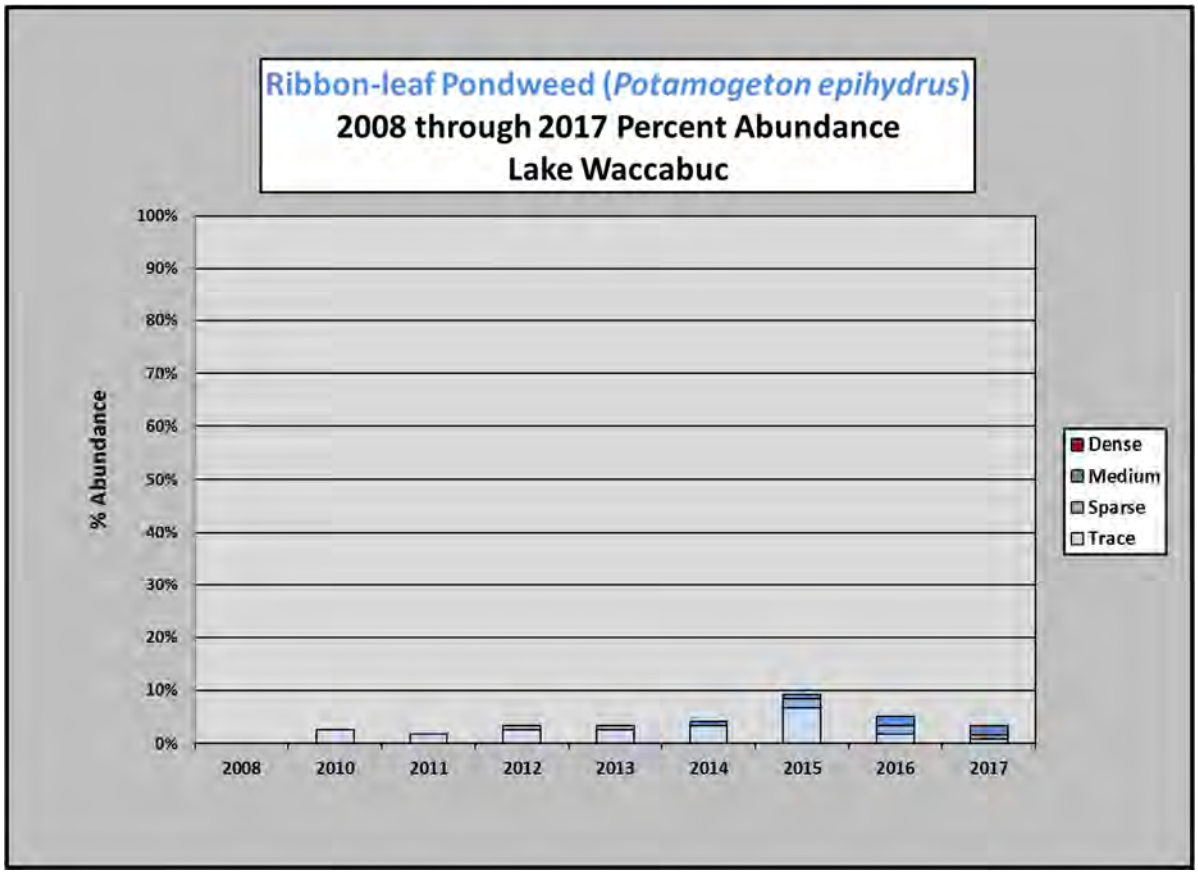
Ribbon-leaf Pondweed (*Potamogeton epihydrus*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
20%
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Dense
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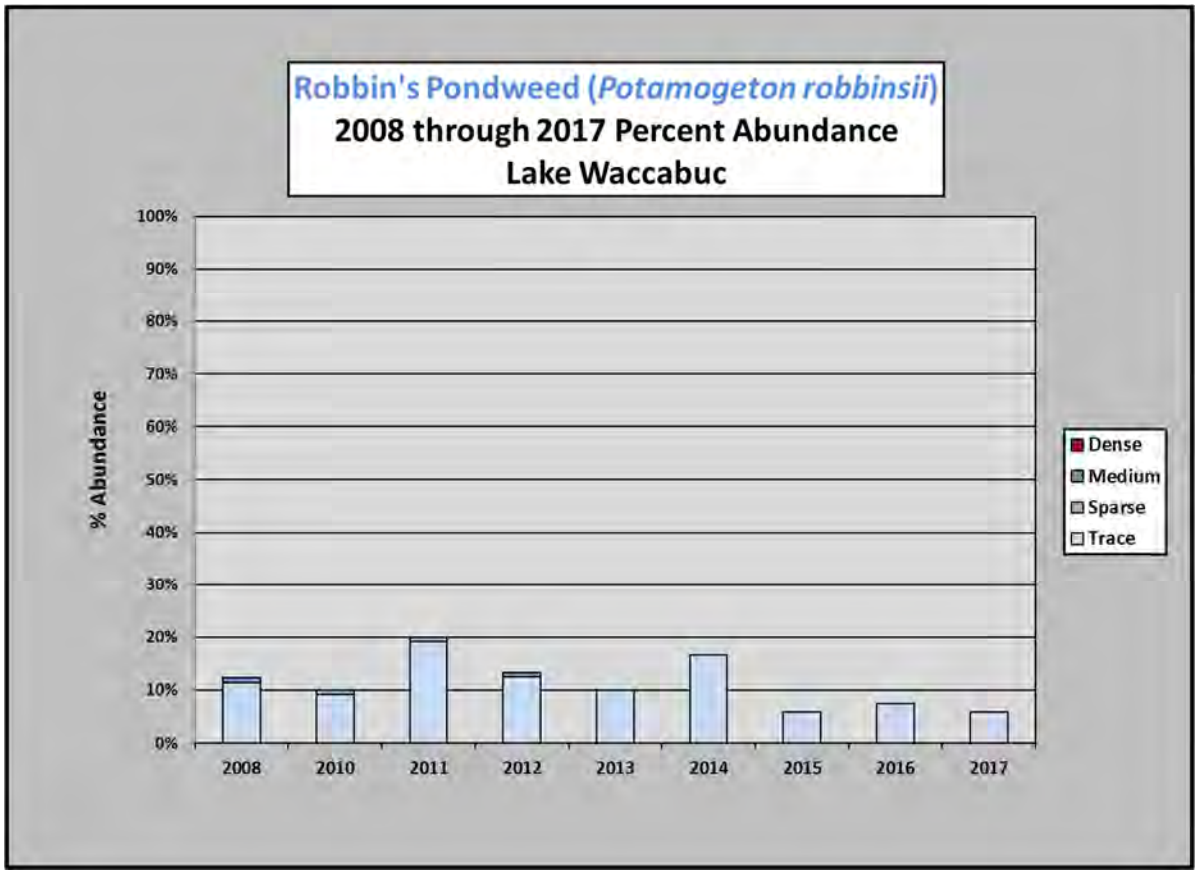
Sparse
Trace


Robbin's Pondweed (*Potamogeton robbinsii*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
50%
40%
30%
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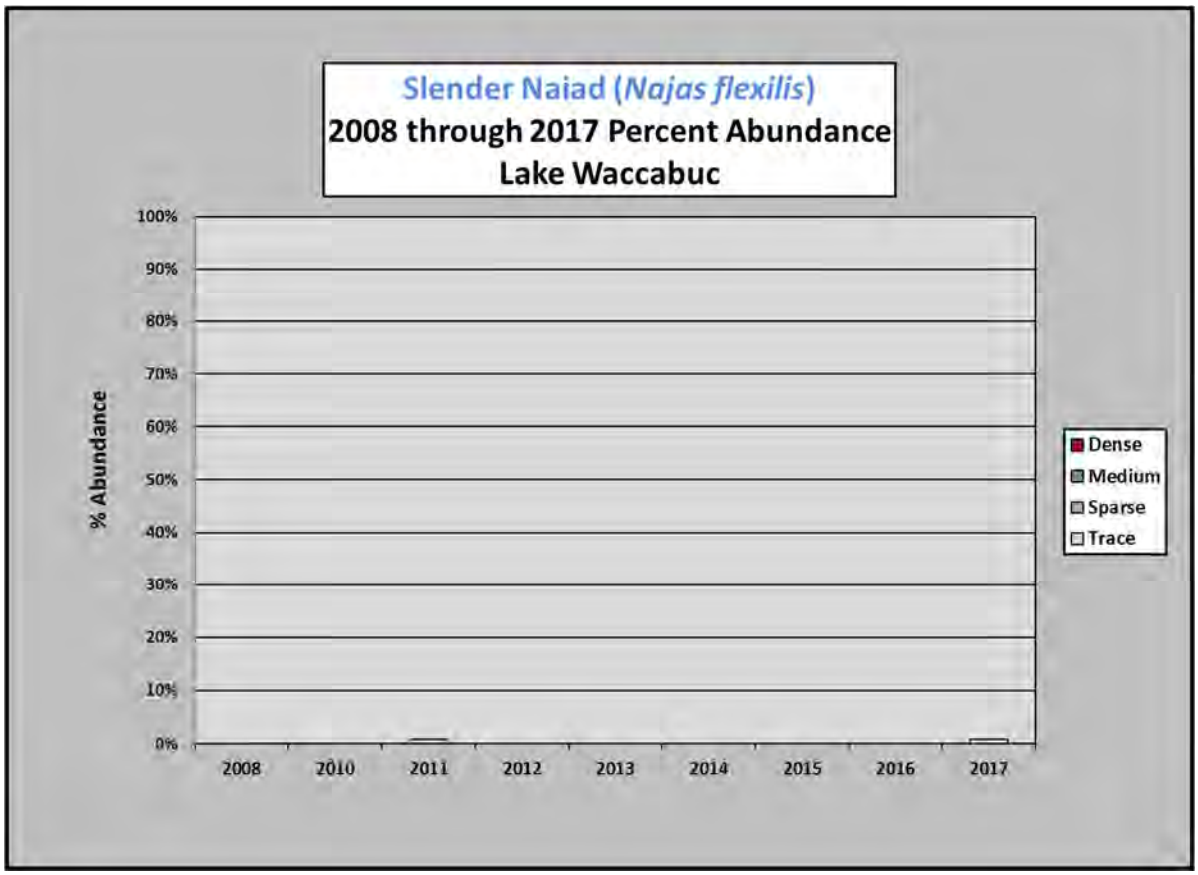
Sparse
Trace


Slender Naiad (*Najas flexilis*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
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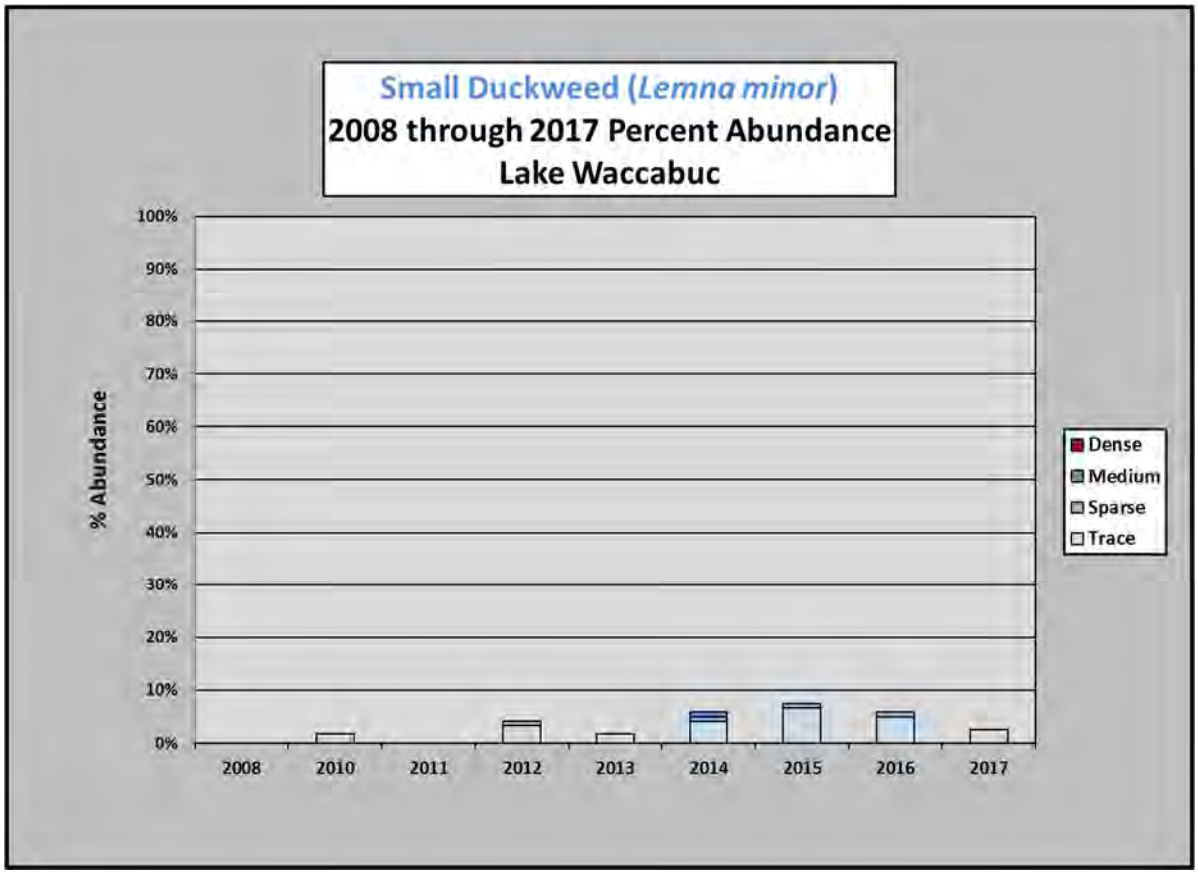
Sparse
Trace


Small Duckweed (*Lemna minor*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
60%
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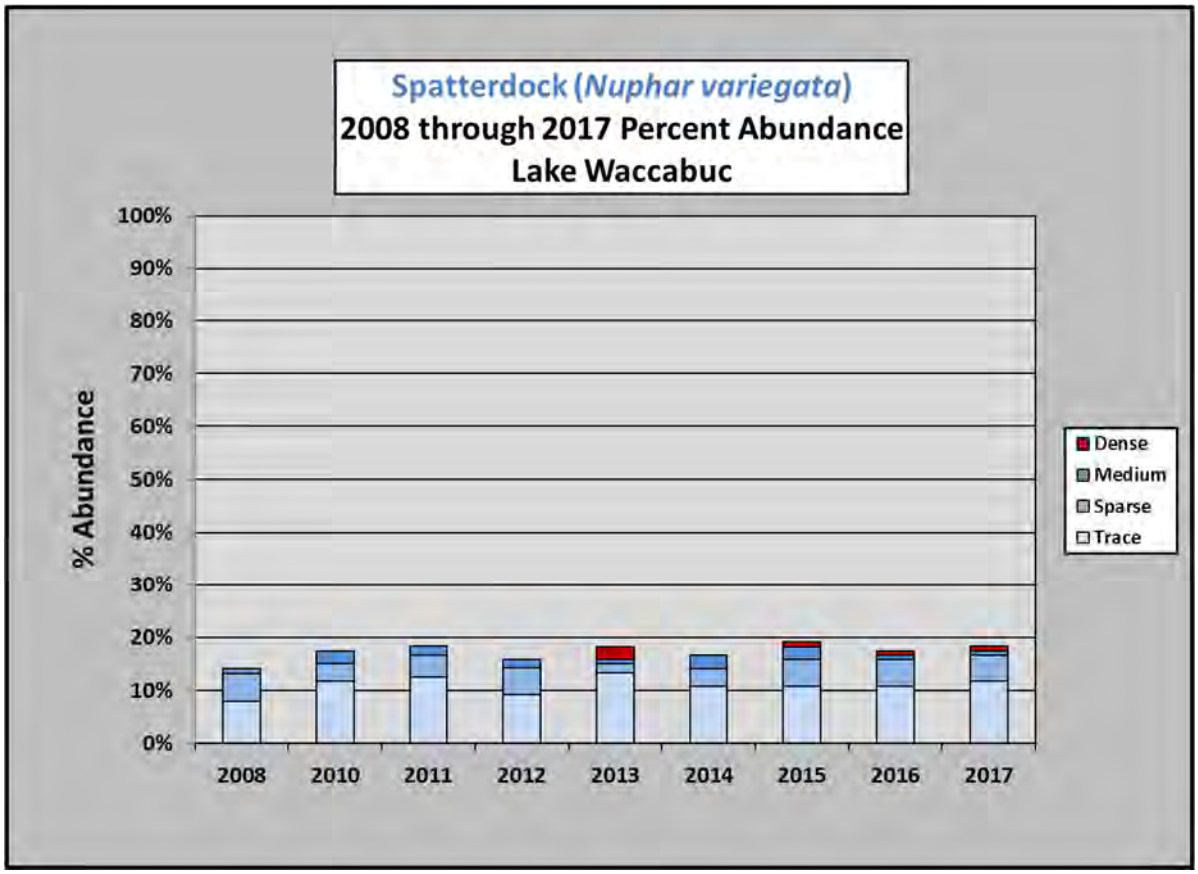
Trace


Spatterdock (*Nuphar variegata*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
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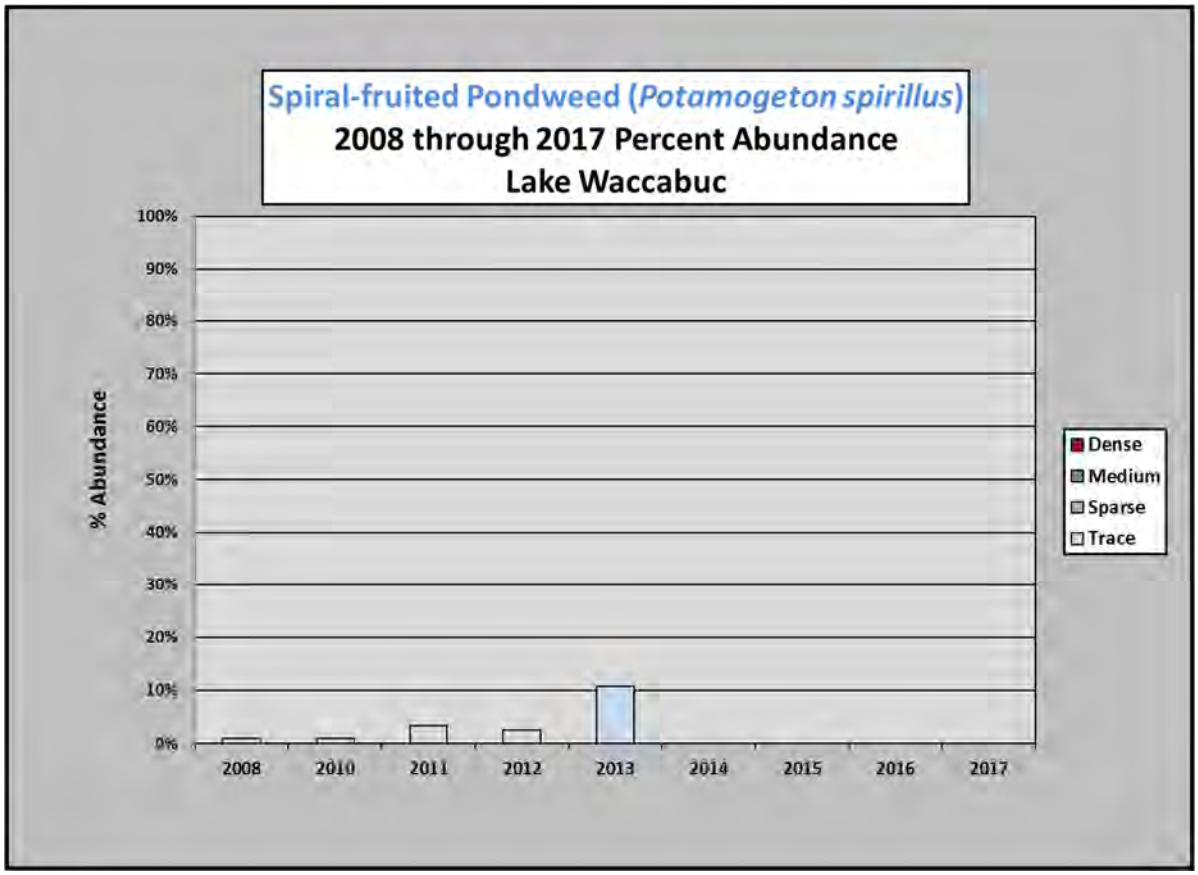
Spiral-fruited Pondweed (*Potamogeton spirillus*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
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60%
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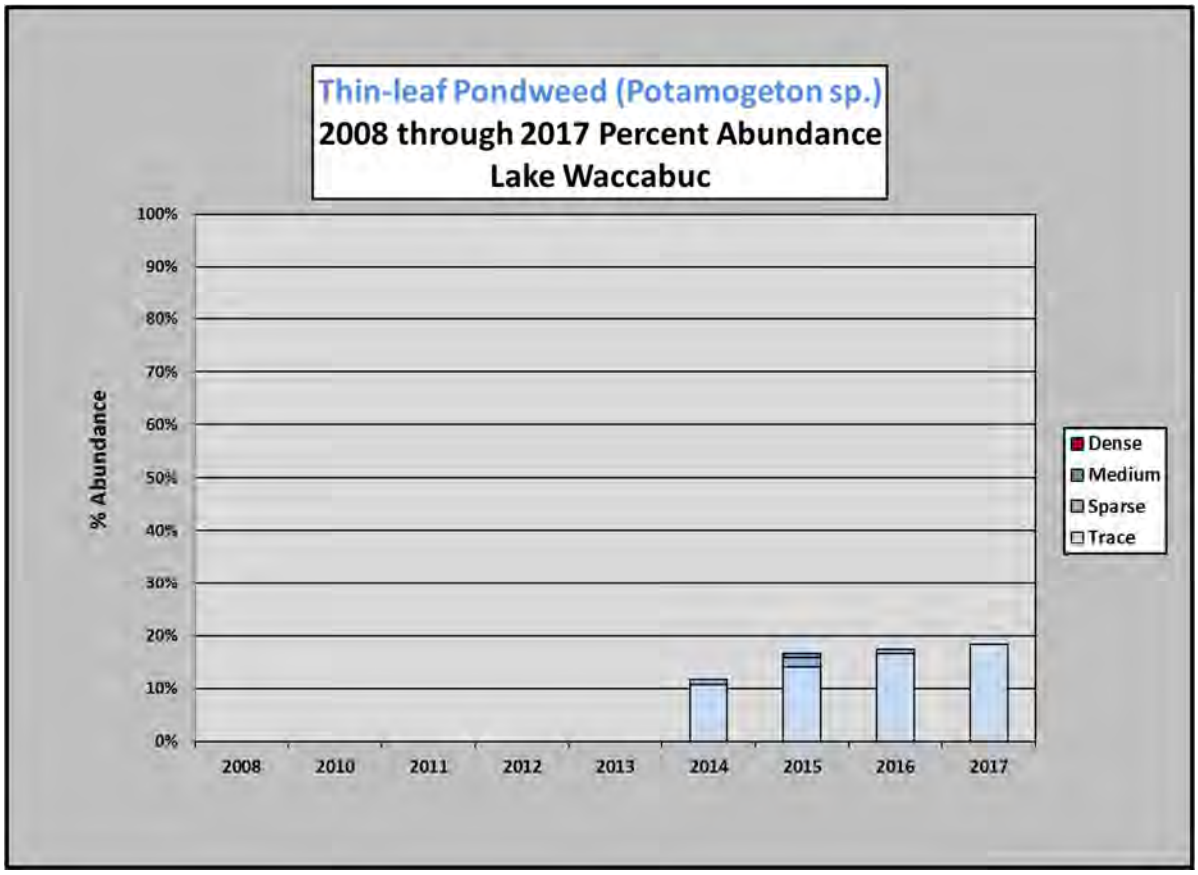
Thin-leaf Pondweed (Potamogeton sp.)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
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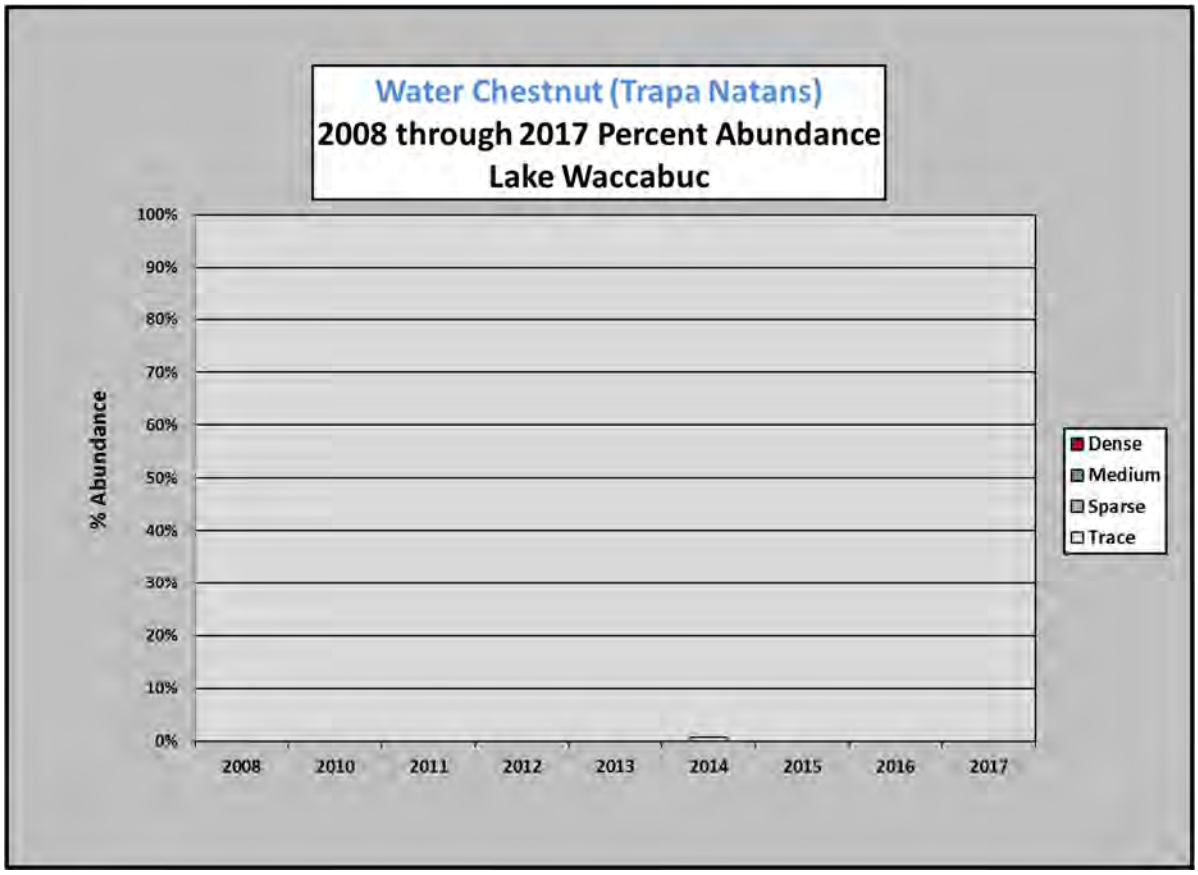
Water Chestnut (Trapa Natans)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
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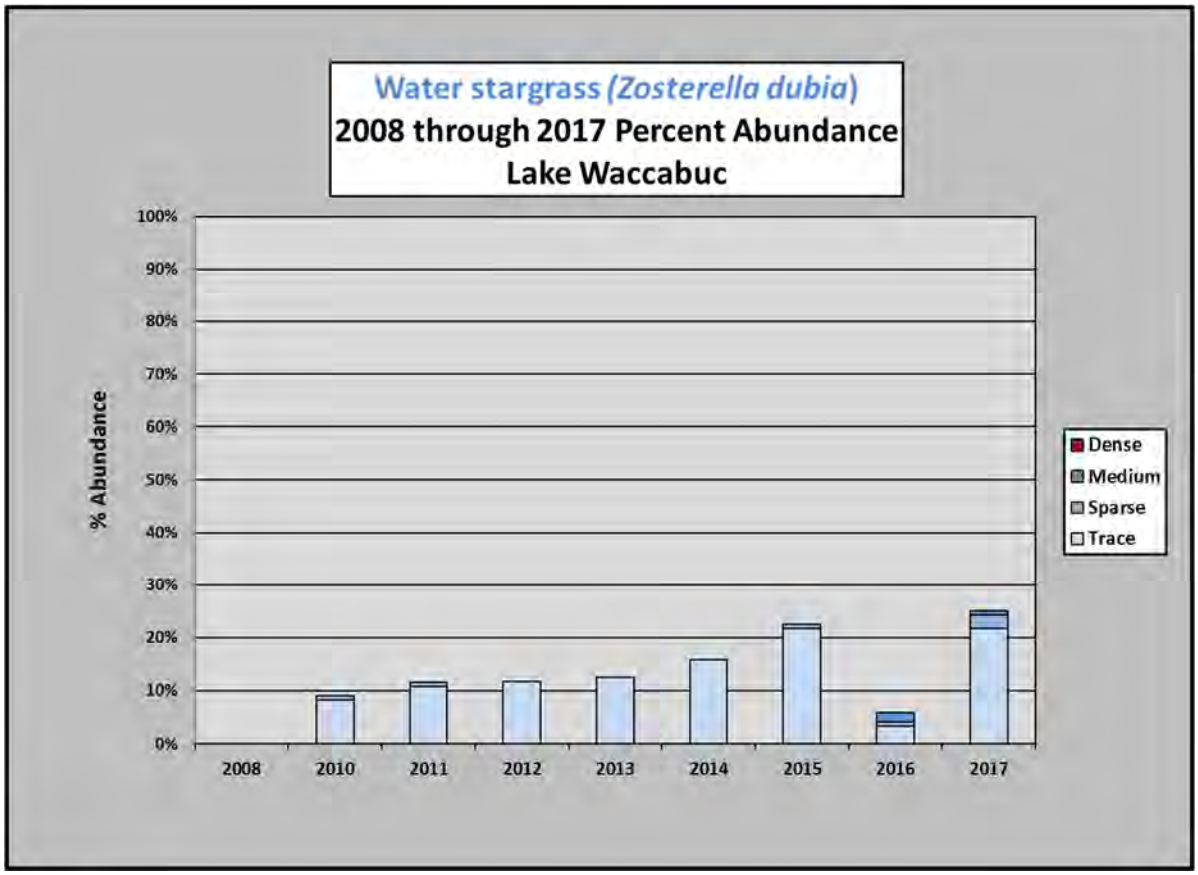
Water stargrass (Zosterella dubia)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
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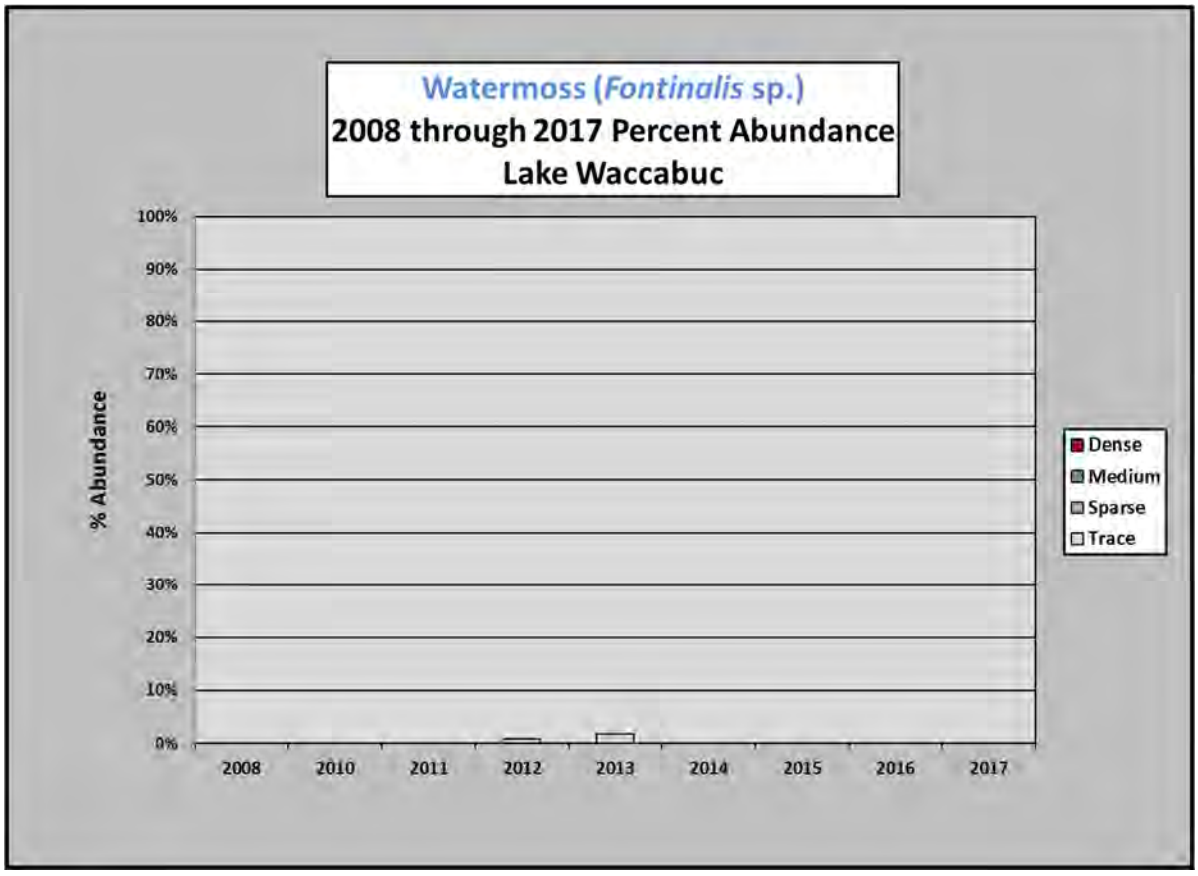
Watermoss (Fontinalis sp.)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
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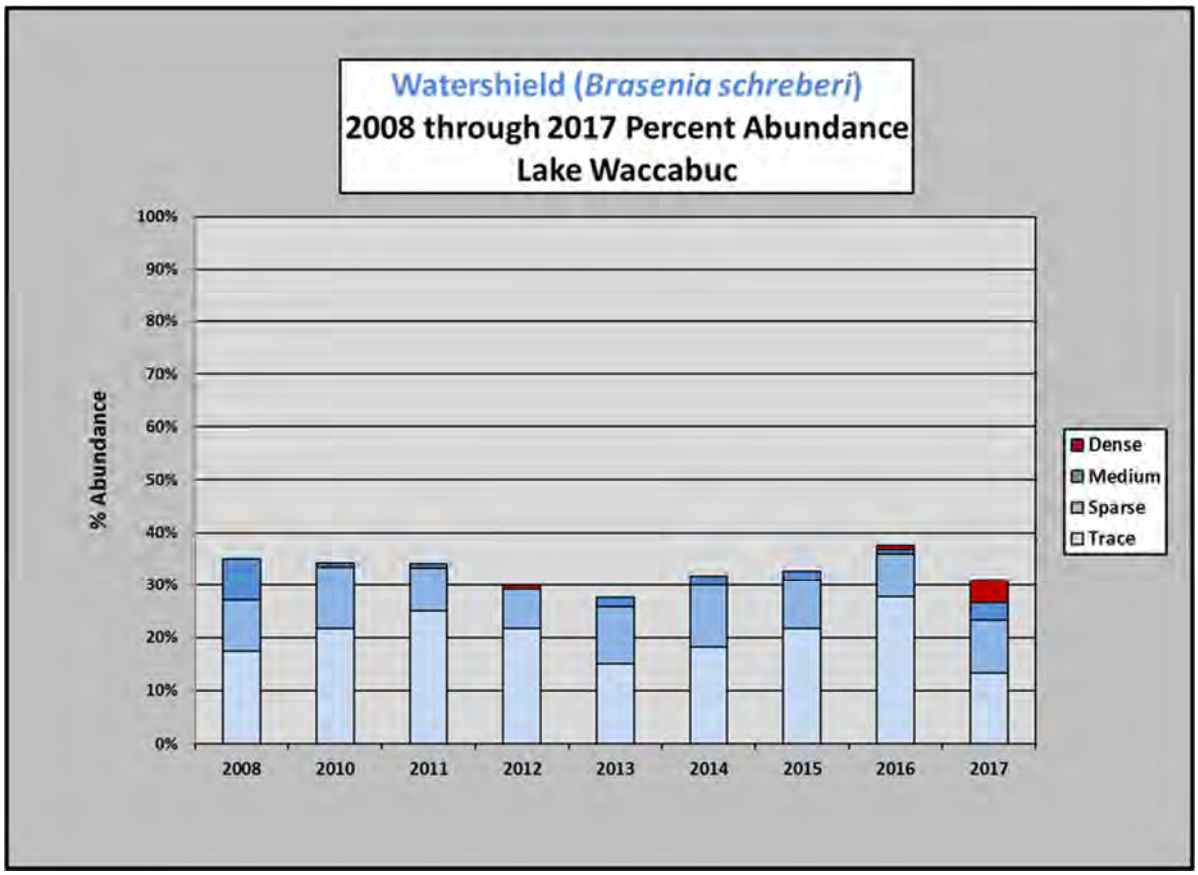
Watershield (*Brasenia schreberi*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
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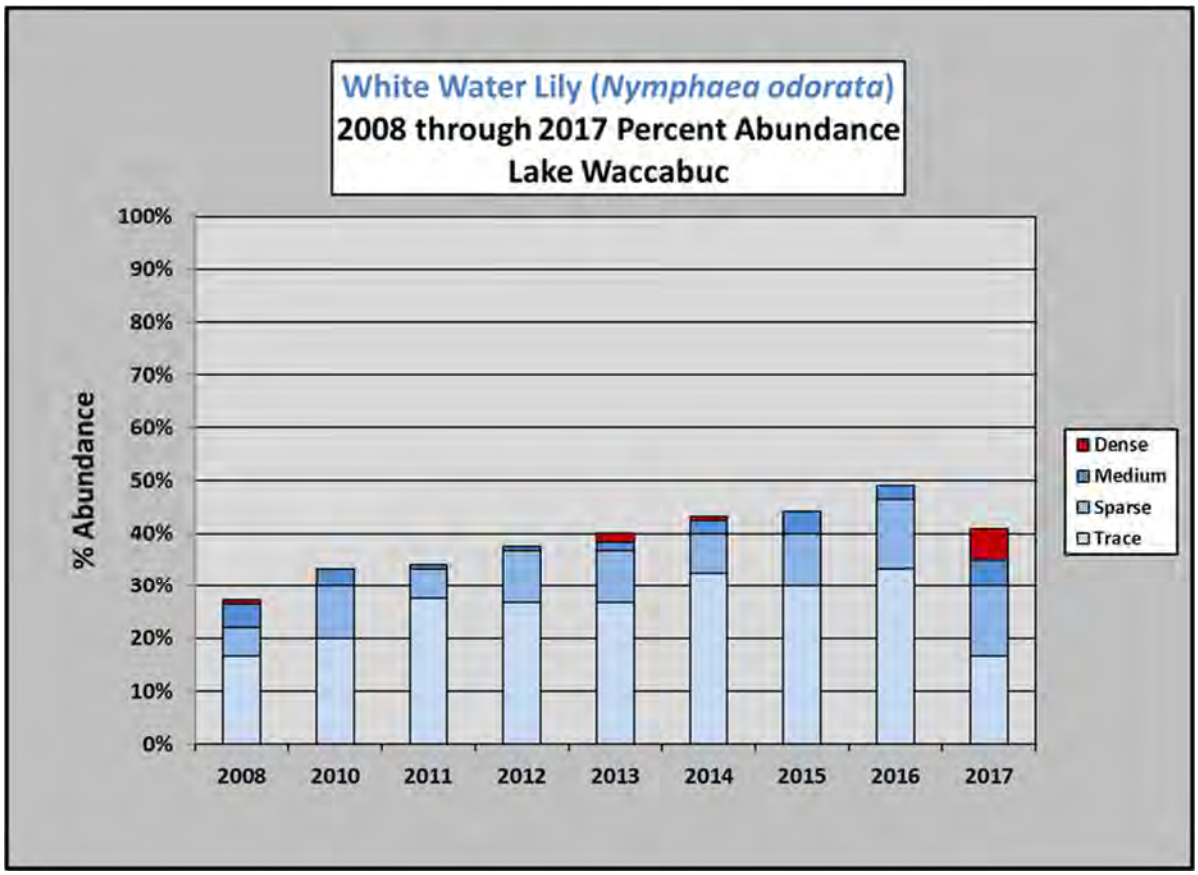
White Water Lily (*Nymphaea odorata*)
2008 through 2017 Percent Abundance
Lake Waccabuc
% Abundance
100%
90%
80%
70%
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50%
40%
30%
20%
10%
0%
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Dense
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