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Fresh Water Institute

Lake George, New York
Adirondack Field Station at Bolton Landing

Aquatic Vegetation of Lake Iroquois, Chittenden County, Vermont

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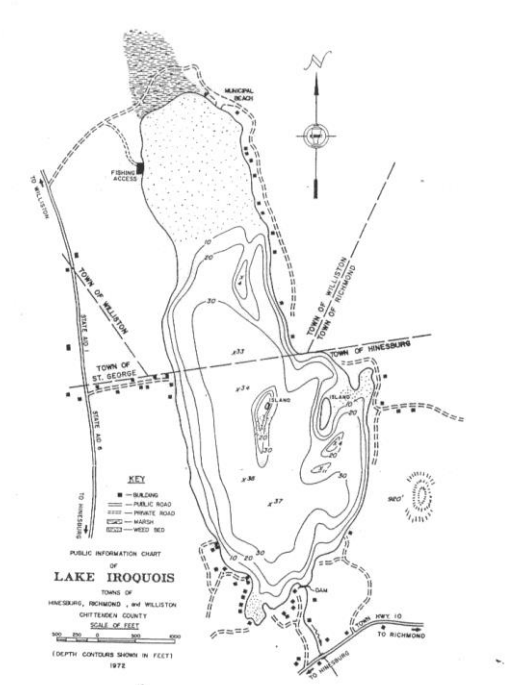
Background.

At the request of the Lake Iroquois Association, quantitative aquatic plant surveys were undertaken for Lake Iroquois, Vermont in September of 2019. The surveys consisted of frequency of occurrence and relative abundance data for all aquatic plant species present in points distributed throughout the lake. Surveys were also designed to be comparable to a prior survey by the author in 2017 (Eichler 2017). The Point-Intercept Rake Toss method presently used by the US Army Corps of Engineers and others was employed. The assessment included the distribution and density of existing aquatic plant communities, the extent of exotic species infestation and a review of ongoing management efforts to control Eurasian watermilfoil (*Myriophyllum spicatum*).

Methods

Survey Sites

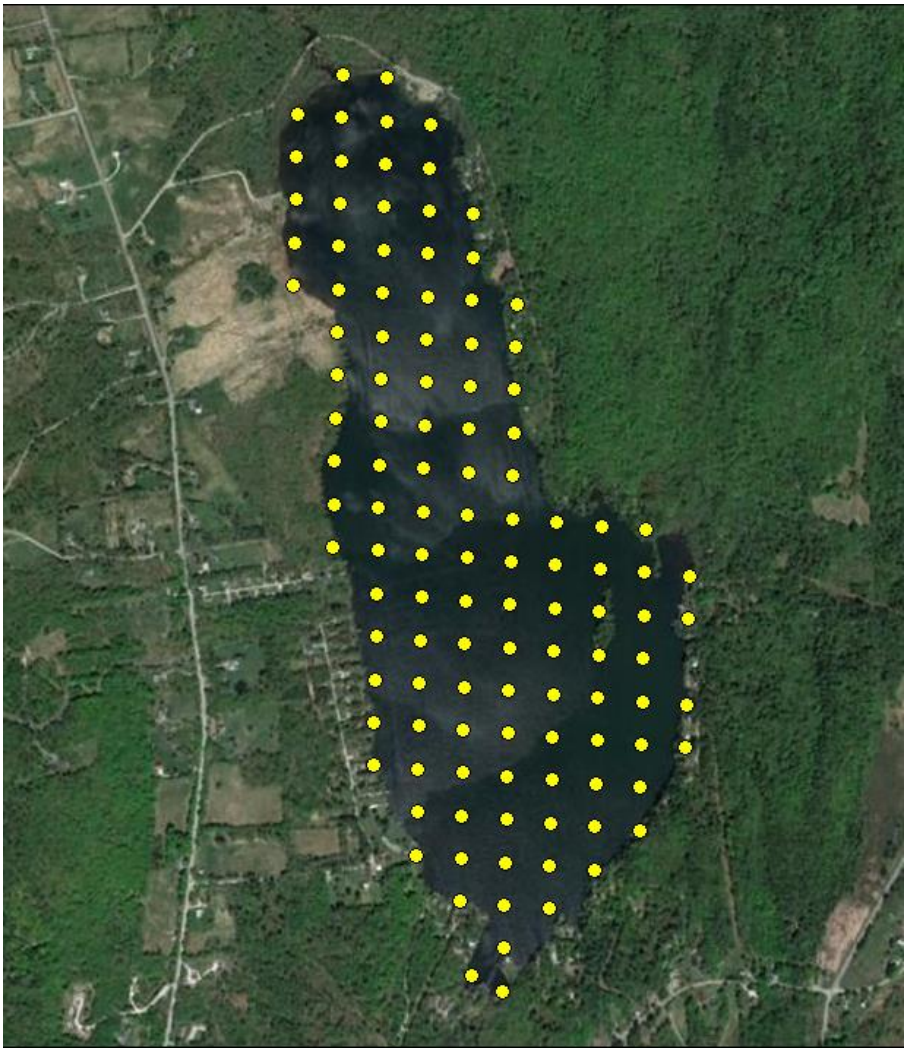


Lake Iroquois. Lake Iroquois is located in Chittenden County, in the towns of Hinesburg, Richmond and Williston. The lake has a surface area of approximately 244 acres with a watershed area of 2198 acres. Lake Iroquois has a single outlet with a control structure, however no lake level control is possible. Maximum water depth is reported to be 37 ft with average water depth of 19 feet (VTDEC 2016a). Secchi disk transparency in 2015 averaged 12 ft (3.8 m; VT DEC 2015). Lake Iroquois is classified as eutrophic based on phosphorous and chlorophyll concentrations, indicating that nutrient levels are sufficient to support dense growth of planktonic algae and aquatic plants. Two aquatic invasive aquatic plant species are reported for Lake Iroquois, Eurasian watermilfoil (*Myriophyllum spicatum*) and Curly-leaf Pondweed (*Potamogeton crispus*) (VT DEC 2016b). VT DEC records indicate that Eurasian watermilfoil was first confirmed in 1991 while curly-leaf pondweed was present in 1984. An aquatic plant survey of Lake Iroquois in September of 2014 reported over 70 acres of dense Eurasian watermilfoil growth (Knoecklein 2015). A total of 45 aquatic plant species have been reported for Lake Iroquois in multiple surveys since 1984, however a 2014 survey only reported 23 species. Loss of native species is a commonly reported phenomenon in lakes with severe infestation by Eurasian watermilfoil and/or other invasive aquatic plant species (Madsen et al. 1991). In a survey conducted by the author in 2017, a total of 25 species of aquatic plants were observed in Lake Iroquois (Eichler 2017). The aquatic plant community included sixteen submersed species, two floating-leaved species, and seven emergent species. Duck celery (*Vallisneria americana*) and coontail (*Ceratophyllum demersum)* were the most common native plants. Eurasian watermilfoil (*Myriophyllum*

spicatum) was present in 24% of survey points.

Hand harvesting efforts began on Lake Iroquois during 2008 to control the dense growth of Eurasian watermilfoil. The aquatic weevil (*Euhrychiopsis lecontei*) population of the lake was supplemented in 2008 and 2009 in an effort to provide a biocontrol agent for Eurasian watermilfoil. The extensive growth of Eurasian watermilfoil reported in 2014 suggested a more extensive management effort was necessary. In 2016, diver assisted suction harvesting (DASH) for Eurasian watermilfoil control was employed in the boat launch area and near the LIRD beach. Over a period of 2 weeks, divers harvested over 5000 gallons of Eurasian watermilfoil. Benthic barriers (mats) were installed in 2017 to maintain the areas harvested by DASH in 2016. In 2019, DASH collected approximately 2000 gallons of Eurasian watermilfoil, however this only represented a very small fraction of the Eurasian watermilfoil growth in the lake. Residents remained concerned that current Eurasian watermilfoil growth was exceeding the capacity of the existing management effort.

Figure 1. Map of Lake Iroquois with point intercept survey locations for 2019.



Species List and Herbarium Specimens. As the lakes were surveyed, the occurrence of each aquatic plant species observed in the lake was recorded and adequate herbarium specimens were collected. The herbarium specimens were returned to the Darrin Fresh Water Institute, where they were pressed, dried, and mounted (Hellquist 1993).

***Point Intercept Surveys*.** The frequency and diversity of aquatic plant species were evaluated using a point intercept method (Madsen 1999). At each grid point intersection, all species located at that point were recorded, as well as water depth. Species were located by a visual inspection of the point and by deploying a rake to the bottom, and examining the plants retrieved. A total of 115 points were surveyed for Lake Iroquois, based on a 100 m grid. A global positioning system (GPS) was used to navigate to each point for the survey observation. Point intercept plant frequencies were surveyed on September 12, 2019 at a time of maximum aquatic plant abundance.

Relative abundance in the Point Intercept surveys. To characterize relative abundance of each of the species identified in the point intercept survey, a scale developed by Cornell University and the US Army Corps of Engineers was employed. For each rake toss, the relative abundance of each plant species collected was recorded based on a rating scale (see below). Maps of the distribution of each species by its relative abundance are included in Appendices A & B.

Relative abundance scale based on US Army Corp/Cornell methods.

Code	Rating	Abundance
0	no plants	
1	trace growth of plants	fingerful on rake
2	sparse growth of plants	handful on rake
3	medium growth of plants	rakeful of plants
4	dense growth of plants	difficult to bring into boat

Results and Discussion

Lake Iroquois Survey Results

In September of 2019, the aquatic plant community of Lake Iroquois included twenty-three submersed species, two floating-leaved species, one floating species and seven emergent species (Table 1) and included some species observed but not collected in the point intercept survey. Twenty five species were present in the point intercept portion of the 2019 surveys, slightly more than the 19 and 23 species reported in 2017 and 2014, respectively. Combining the results of all surveys, a total of 45 species of aquatic plants have been reported for Lake Iroquois, however many of these would be classified as wetland species not captured by the current survey techniques. This number of species greatly exceeds the 15 species typically reported for moderately productive lakes in our region and indicates good water quality and a variety of habitat types. Eurasian watermilfoil (*Myriophyllum spicatum)* and curly-leaf pondweed (*Potamogeton crispus*) were the only exotic species reported in Lake Iroquois. One of the species present in Lake Iroquois, Humped Bladderwort (*Utricularia gibba*) is found on Vermont's rare plant list (VT DEC 2012).

Table 1. Species lists for Lake Iroquois and Sunset Pond.
Species in red are invasive.

Species Name	Common Name	Lake Iroquois
Brasenia schreberi	Water shield	fl
Ceratophyllum demersum L.	coontail	s
Chara sp.	muskgrass, chara	s
Eleocharis acicularis (L.) Roemer & Schultes	needle spike-rush	e
Elodea canadensis Michx.	elodea	s
Isoetes echinospora Dur.	quillwort	e
Lemna minor L.	duckweed	f
Lemna trisulca L.	duckweed	s
Megalodonta (Bidens) beckii Torr.	water marigold	s
Myriophyllum spicatum L.	Eurasian watermilfoil	s
Najas flexilis (Willd.) Rostk. & Schmidt.	bushy pondweed	s
Najas guadalupensis L.	southern naiad	s
Nymphaea odorata Ait.	white waterlily	fl
Polygonum amphibium	smartweed	e
Pontederia cordata L.	pickerelweed	e
Potamogeton amplifolius Tuckerm.	large-leaf pondweed	s
Potamogeton crispus L.	curly-leaf pondweed	s
Potamogeton foliosus Raf.	pondweed	s
Potamogeton natans L.	floating-leaf pondweed	s
Potamogeton perfoliatus L.	clasping-leaf pondweed	s

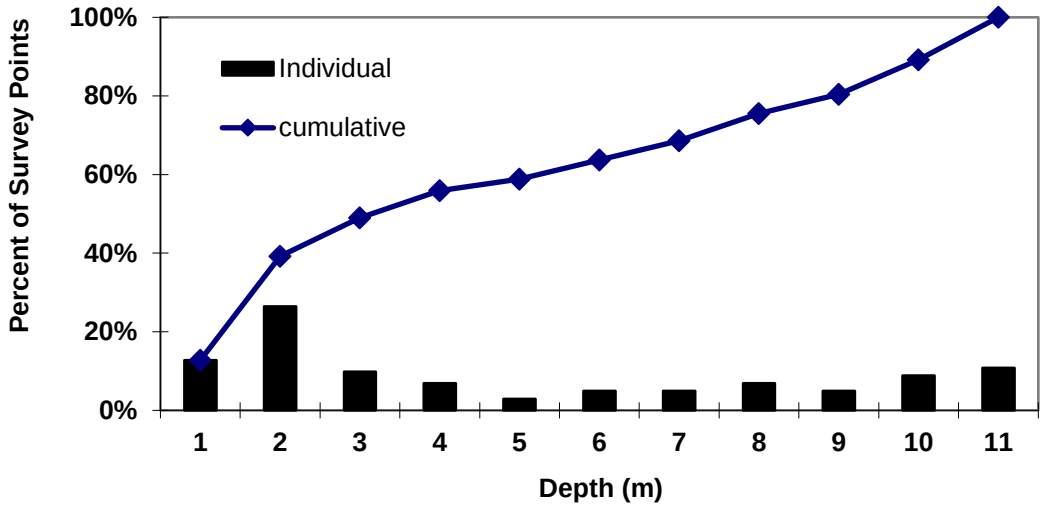
Species Name	Common Name	Lake Iroquois
Potamogeton praelongus Wulfen	white-stem pondweed	s
Potamogeton pusillus L.	small pondweed	s
Potamogeton richardsonii Oakes	Richardsons' pondweed	s
Potamogeton spirillus Tuckerm.	pondweed	s
Potamogeton zosteriformis Fern.	flat-stem pondweed	s
Ranunculus longirostris Godron	white water crowsfoot	s
Scirpus sp.	rush	e
Sparganium sp.	burreed	e
Typha sp.	cattail	e
Utricularia gibba L.	humped bladderwort	s
Utricularia vulgaris L.	great bladderwort	s
Vallisneria americana L.	wild celery	s
Zosterella dubia (Jacq.) Small	water stargrass	s

f=floating fl=floating leaved e=emergent s=submersed

Maximum Depth of Colonization

Maximum depth of rooted aquatic plant growth, termed the littoral zone, extended to a depth of approximately 5.0 meters (16 feet) in Lake Iroquois. The littoral zone is defined by the presence of rooted aquatic plants, for Lake Iroquois it extends from the lakeshore to a depth of 5 meters. The majority of survey points were in the littoral zone (Figure 2), providing a reasonable representation of the aquatic plant population of Lake Iroquois.

Figure 2. Depth Distribution of Lake Iroquois Sampling Points in 1 meter depth classes.



Species Lists

Maps of the distribution of aquatic plant species for Lake Iroquois are included in Appendix A. Frequency of occurrence results are presented in Table 2. Eurasian watermilfoil (*Myriophyllum spicatum*) was the most common species, present in 43% of survey points. This represents an increase from the 24% of survey points reported in 2017. A number of native species were also commonly observed, including Waterweed (*Elodea canadensis,* 30% of survey points), Water stargrass (*Zosterella dubia,* 24%), Duck celery (*Vallisneria americana,* 19%), White waterlily (*Nymphaea odorata,* 12%), and Muskgrass *(Chara spp,* 10%). In the 2017 survey, Duck celery (*Vallisneria americana*) and coontail (*Ceratophyllum demersum)* were the most common plants (28% of survey points). Other common native species in 2017 included, *Elodea canadensis* (23 % of survey points), *Zosterella dubia* (21%), *Chara/Nitella* (20%), *Najas flexilis* (15%), *Nymphaea odorata* (12%), and *Potamogeton praelongus* (10%). Slight declines in the frequency of occurrence of the majority of native species were observed (19 of 23 species) between 2017 and 2019.

Table 2. Lake Iroquois percent frequency of occurrence data.

Species Name	Common Name	2017	2019
Ceratophyllum demersum L.	coontail	27.5%	7.8%
Chara sp.	muskgrass, chara	19.6%	10.4%
Eleocharis acicularis (L.) Roemer & Schultes	needle spike-rush	4.9%	1.7%
Elodea canadensis Michx.	elodea	22.5%	30.4%
Isoetes echinospora Dur.	quillwort	1.0%	1.7%
Lemna minor L.	duckweed		0.9%
Lemna trisulca L.	duckweed	2.9%	0.9%
Myriophyllum spicatum L.	Eurasian watermilfoil	23.5%	42.6%
Najas flexilis (Willd.) Rostk. & Schmidt.	bushy pondweed	14.7%	4.3%
Najas guadalupensis L.	southern naiad	1.0%	
Nymphaea odorata Ait.	white waterlily	11.8%	12.2%
Polygonum amphibium	smartweed	1.0%	0.9%
Potamogeton amplifolius Tuckerm.	largeleaf pondweed	5.9%	6.1%
Potamogeton crispus L.	curlyleaf pondweed	2.0%	1.7%
Potamogeton foliosus Raf.	pondweed	6.9%	
Potamogeton perfoliatus L.	clasping-leaf pondweed	2.9%	1.7%
Potamogeton praelongus Wulfen	white-stem pondweed	9.8%	6.1%
Potamogeton pusillus L.	small pondweed	6.9%	4.3%
Potamogeton richardsonii Oakes	Richardsons' pondweed	4.9%	2.6%
Potamogeton spirillus Tuckerm.	pondweed	1.0%	
Potamogeton zosteriformis Fern.	flat-stem pondweed	6.9%	6.1%
Ranunculus longirostris Godron	white watercrowfoot	5.9%	4.3%
Scirpus sp.	bulrush		0.9%

Species Name	Common Name	2017	2019
Sparganium sp.	burreed	1.0%	0.9%
Typha sp.	cattail	1.0%	1.7%
Utricularia gibba L.	humped bladderwort	2.0%	
Utricularia vulgaris L.	great bladderwort	3.9%	0.9%
Vallisneria americana L.	wild celery	28.4%	19.1%
Zosterella dubia (Jacq.) Small	water stargrass	20.6%	23.5%

Forty-five percent of whole lake sampling points were vegetated by at least one native plant species, 91% of survey points with depths less than 5 m and 97% of survey points with depths less than 2 meters depth yielded native aquatic plants in 2019 (Figure 3). The expected relationship of greater frequency of occurrence of aquatic plants with shallower water depth is consistent with that reported by other regional studies. Littoral zone frequency of occurrence values were dominated by native species and similar to nearby lakes (Getsinger et al. 2002). In 2019, Eurasian watermilfoil was present in 43% of whole lake survey points, and 86% of survey points less than 5 m water depth, representing the littoral zone or zone of aquatic plant growth. This represents a substantial increase from the 24% of whole lake survey points and 42% of littoral zone survey points reported in 2017 (Figure 4).

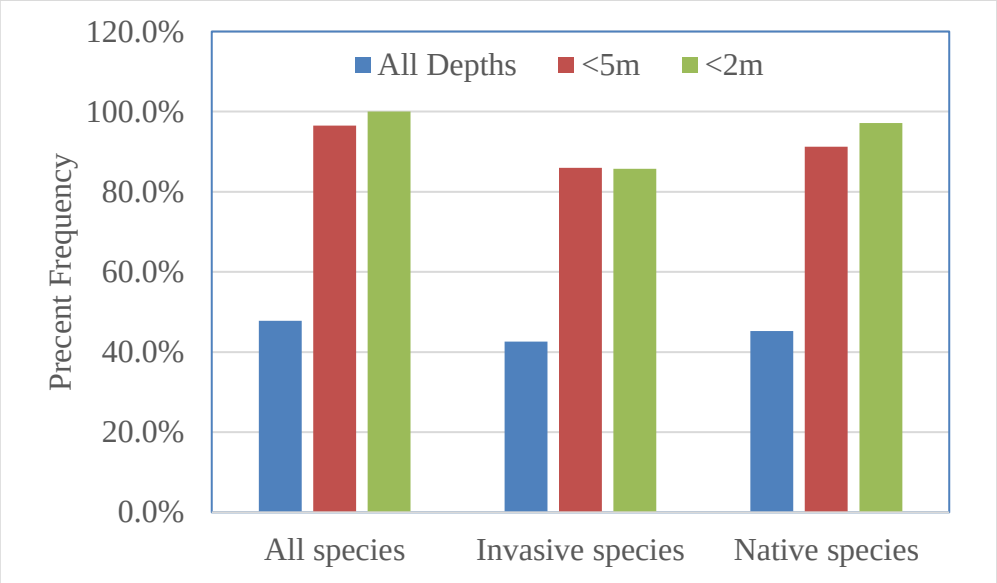


Figure 3. Lake Iroquois frequency of occurrence summaries.

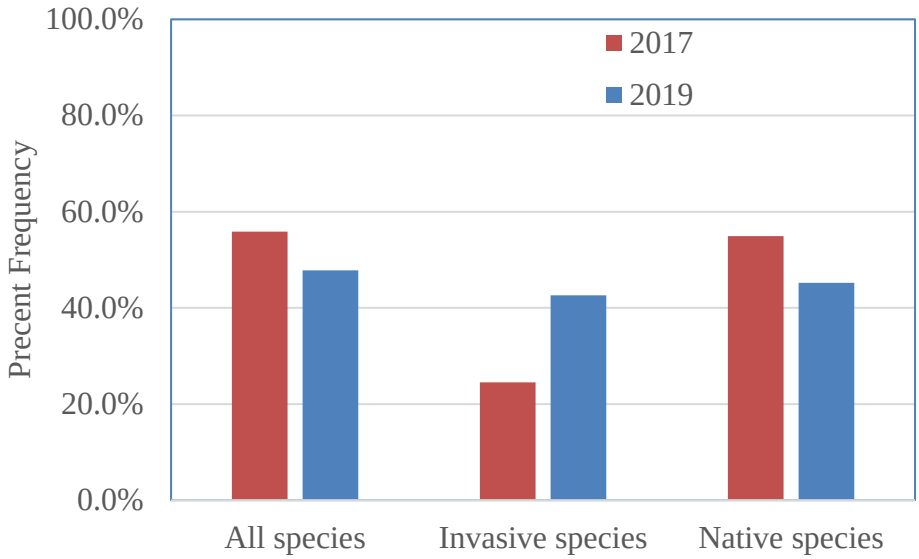


Figure 4. Lake Iroquois frequency of occurrence summaries for 2017 and 2019 surveys.

Species richness was quite high, with a number of species occurring in more than 5% of survey points. Species richness results are presented in Table 3 and Figure 5. Whole lake native species richness in 2017 was 2.13 ± 0.25 species per sample point and declined to 1.50 ± 0.12 species per sample point in 2019. Species richness in this range is comparable to other nearby lakes (Eichler 2016). For survey points exclusively within the littoral zone (depths less than 5 meters), native species richness was 3.62 ± 0.30 species per survey point in 2017 and declined to

Table 3. Lake Iroquois species richness comparison.

Plant Grouping	Water Depth Class	Summary Statistic	Survey Result	
			2017	2019
Native plant species	Whole Lake (all depths)	Mean	2.13	1.50
		N	102	115
		Std. Error	0.25	0.12
	Points with depths <5m	Mean	3.62	3.02
		N	60	57
		Std. Error	0.30	0.27
	Points with depths <2m	Mean	4.50	3.86
		N	50	35
		Std. Error	0.31	0.31
All plant species	Whole Lake (all depths)	Mean	2.40	1.94
		N	102	115
		Std. Error	0.27	0.15
	Points with depths <5m	Mean	4.08	3.91
		N	60	57
		Std. Error	0.30	0.28
	Points with depths <2m	Mean	4.90	4.74
		N	50	35
		Std. Error	0.31	0.32

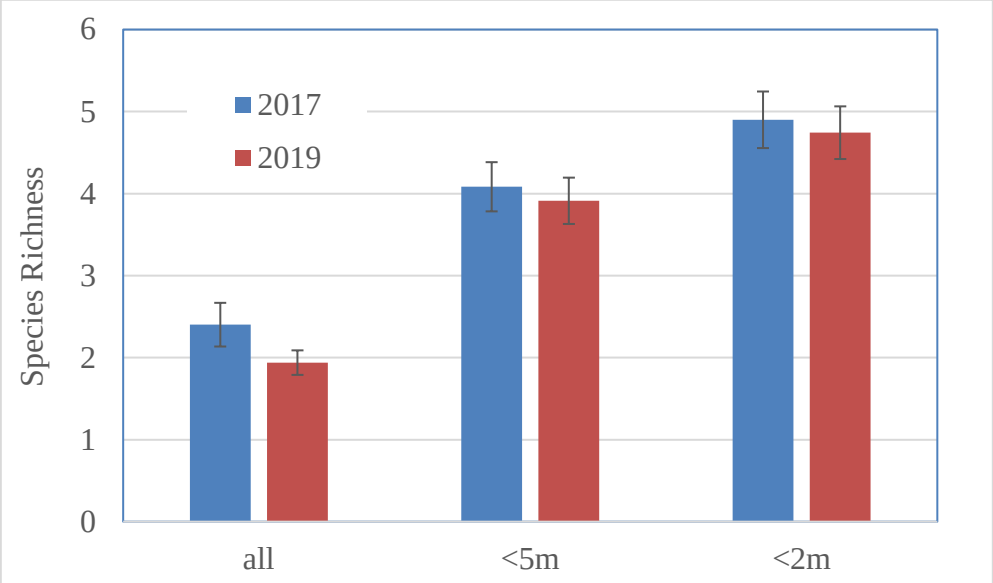


Figure 5. Lake Iroquois species richness.
Error bars are standard error of the mean.

3.02 ± 0.27 species per sample point. As expected, species richness in the littoral zone and its shallow fringe was higher than whole lake species richness. The expansion of Eurasian watermilfoil frequency of occurrence between 2017 and 2019 may account for the decline in total and native species richness. The negative impact of a canopy of Eurasian watermilfoil on species richness of native plants has been well documented (Madsen et al. 1991).

Summary

Quantitative aquatic plant surveys were undertaken for Lake Iroquois, Vermont, in September of 2019. Surveys were designed to obtain post-treatment data following aquatic plant management efforts employing diver assisted suction harvesting (DASH) for Eurasian watermilfoil control and be comparable to a prior survey by the author in 2017 (Eichler 2017). The frequency and distribution of aquatic plant species were evaluated using a point intercept method based on a differential global positioning system of grid points. The assessment generated the information necessary to: 1) evaluate the effectiveness of the aquatic plant management efforts, 2) determine the impact of the management efforts on non-target aquatic plant species, and 3) provide data for comparison of post-treatment conditions to prior survey information.

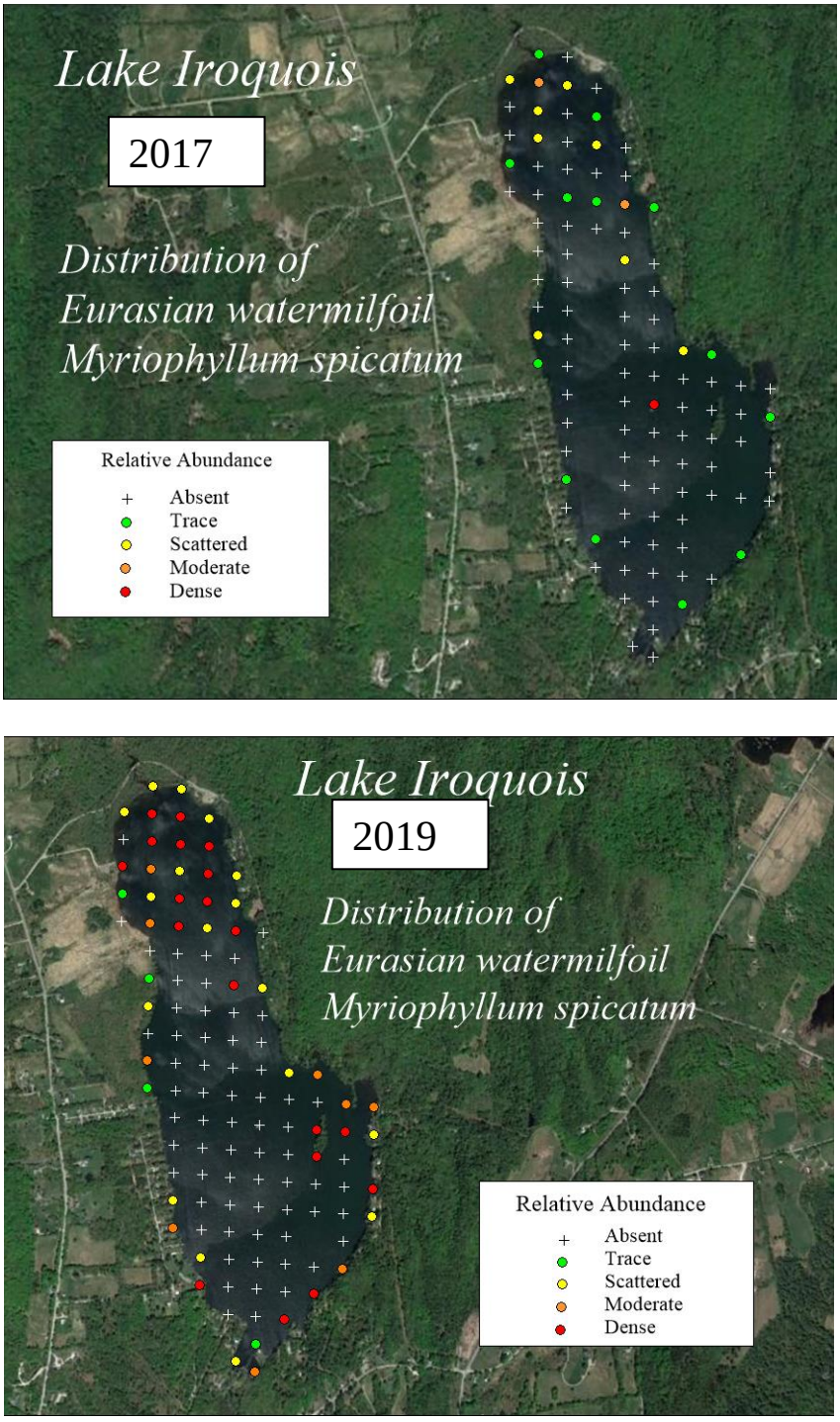
Eurasian watermilfoil (*Myriophyllum spicatum*) populations were first reported in 1990 in Lake Iroquois and confirmed in 1991. Hand harvesting by skin and SCUBA divers has been the basis of the program for most years since the formation of the lake association in 2007. The aquatic weevil (*Euhrychiopsis lecontei*) population of the lake was supplemented in 2008 and 2009 in an effort to provide a biocontrol agent for Eurasian watermilfoil. Approximately 70 acres of Lake Iroquois was reported to support dense growth of Eurasian watermilfoil in 2014. Diver assisted suction harvesting (DASH) in 2016 harvested over 5000 gallons of Eurasian watermilfoil from 2 locations. Benthic barriers (mats) were installed in 2017 to maintain the areas harvested by DASH. In 2019, DASH collected approximately 2000 gallons of Eurasian watermilfoil, however this only represented a very small fraction of the Eurasian watermilfoil growth in the lake. Residents remain concerned that current Eurasian watermilfoil growth is exceeding the capacity of the existing management effort.

The aquatic plant community of Lake Iroquois includes twenty-three submersed species, two floating-leaved species, one free-floating species and seven emergent species, for a total of 33 species observed in 2019. Species numbers are similar to the 30 species and 23 species reported in 2017 and 2014, respectively. This number of species greatly exceeds the 15 species typically reported for moderately productive lakes in our region and indicates good water quality and a variety of habitat types. One of the species present in Lake Iroquois, Humped Bladderwort (*Utricularia gibba*) is found on Vermont's rare plant list (VT DEC 2012). Eurasian watermilfoil was present in 43% of survey points in 2019, an increase from the 24% of survey points in 2017 (Figure 6) and similar to results for 2014. The density of Eurasian watermilfoil growth also increased, with most points described as scattered growth in 2017 currently reported as moderate or dense growth.

A number of native species were commonly observed, including Waterweed (*Elodea canadensis*, 30% of survey points), Water stargrass (*Zosterella dubia,* 24%), Duck celery (*Vallisneria americana,* 19%), White waterlily (*Nymphaea odorata,* 12%), and Muskgrass *(Chara spp,* 10%). Native species results are generally comparable to those reported in 2017 with a few exceptions. In the 2017 survey, common native species for Lake Iroquois included wild celery (*Vallisneria americana,* 28% of survey points), coontail (*Ceratophyllum demersum,* 28%), waterweed (*Elodea canadensis,* 23%), water stargrass (*Zosterella dubia,* 21%), muskgrass (*Chara/Nitella,* 20%), bushy pondweed (*Najas flexilis,* 15%), white waterlily (*Nymphaea odorata,* 12%), and white-stem pondweed *(Potamogeton praelongus*, 10%). The majority of native species (19 of

23) declined in frequency of occurrence between 2017 and 2019, however declines were generally on the order of 1% to 2%. One exception was *Ceratophyllum echinatum*, one of the most abundant species in 2014, but absent in 2017 and 2019. A very similar, common native species, *Ceratophyllum demersum*, remains dominant in Lake Iroquois. Declines in most native species are observed as a result of invasion and canopy formation by Eurasian watermilfoil.

Figure 6. Distribution of Eurasian watermilfoil in Lake Iroquois.



Species richness in Lake Iroquois was quite high, with a number of species occurring in more than 5% of survey points. Forty-five percent of sampling points were vegetated by at least one native plant species and 91% of sampling points within the littoral zone supported native aquatic plants. The large number of points supporting native plant species suggests that Lake Iroquois is a prime candidate for recovery of its native plant population following management of Eurasian watermilfoil. Native species richness in the littoral zone was 3.62 species per sample in 2017, at the high end of species richness values for other regional lakes, which ranged from 1.79 to 4.00 species per sample. Native species richness declined slightly to 3.02 species per survey point in 2019, typical of lakes experiencing an expansion of Eurasian watermilfoil growth. Loss of native species is a commonly reported phenomenon in lakes with severe infestation by Eurasian watermilfoil and/or other invasive aquatic plant species (Madsen et al. 1991).

Eurasian watermilfoil in Lake Iroquois was present primarily as moderate and dense growth in September of 2019 (Figure 6), representing an increase from primarily scattered growth in 2017 and similar to the density of growth reported in 2014. Frequency of occurrence of Eurasian watermilfoil also increased from 24% of survey points in 2017 to 43% of survey points in 2019. While the native plant populations appear robust and similar to other regional lakes, declines in both frequency of occurrence and species richness were observed between 2019 and 2017. Several areas of dense growth of Eurasian watermilfoil for Lake Iroquois were observed, including the north and south ends of the lake, the eastern embayment and the area surrounding the mid-lake island. Eurasian watermilfoil growth has increased in Lake Iroquois, even with ongoing management efforts. Even though shifts in plant growth from year to year are common, particularly with new invaders like Eurasian watermilfoil, expanded management efforts are warranted given the density of Eurasian watermilfoil growth in Lake Iroquois.

Management Review

The Eurasian watermilfoil management effort at Lake Iroquois is an ongoing activity. Establishment of an effective lake association was a critical first step. The association appears to be effective, well organized, adequately funded and strongly motivated. An educated lake community is a valuable asset. Data collection to understand the options for management of invasive aquatic plants is well underway. With only a review of annual reports, brief discussions with program managers, and the results of the Fall plant surveys, I offer the following suggestions. Given the level of the current program, I anticipate that most if not all of these recommendations have been considered and many are currently being employed.

Prevention

1. Maintain or consider expanding the 'Greeter' program. Prevention is the most cost effective mechanism for invasive aquatic species (IAS) control. Enforce clean, drain and dry whenever possible.
2. Expand boat washing. Mandatory boat washing is becoming more common as regulatory agencies shoulder more of the costs for invasive species management. A quick review of the lakes visited by boaters prior to launching into central Vermont lakes includes sources for zebra mussels (Lake Champlain, Lake George, Glen Lake), asian clams (Lake George), and spiny waterfleas (Lake George, Lake Champlain). The larval stages of these species, and in some cases the adults, are too small for visual inspections to capture.
3. Discourage lake users from feeding waterfowl. Large collections of waterfowl increase the likelihood of nuisance plant and animal introductions via waterfowl transport. It also has other benefits, such as reducing the spread of swimmers itch, other forms of contact dermatitis, and additional public health concerns.

Education

1. Take full advantage of the educational materials available through the VT DEC, Lake Champlain Basin Program, Federation of Vermont Lakes and Ponds (FOVLAP) and others. Developing the support of residents and visitors greatly enhances prevention efforts and can provide additional inputs to monitoring activities.
2. Maximize community involvement through social media such as webpages, newsletters and others. Lake Iroquois Association has a well organized and frequently updated webpage.
3. Lake associations must band together to have the required political clout to maintain programs to manage lakes. Several excellent "umbrella" groups are the North American Lake Management Society (NALMS), the Aquatic Plant Management Society (APMS) and its Northeast Chapter (NEAPMS) and the Federation of Vermont Lakes and Ponds (FOVLAP). All publish informational

newsletters and brochures, and memberships are available both for lake associations and individuals.

Management

1. The current combination of physical and biological techniques employed by the Lake Iroquois Milfoil Management Program indicates an awareness of integrated milfoil management. Consider all available options for milfoil control, and combine the techniques chosen into an integrated management effort both lake-wide and on a site by site basis. Given the lake-wide growth of Eurasian watermilfoil, consideration of whole lake herbicide treatments is warranted.
2. Consider intensive efforts (i.e. herbicides, larger hand pulling crew sizes or more volunteer teams) to transition from a management to a maintenance condition. Once milfoil abundance is reduced through intense management efforts, levels can be maintained with limited annual efforts. Consider new ways to use existing resources. For example, some lakes have had success using larger dive teams with surface support (i.e. kayaks or canoes) to hand harvest areas of dense growth typically considered too large for this type of effort. Continued use of diver assisted suction harvesting (DASH) teams may be a viable option.
3. Prioritize harvest to manage sites most likely to produce fragments for in-lake dispersal (i.e. high traffic zones, high wave action areas, waterfowl areas).
4. Consider reducing visits to sites which produce very few milfoil plants to once every other season freeing divers to focus on areas of dense growth.
5. Consider benthic barrier for difficult to harvest sites, such as gravel or deep soft silty sediments. Sand bags can be substituted for stakes in very hard or very soft substrates to secure the barrier material.
6. Initial indications are that the weevil augmentation for Iroquois Lake has not controlled Eurasian watermilfoil growth nor resulted in an increase in the overall weevil population, however assessment of weevil density and the extent of weevil damage should be continued. This type of control effort may take several years to become established.

Monitoring and Assessment

1. Take advantage of volunteers to make visual inspections of the littoral zone for the presence of IAS. Judging by the number of volunteer hours and the description of milfoil mapping efforts, it appears that you are making use of volunteers.
2. Employ monitoring results to refine management efforts based on density of growth of IAS and site specific conditions. For example, use benthic barrier or ‘spot’ herbicide treatments for very dense growth or where site conditions make suction harvesting difficult. Benthic barrier has been demonstrated to kill milfoil

in about 6 weeks, so barrier can be recovered and used at another location in a single season, if needed. Employ suction harvesting on moderate to dense growth areas and use hand harvesting in scattered growth areas or as a "clean-up" of areas originally harvested by other means. Select dense sites with large fragmentation potential to be harvested first, with more remote sites with less milfoil growth saved for later in the season. Employ mechanical and physical techniques to extend the period between herbicide applications.

3. Conduct extensive surveys of the plant community periodically to confirm visual inspections, detect any additional invasive aquatic species, evaluate the effectiveness of current management efforts, and detect any unintended impacts to native (non-target) species.

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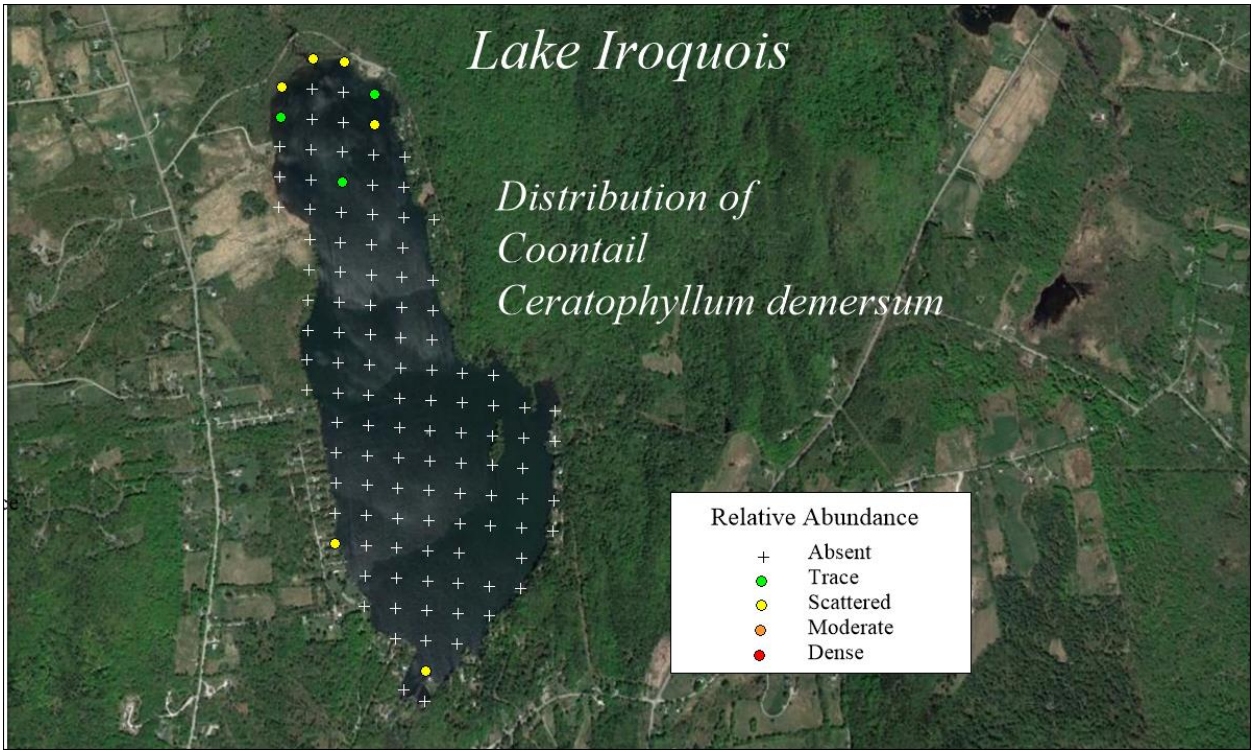
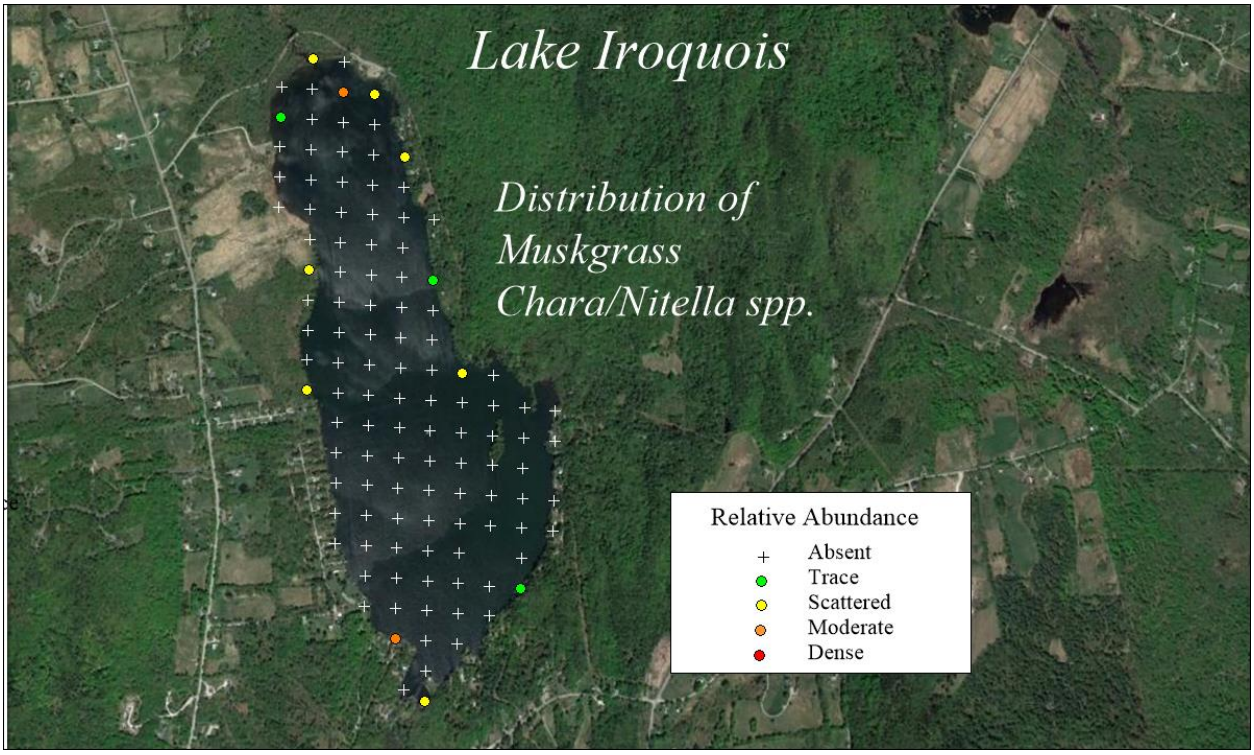
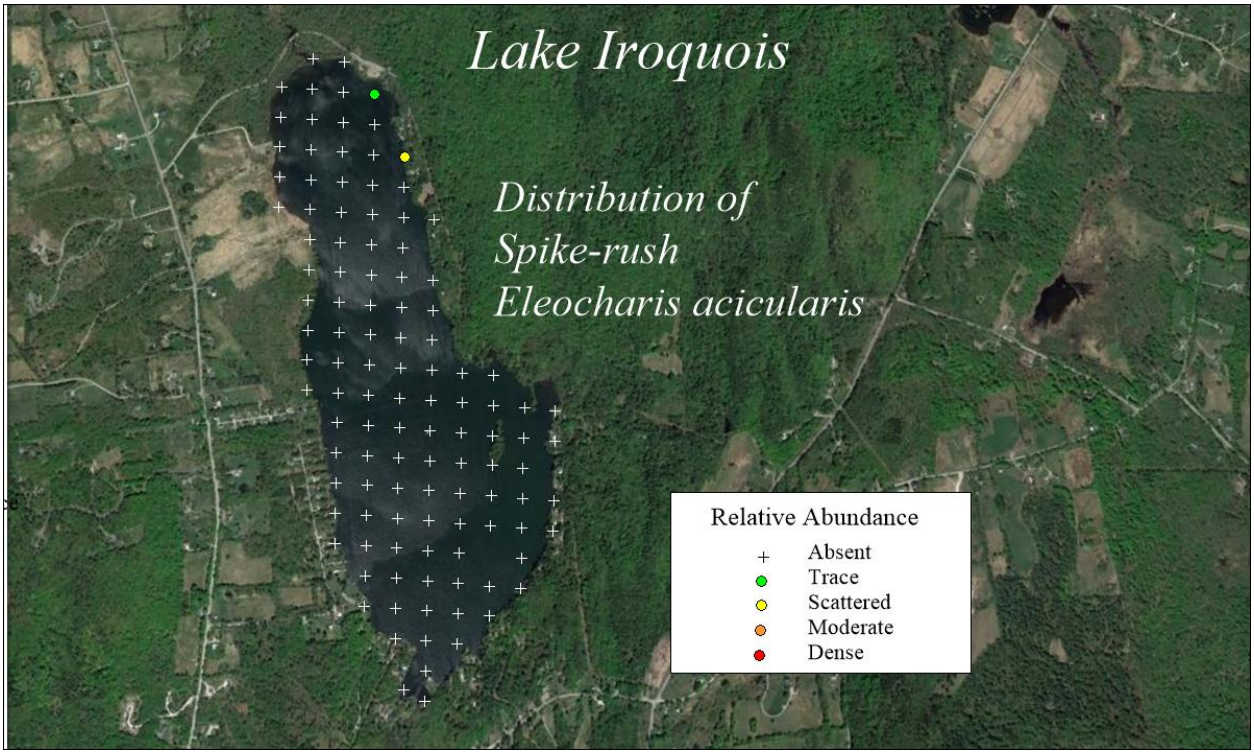
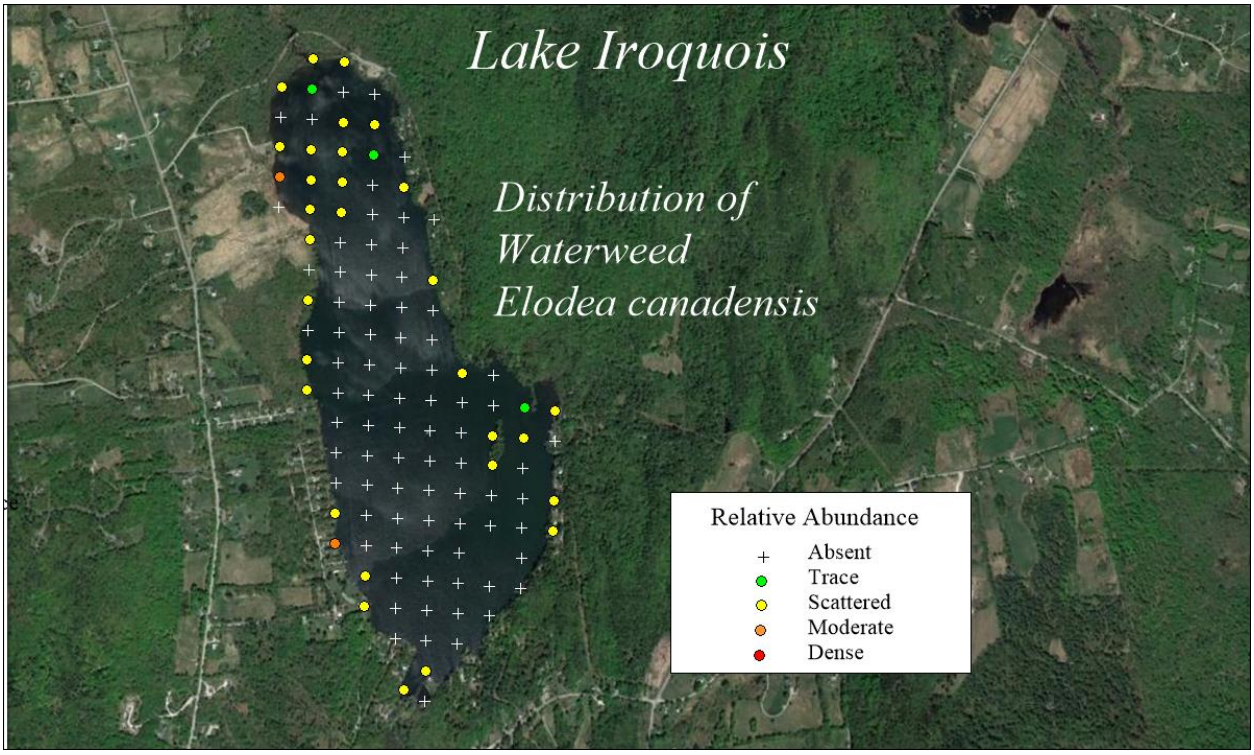
Appendix A

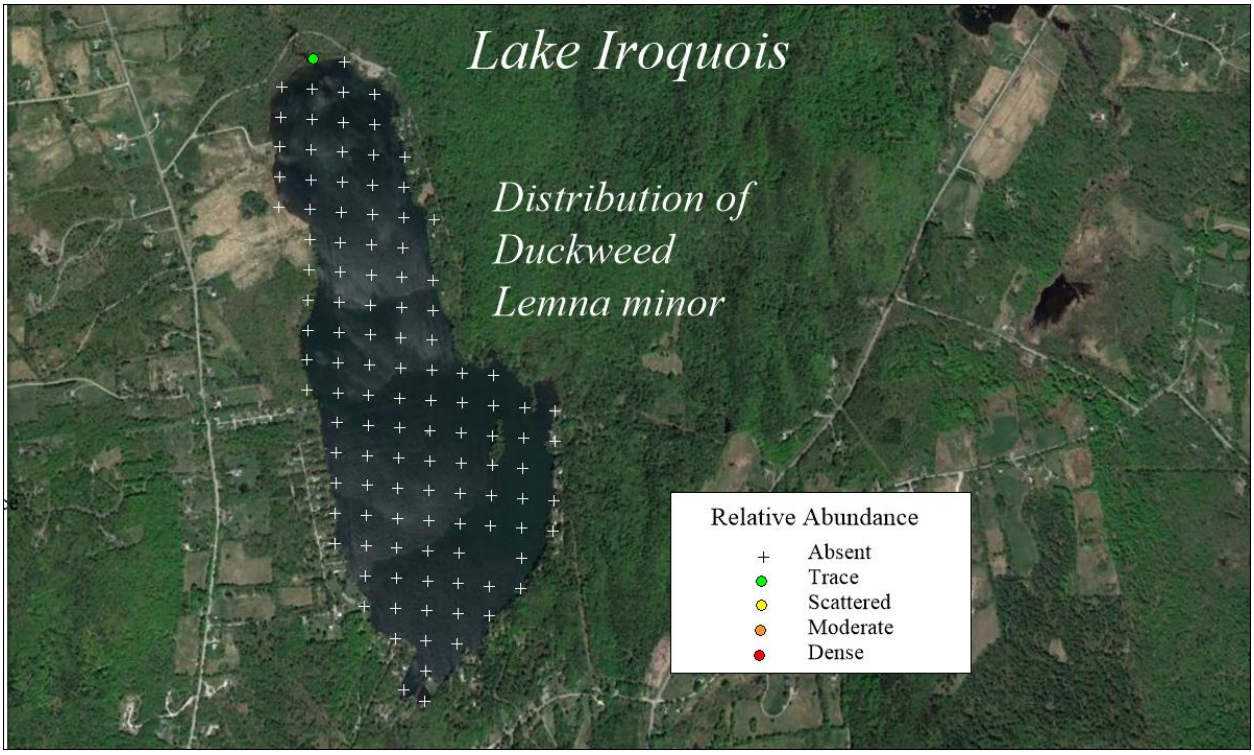
Lake Iroquois Aquatic Plant Distribution Maps

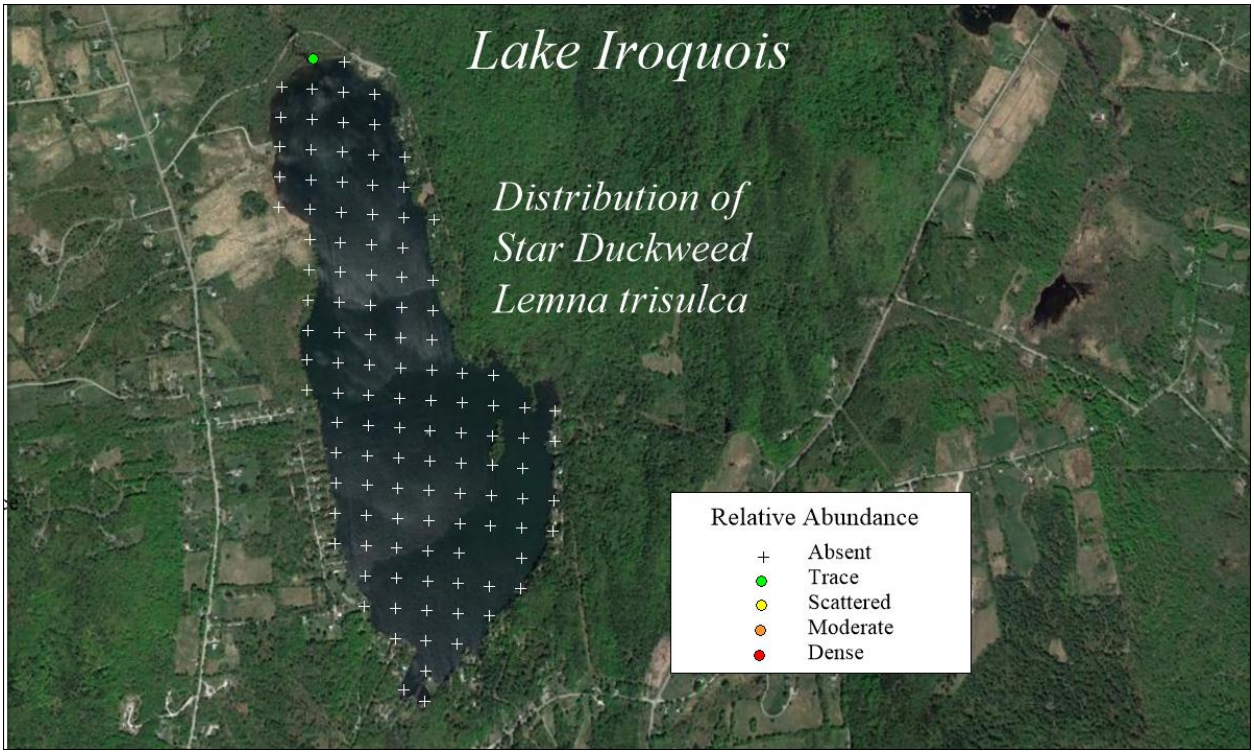

Lake Iroquois
Distribution of
Coontail
Ceratophyllum demersum
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

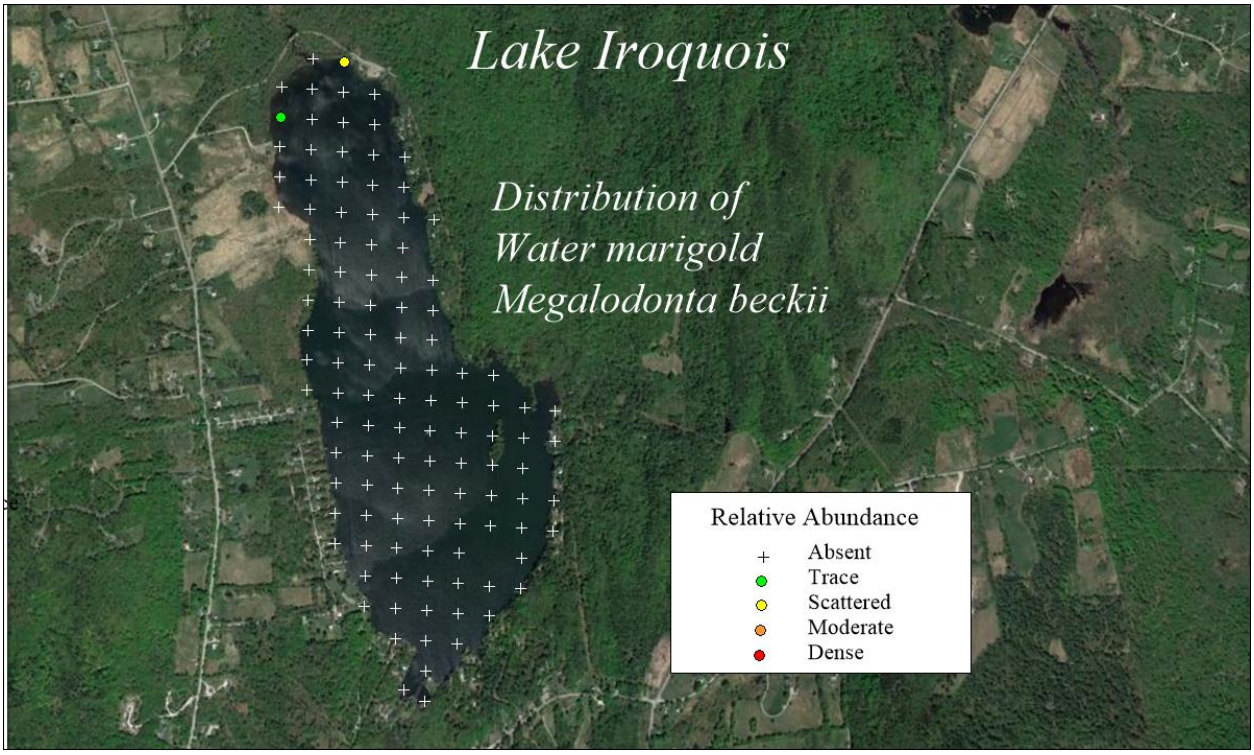

Lake Iroquois
Distribution of
Muskgrass
Chara/Nitella spp.
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

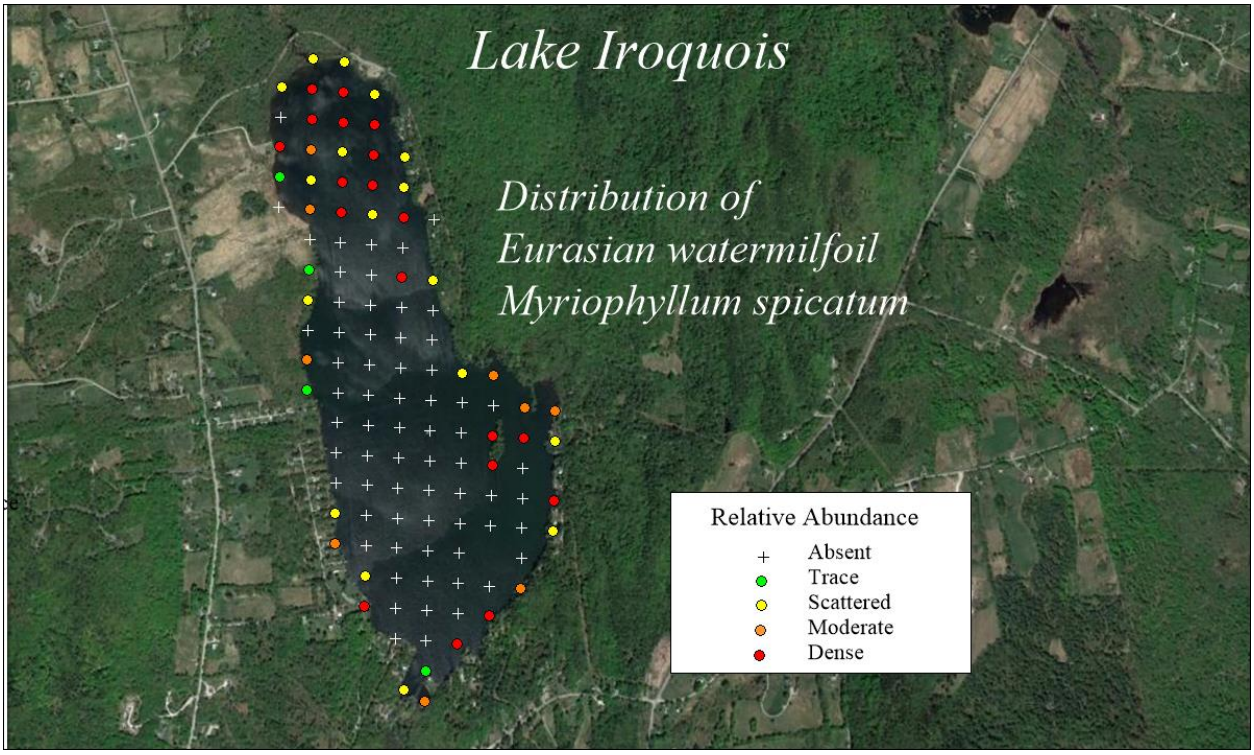

Lake Iroquois
Distribution of
Spike-rush
Eleocharis acicularis
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

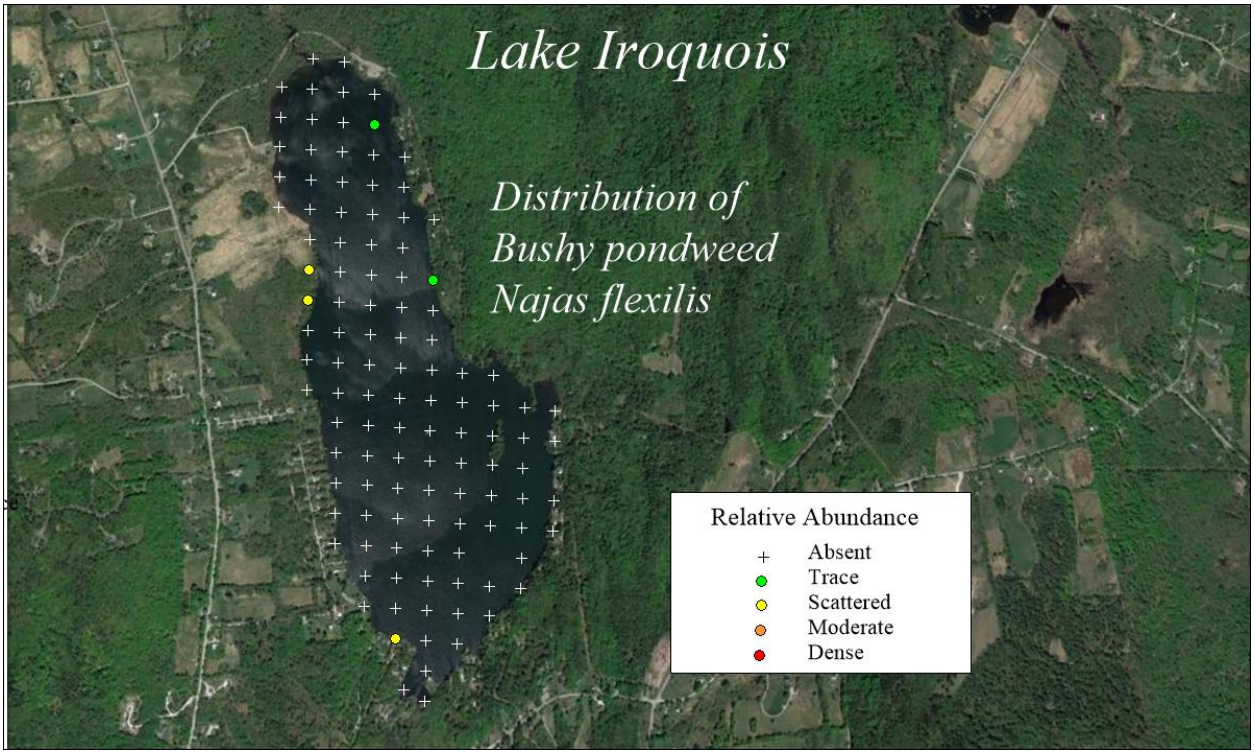

Lake Iroquois
Distribution of
Waterweed
Elodea canadensis
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

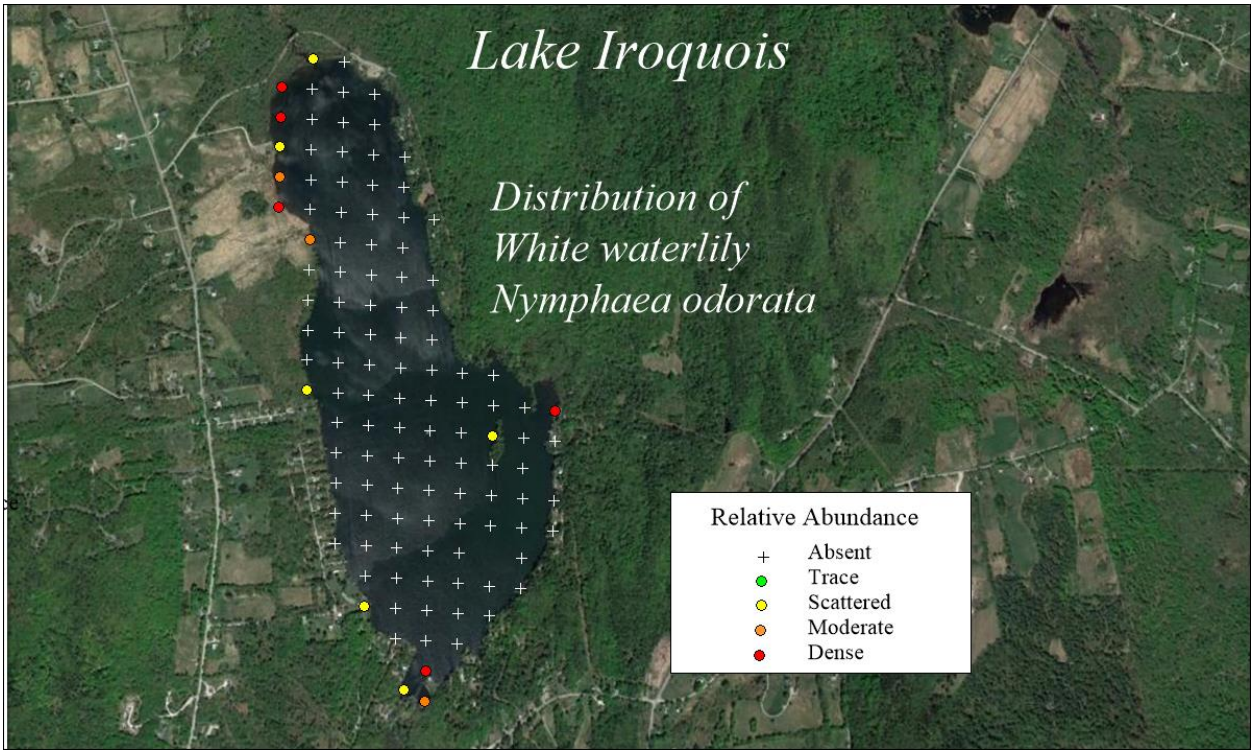

Lake Iroquois
Distribution of
Duckweed
Lemna minor
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

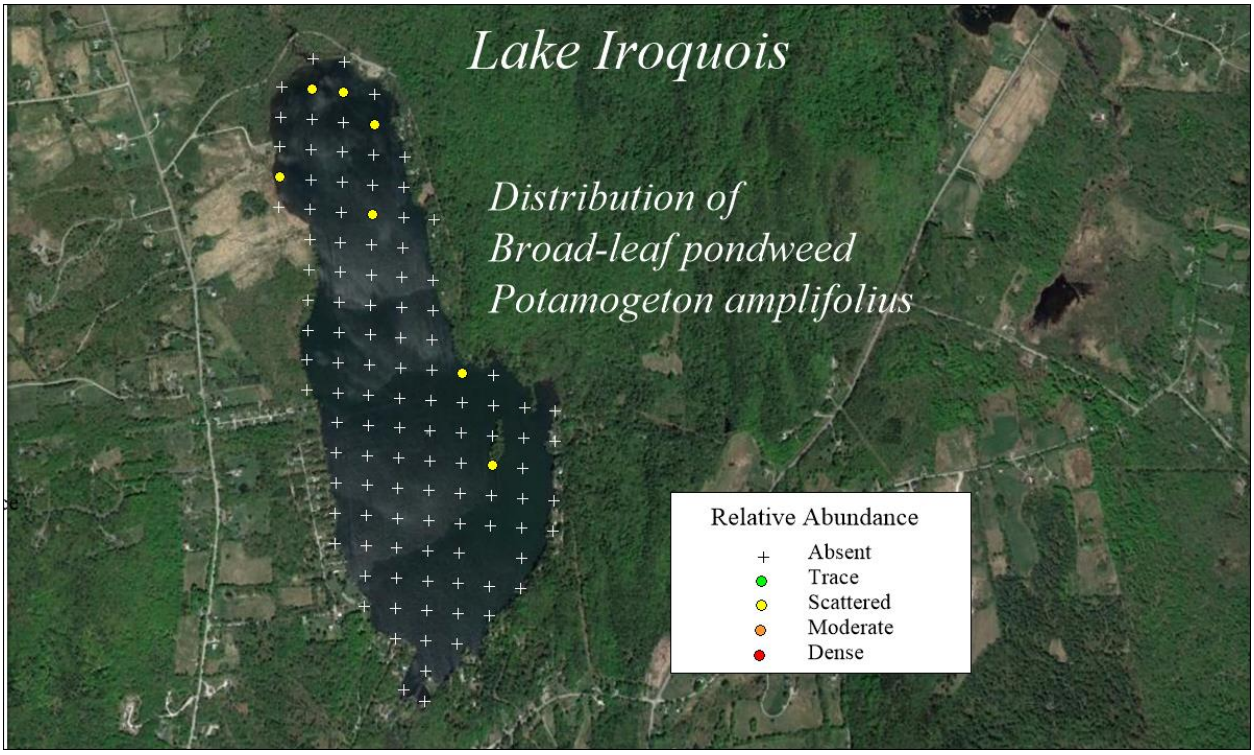

Lake Iroquois
Distribution of
Star Duckweed
Lemna trisulca
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

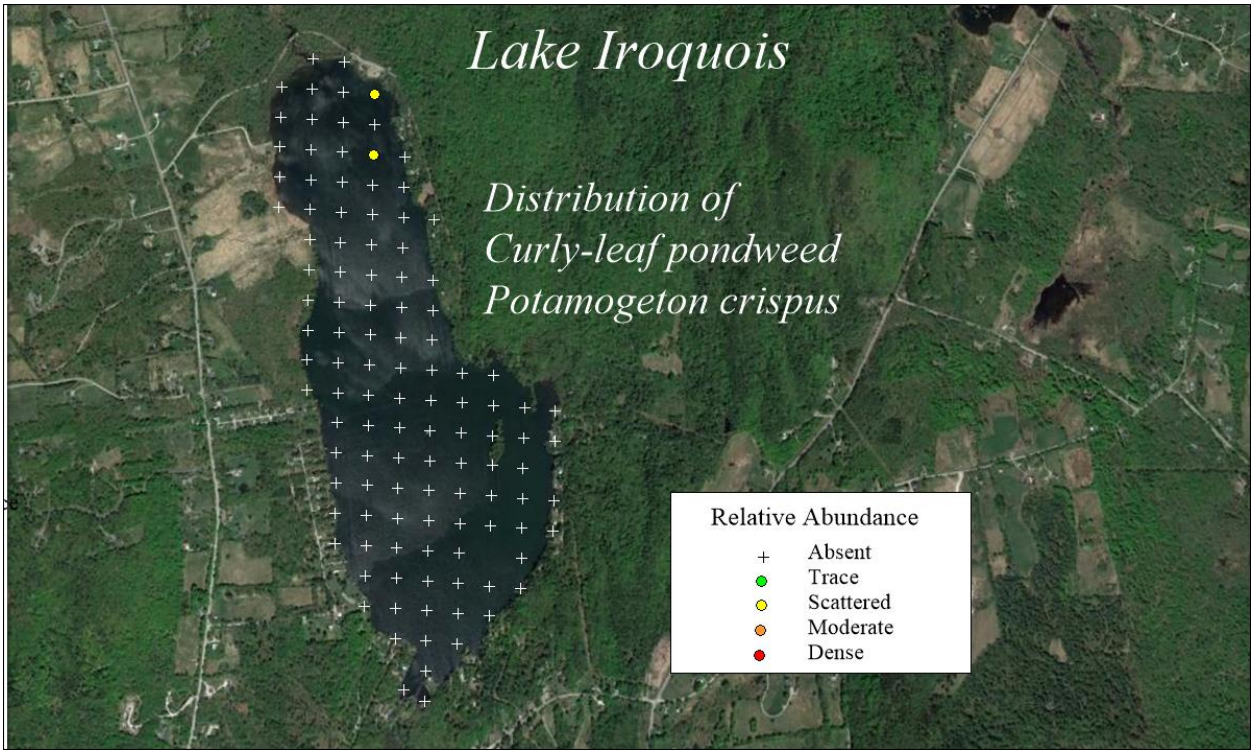

Lake Iroquois
Distribution of
Water marigold
Megalodonta beckii
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

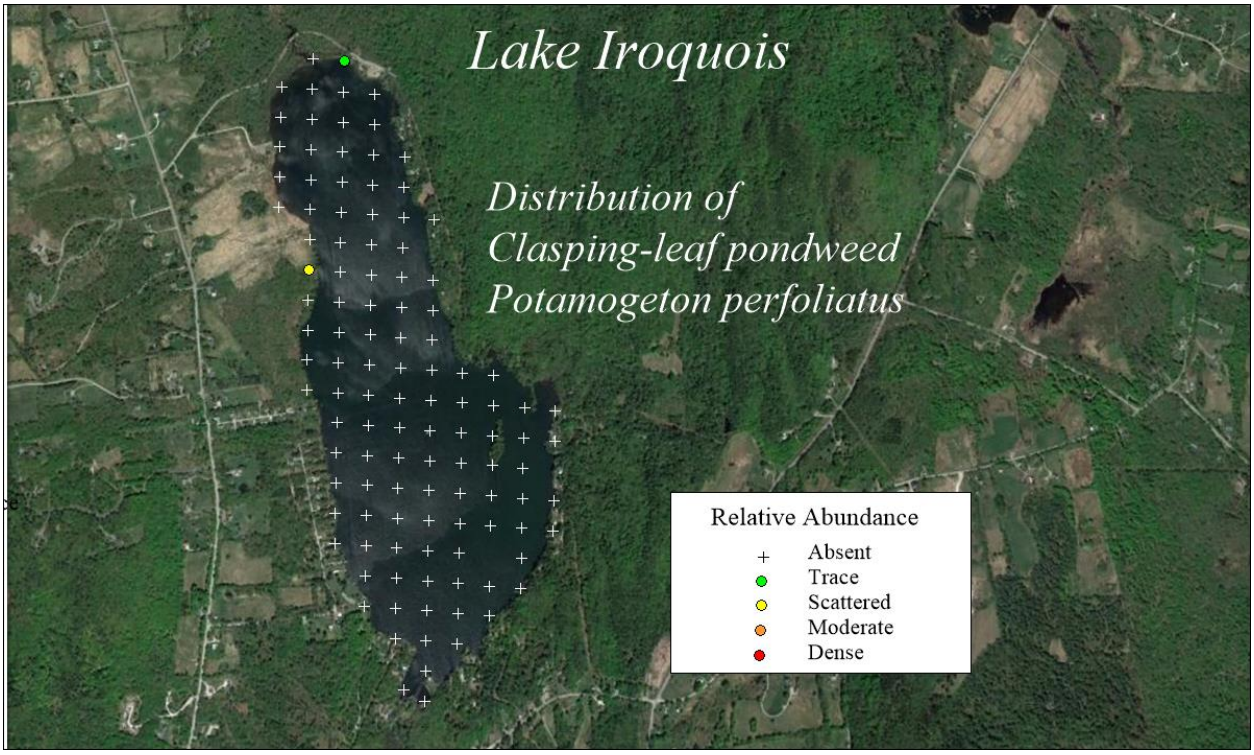

Lake Iroquois
Distribution of
Eurasian watermilfoil
Myriophyllum spicatum
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

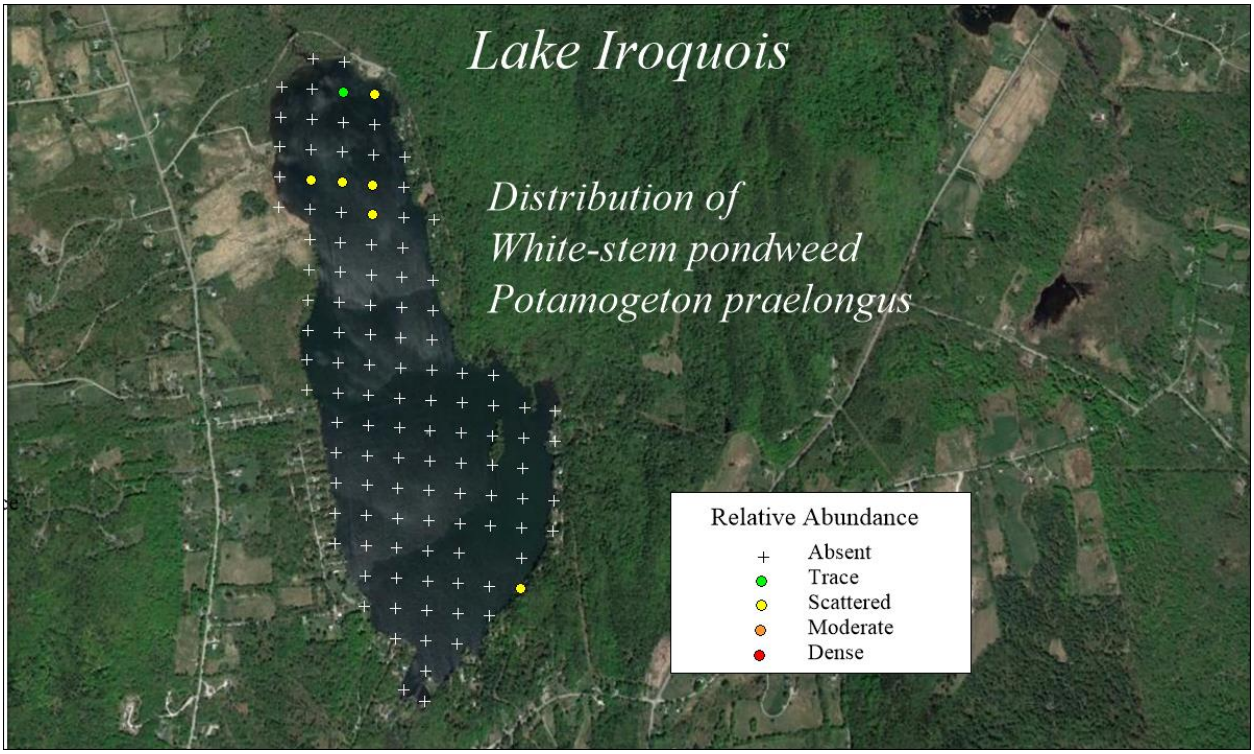

Lake Iroquois
Distribution of
Bushy pondweed
Najas flexilis
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

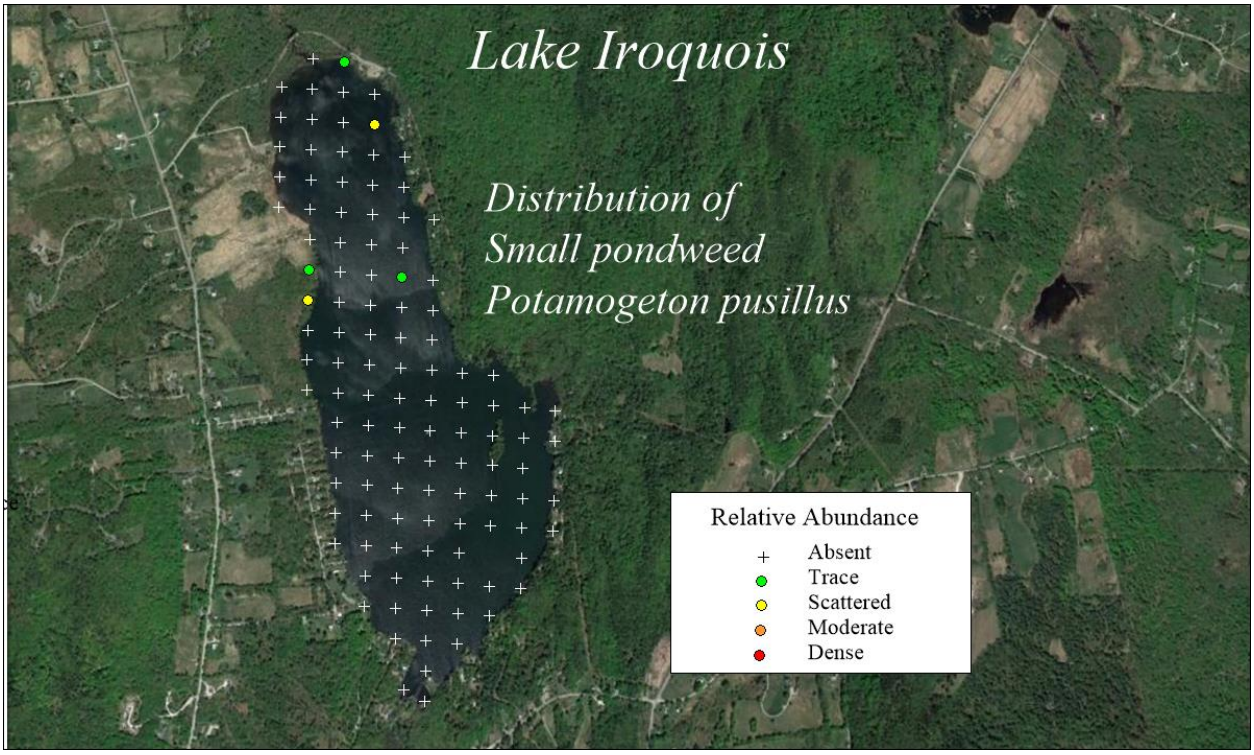

Lake Iroquois
Distribution of
White waterlily
Nymphaea odorata
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

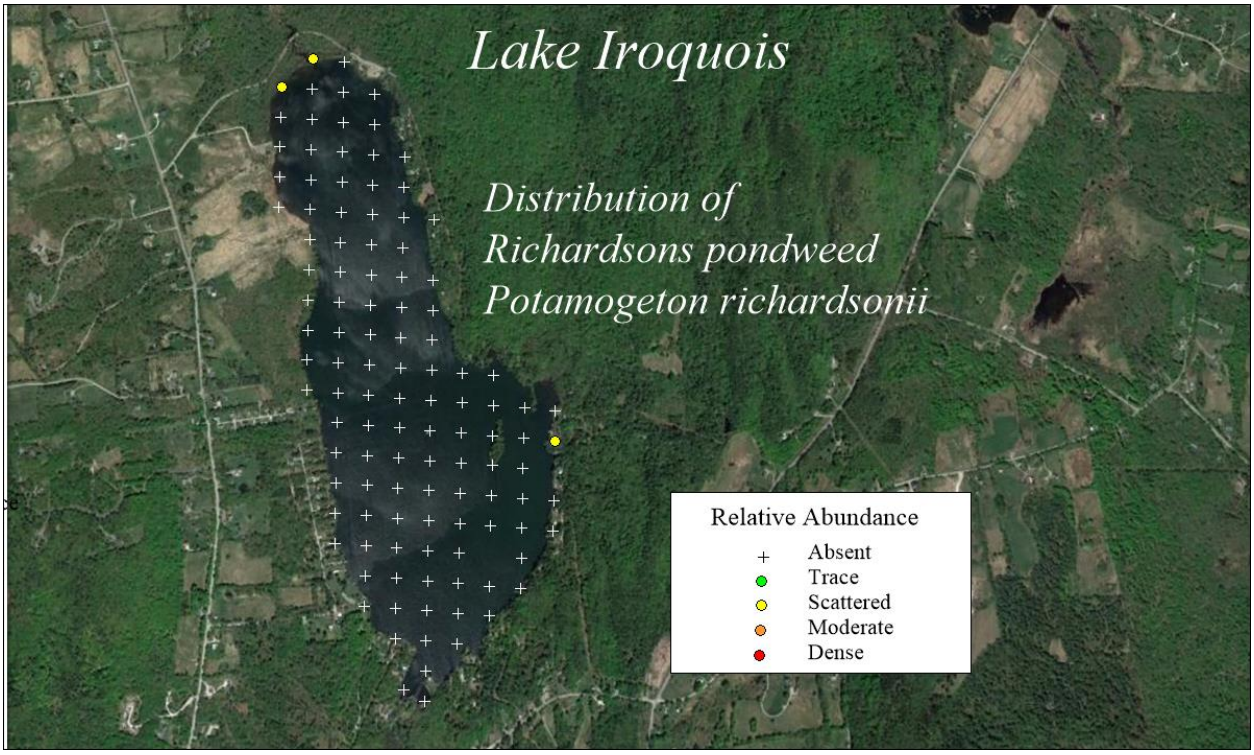

Lake Iroquois
Distribution of
Broad-leaf pondweed
Potamogeton amplifolius
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

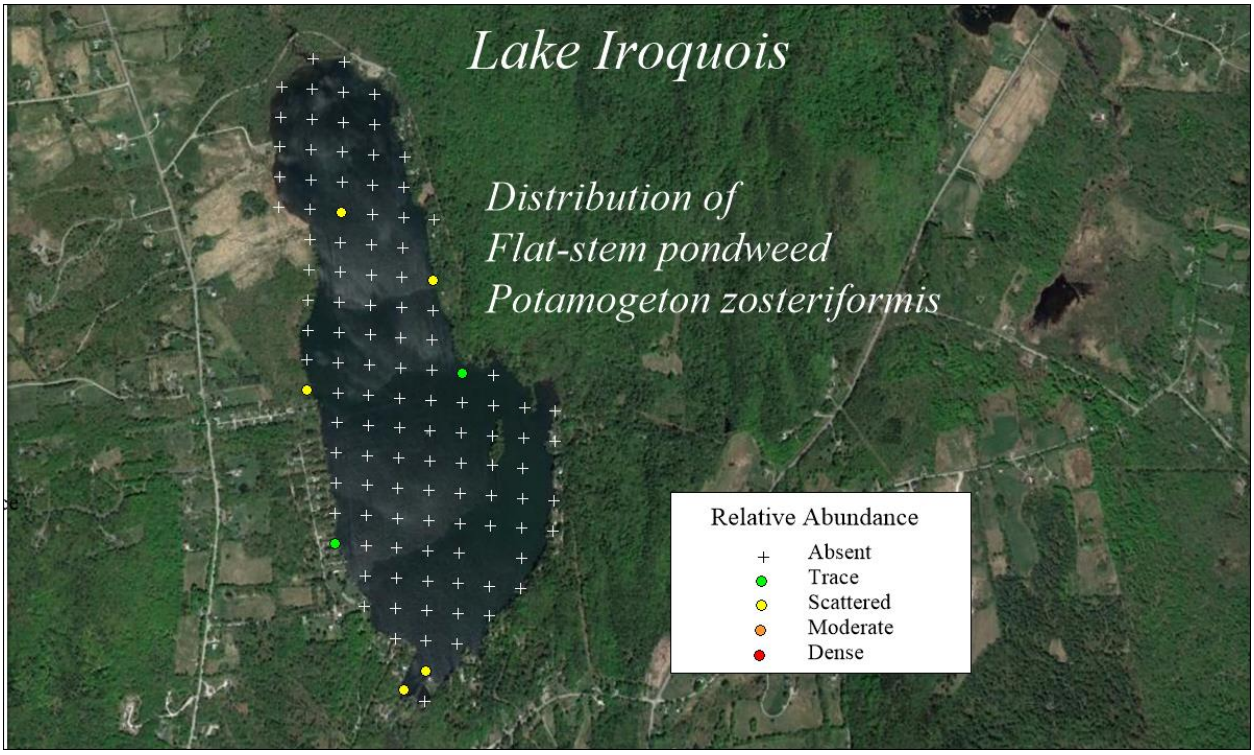

Lake Iroquois
Distribution of
Curly-leaf pondweed
Potamogeton crispus
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

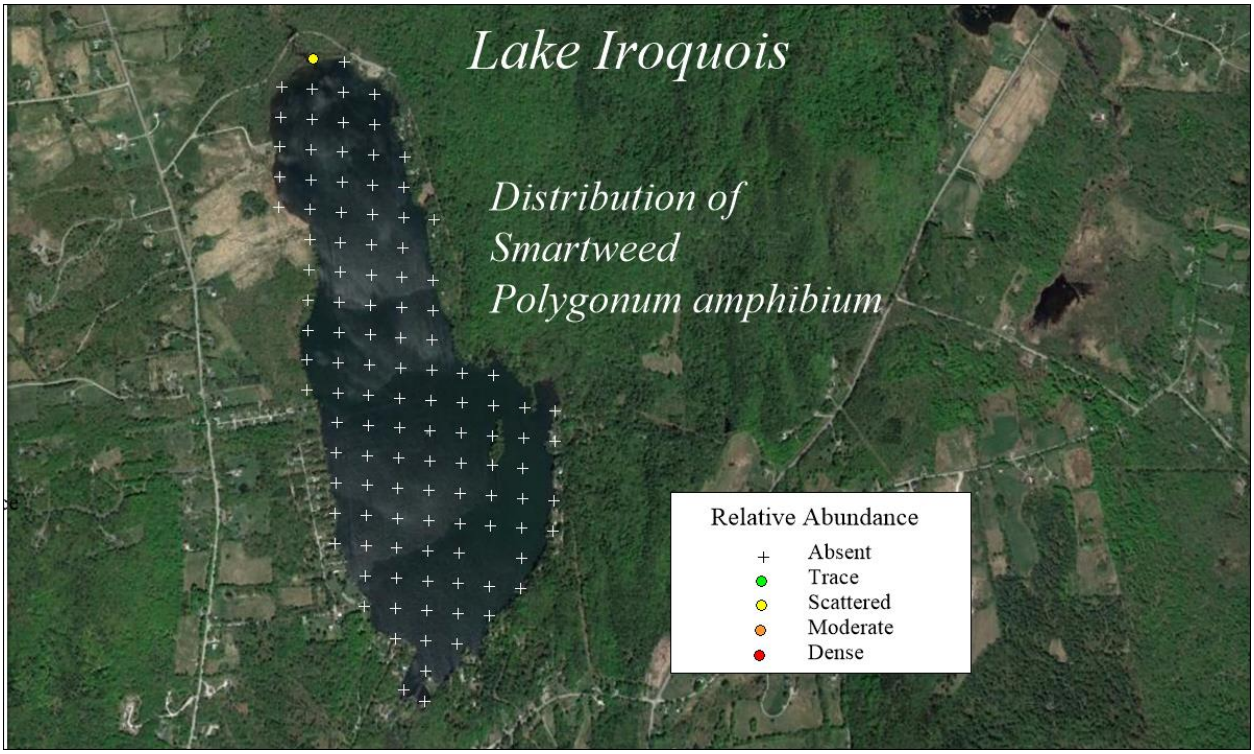

Lake Iroquois
Distribution of
Clasping-leaf pondweed
Potamogeton perfoliatus
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

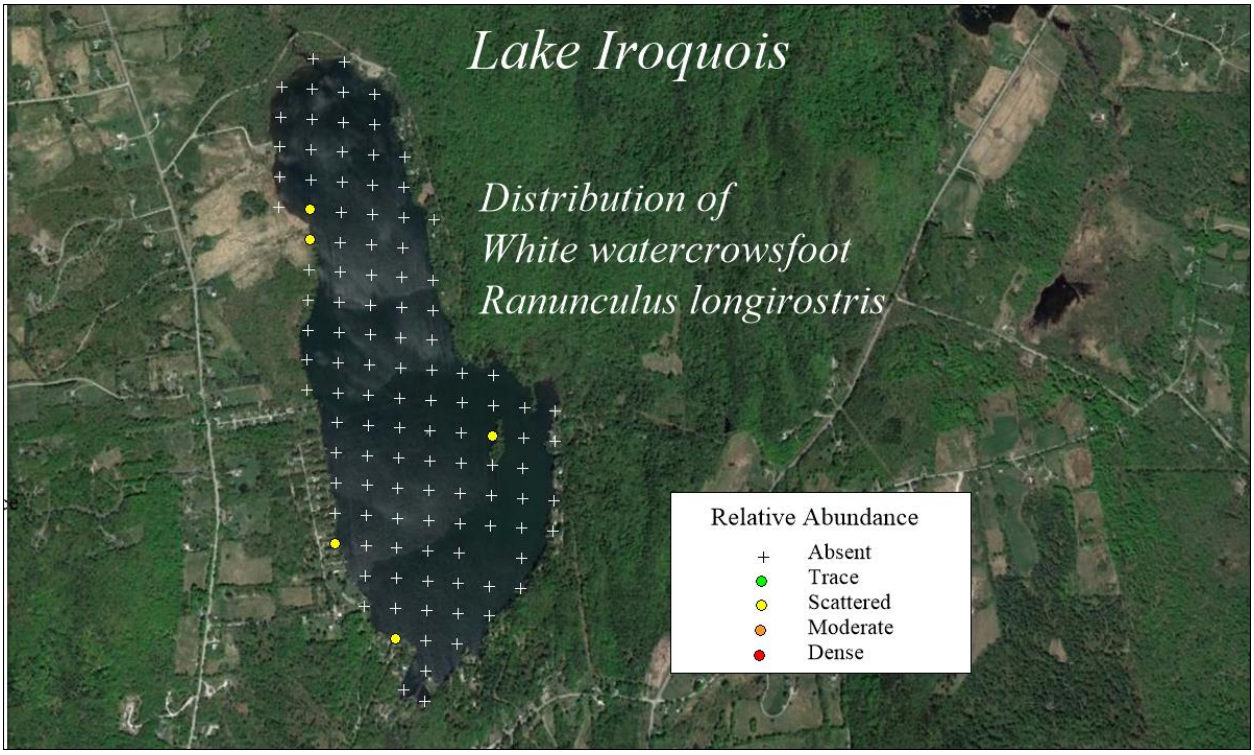

Lake Iroquois
Distribution of
White-stem pondweed
Potamogeton praelongus
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

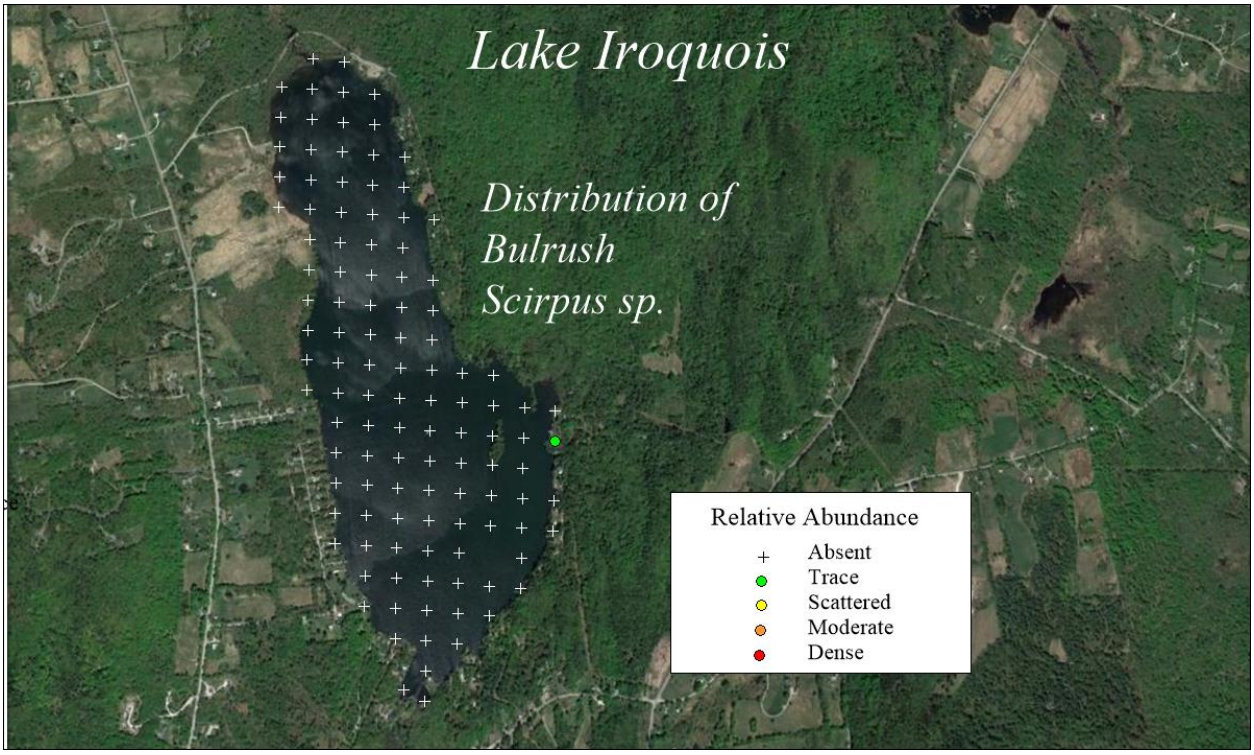

Lake Iroquois
Distribution of
Small pondweed
Potamogeton pusillus
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

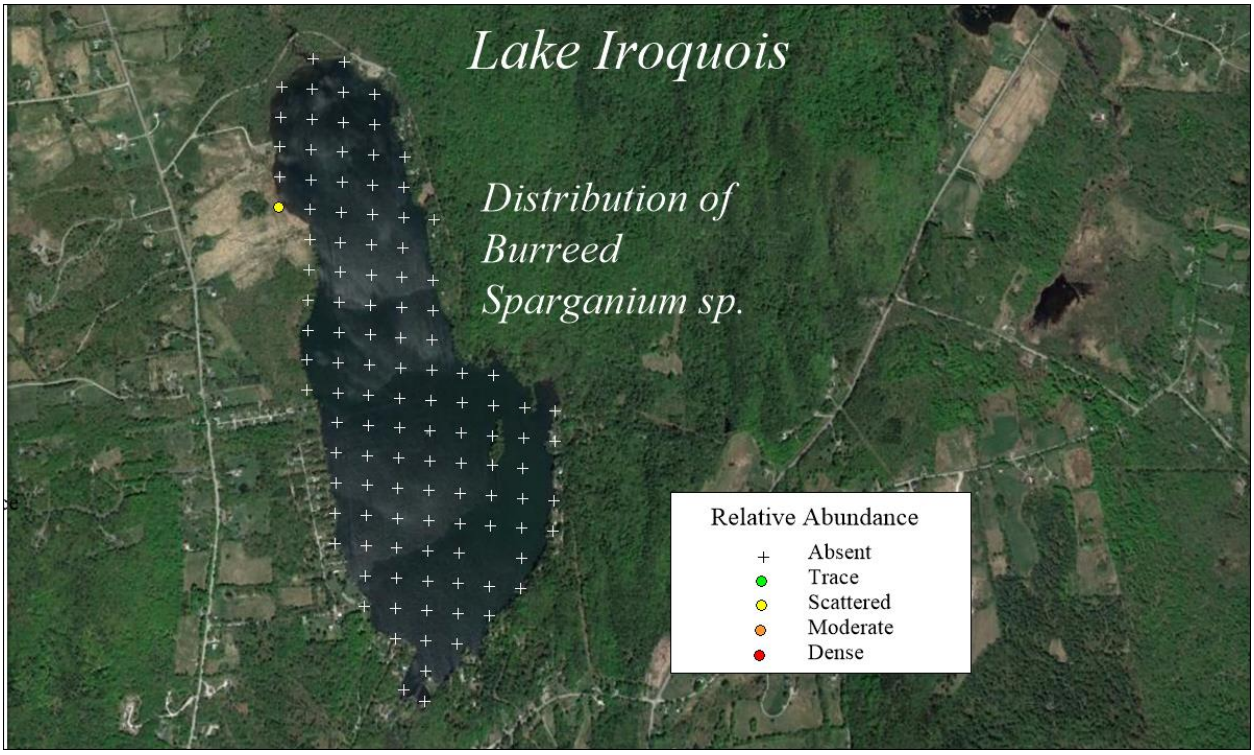

Lake Iroquois
Distribution of
Richardsons pondweed
Potamogeton richardsonii
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

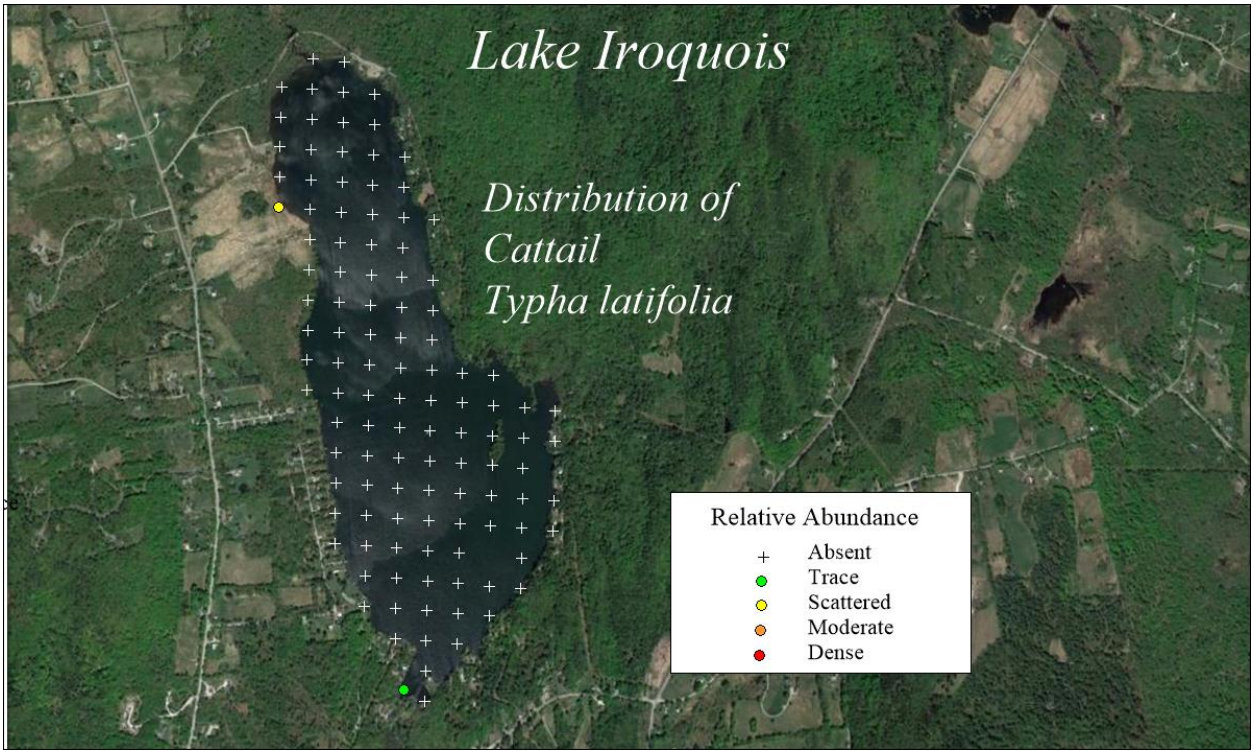

Lake Iroquois
Distribution of
Flat-stem pondweed
Potamogeton zosteriformis
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

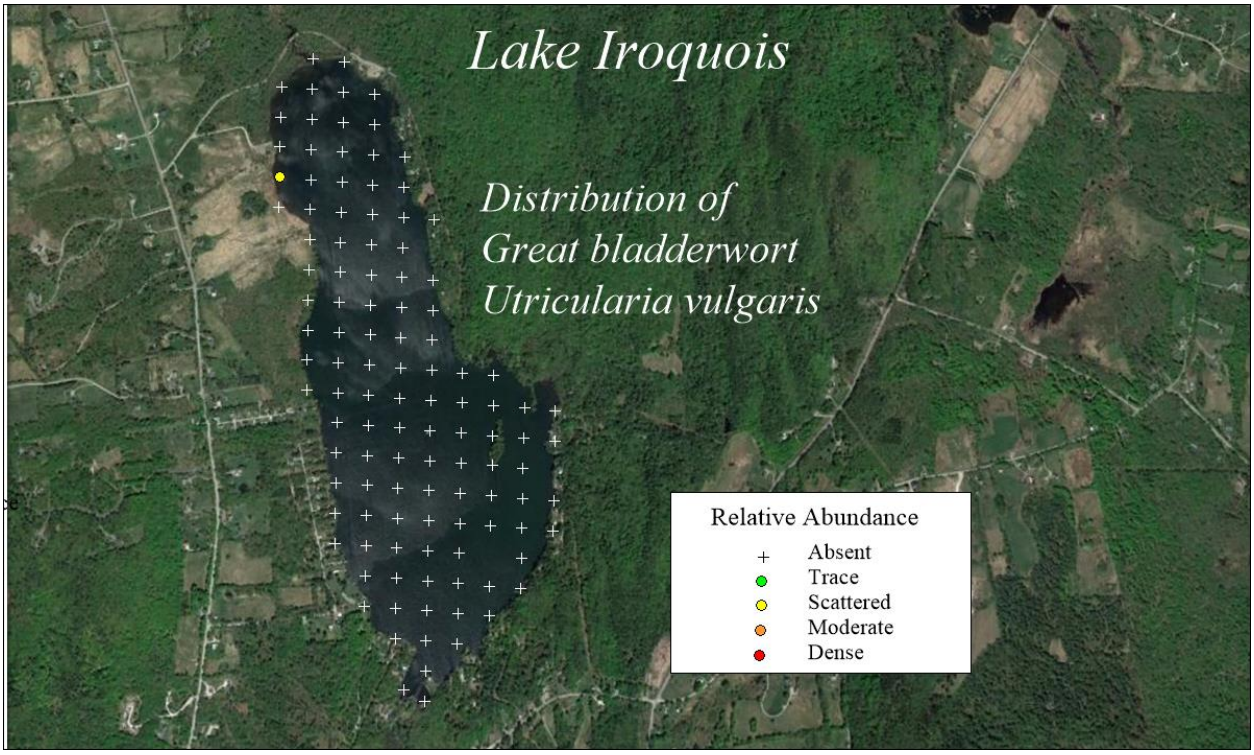

Lake Iroquois
Distribution of
Smartweed
Polygonum amphibium
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

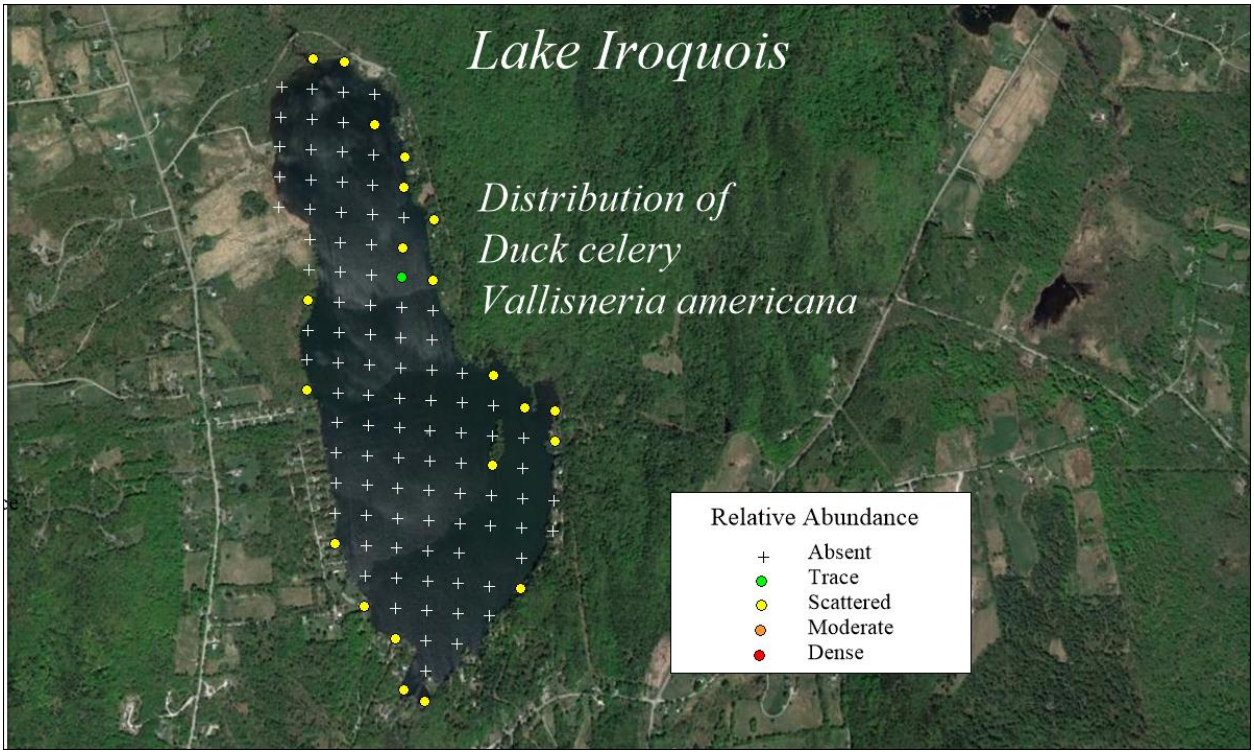

Lake Iroquois
Distribution of
White watercrowsfoot
Ranunculus longirostris
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense

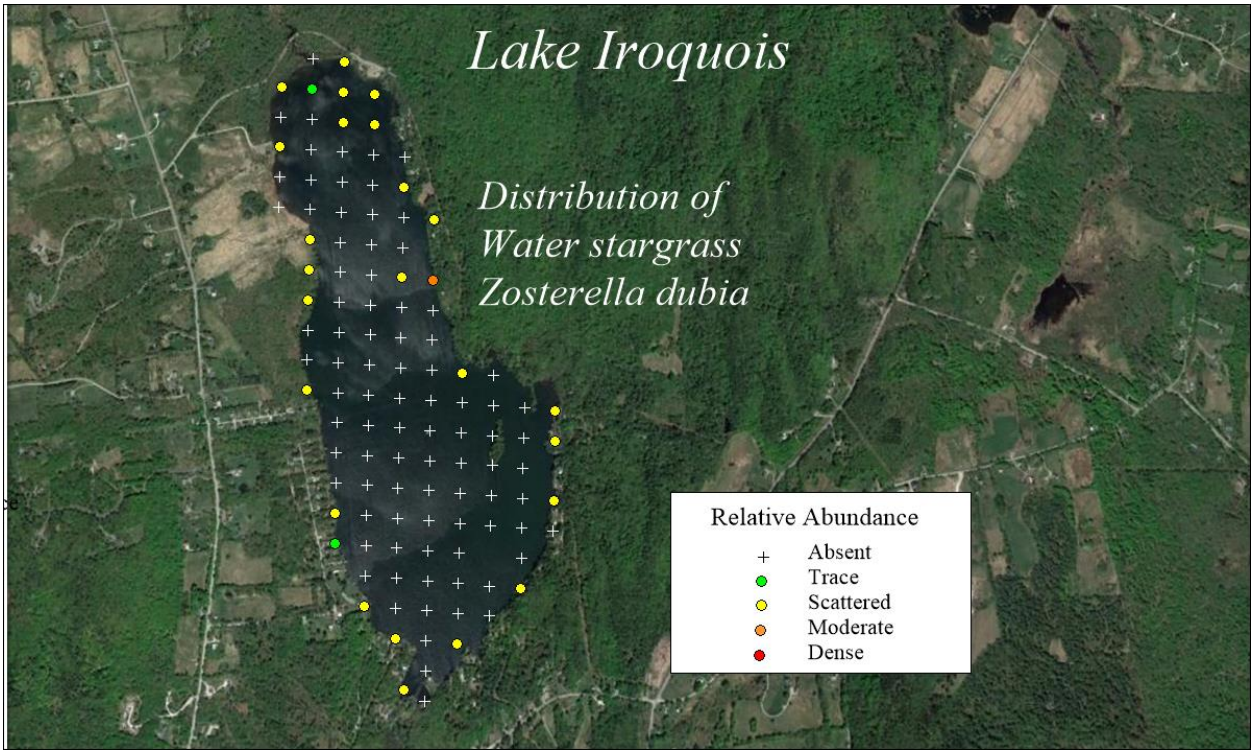

Lake Iroquois
Distribution of
Bulrush
Scirpus sp.
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense


Lake Iroquois
Distribution of
Burreed
Sparganium sp.
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense


Lake Iroquois
Distribution of
Cattail
Typha latifolia
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense


Lake Iroquois
Distribution of
Great bladderwort
Utricularia vulgaris
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense


Lake Iroquois
Distribution of
Duck celery
Vallisneria americana
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense


Lake Iroquois
Distribution of
Water stargrass
Zosterella dubia
Relative Abundance
Absent
Trace
Scattered
Moderate
Dense